Title: **PACS Commissioning Phase Plan**

CI-No:

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Issue	Date	Sheet	Description of Change	Release
1.0	27-Oct-08		Initial version, based on existing technical notes for individual test blocks and including previously delivered commissioning phase spreadsheets and durations for data analysis	
1.1	03-Nov-08		Updated Ge:Ga bias adjustment document; Included AOR definitions for bolometer bias adjustment;	
1.2	28-Nov-08		Added tables of CUS modules, AORs and their precise X-HSPOT durations; Chopper_5 is now reduced in time and a new optional Chopper block Chopper_6 has been added.	
1.3	16-Feb-09		Added new section 4 on basic thermal environment requirements, based on MK email 18-Nov-08 and GP email 3-Feb-09; New constraint for GeGa_Dark block, section 6.7; Few typo corrections; Added section on real time science data requirements; Target visibility note added for block BOLO_BIAS_2;	
2.0	20-Mar-09		Updated Bolometer specific activities based on new AD5; slight changes of BOLO_BIAS block durations and content; Only significant change of duration is in BOLO_BIAS_2; Replaced CUS mode PacsCal_WaveCal by PacsEng_WaveCal for simplifying MPS scheduling in case of dummy pointings;	

Table of Contents

1 Purpose

The PACS commissioning phase plan describes the activities to be carried out with PACS instrument during the commissioning phase of the Herschel spacecraft. The goal of the tests below is to verify the correct function of PACS after the launch and to establish rough in-flight operational settings for both, the spectrometer and photometer detectors in order to be able to proceed to use PACS for the activities related to the Herschel pointing calibration, where the instrument plays a major role.

The sections below provide pointers to the documents with detailed descriptions of each of the tests. Wherever the mission planning system will be used the proposal names and the detailed sequence of AORs is listed. All activities where manual operations procedures are required (MOIS import files from PACS User Manual) are covered by the respective MOC procedures (AD07).

2 Overview and Test Duration

Step #	Description	Duration (min)	Document	Commanding & Cover
1	FDIR	30 RT	PACS-ME-TP-021	MOIS/closed
2	SFT HeII	120 RT	PACS-ME-TP-017	MOIS/closed
3	Chopper_1	60 RT	PACS-ME-TP-021	MOIS/closed
4	Chopper_x (x=2,3,4)	720 RT	PACS-ME-TP-021	MOIS/closed
5	Grating_x (x=1,2,3,4,5)	1200 RT	PACS-ME-TP-021	MOIS/closed
6	Chopper_5	240	PICC-MA-TN-002	MPS/closed
7	GeGa_Bias_1	1240	PICC-MA-TN-001	MPS/closed
8	FFT	720	PACS-ME-TP-021	MPS/closed
9	SPT-SPEC	420	PACS-ME-TP-021	MPS/closed
10	SPT-PHOT	410	PACS-ME-TP-021	MPS/closed
11	BOLO_BIAS_0	100	SAp-PACS-MS-0670-08	MPS/closed
12	Chopper_6	218	PICC-MA-TN-002	MPS/closed
	Open Cryo-Cover			
13	TEL_BCK	120	PACS-ME-TP-021	MPS/open
14	BOLO_Bias_1	430	SAp-PACS-MS-0670-08	MPS/open
15	GeGa_Bias_2	375	PICC-MA-TN-001	MPS/open
16	GeGa_Dark	330	PICC-MA-TN-001	MPS/open
17	BOLO_Bias_2	555	SAp-PACS-MS-0670-08	MPS/open
18	GeGa_Bias_x (x=3,4)	740	PICC-MA-TN-001	MPS/open

Chopper and grating blocks (steps #4 and #5) are grouped into sub-blocks of 4 hours each, in order to fit into separate DTCPs. RT = real time commanding and data analysis will be required. SPT-PHOT and BOLO_BIAS_0 should be carried out together in order to make best use of the recycled cooler at the begin of SPT-PHOT.

3 List of Applicable Documents

The following list of technical notes or procedures describe all detail of the individual test blocks of the PACS commissioning phase.

AD01 PACS-ME-TP-017, Issue 2.1: PACS Short Functional Test Warm and Cold

AD02 PACS-ME-TP-021, issue 2.9: PACS Integrated System test Procedure

AD03 PICC-MA-TN-001, issue 2.1: PACS Ge:Ga Detector Tuning during the Herschel Space Observatory Commissioning Phase

AD04 PICC-MA-TN-002, issue 2.5: PACS Chopper PID Optimization and Fine Tuning during the Herschel Space Observatory Commissioning Phase

AD05 SAp-PACS-MS-0670-08, issue 1.1: Commissioning Phase Plan for the PACS Photometer

AD06 PACS-ME-UM-002, issue 1.3: PACS User Manual

AD07 MOC Procedure Spreadsheet, 20081121 H-Inst Procedure List.xls

AD08 Email M. Krassenburg, 18-Nov-08, Spreadsheet on cryogenic conditions at cryo-cover opening and nozzle switching.

AD09 Email G. Pilbratt, 3-Feb-09, Herschel Temperatures during commissioning

4 Thermal Requirements

This section flags possible temperature dependencies of the PACS commissioning phase programme. In the absence of an agreed and confirmed temperature evolution for that phase all generic input to this topic is therefore only related to AD08 and AD09.

- For any reasonable detector parameter adjustment PACS requires L0 temperatures which are such that the red Ge:Ga detector is at or better below 2.0K. In order to achieve this the HTT has to go likely below 1.9K.
- Cooler recycling: In commissioning phase we do require to recycle the cooler, low temperature of the HTT will obviously be required, however at this early stage we can live also with short cooler hold times of 12-16h. In this context, and to be on the safe side for the cooler hold time, it will be good to schedule the block BOLO_BIAS_0 very close to the block SPT-PHOT. Optimum cooler hold times will not yet be a strong requirement during the commissioning phase, in contrast to PV phase, where we indeed do require the 48h hold time.
- From the TBTV test we learned that the harness temperature of the grating is an important contributor to the grating performance and tunability. The present temperature curves indicate that neither the CVV nor the thermal shield temperatures would be stabilized at the time the grating tuning is carried out. It seems however as if the temperatures are not too far from their stabilized value. Despite this and because we had this bad experience from TBTV, we are forced to ask for additional DTCP time slots to optimize the grating around OD80 were apparently the temperatures are stabilized. Our request is therefore to foresee 2 additional grating tuning blocks of 4hours duration each around OD80. Of course if we are lucky and can show that the grating performance is not degraded once the temperatures are stabilized we will not need those slots, but we have to be at least prepared for them.
- PACS has no strong scheduling requirements or constraints related to nozzle switching and cryo-cover opening. Trusting the plots in AD08, PACS should be able to proceed with its regular CoP activities few hours, to be conservative, say 12hours, after nozzle switching and cryo-cover opening. All other constraints as given in this plan however still apply of course.

5 Requirements on Real-Time Science Data

During all test phases where ICC@MOC requires real-time contact to the instrument, PACS will generate science packets of type TM(21,x) with x being a combination out of [1,2,3]. The chopper and grating blocks are also of interactive nature (real-time feedback into uplink), such that the actual data rates within the allocated DTCP cannot be accurately predicted in advance. The requirement on real time science data rates must be therefore flexible and the system has to allow for full bandwidth (e.g. full use of the selected 1553 bus profile) for the entire duration of the given test.

6 Detailed Description

6.1. FDIR

This test verifies that the dedicated CDMU OBCPs for protection of PACS in case of anomalies are up and running. All critical failure cases are being triggered in controlled conditions in order to check the reaction of the CDMU when PACS issues TM(5,2) packets or when the communication to PACS is lost. This test procedure has been executed several times at IST level and is taken from AD02. MOIS import files together with further procedural details can be found in AD06.

MOC Procedure: H_COP_PAC_FDIR

6.2. Short Functional Test

The PACS short functional test at HeII temperature has been executed several times at IST level and is taken from AD01. It provides a very fast verification of the basic functions of all PACS sub-systems. Test analysis will be carried out in near real-time by comparing with the numerous reference data sets from IST. MOIS import files together with further procedural details can be found in AD06.

MOC Procedure: H_COP_PAC_SFTC

6.3. Chopper Tuning

This section of the IST procedure needs to be executed on integrated system level prior to the first PACS full functional test in order to verify and determine the chopper controller parameters in the new hardware environment and different orientation with respect to gravity. The same procedure shall be performed also in-orbit in the early PACS commissioning phase. The execution of this test may require substantial real time interaction between the CCS/SPACON-operator and the instrument team running the IEGSE. Execution and repetition of individual test steps and scripts may depend on near-realtime anaylsis on the IEGSE. Command parameter tables and hardcoded script parameters may need to be edited within the IEGSE CUS system. In commissioning phase only the nominal chopper will be tuned.

Due to the interactive nature of this procedure we have to plan also for unforeseen problems. Therefore a set of commanding procedures shall be at hand for the SPACON and ready to be executed on request by the instrument operations team.

The details are given in AD06 and AD02. (covers test blocks Chopper_x, x=1,2,3,4)

MOC Procedure: H_COP_PAC_CCVD

Once a stable set of reasonable chopper controller parameters has been established, a more automatic procedure for fine tuning shall be run according to AD04. This test block is called Chopper_5. Once the results of Chopper_5 are available another optional attempt (Chopper_6) of same duration could be scheduled at any point in time in order to further fine tune the chopper performance. The required sequence of AORs with detailed durations according tto X-HSPOT are listed hereafter (from PACS CoP proposal CPMechChop):

Chopper_5

CUS Definition	AOR Name	Dur. [sec.]
PacsEng_ChopperOpenLoop_FullRangeGen	CPMechChop_231A_nStd_OpenLoopFullRange_na_0001	1182
PacsEng_Chopper_AutoOptGen	CPMechChop_232A_nStd_PidFineTuning_na_0001	13045
	Total duration:	**14227**

Chopper_6

CUS Definition	AOR Name	Dur. [sec.]
PacsEng_Chopper_AutoOptGen	CPMechChop_232A_nStd_PidFineTuning_na_0002	13045
	Total duration:	**13045**

6.4. Grating Tuning

This section of the commissioning phase plan has been executed on integrated system level prior to any controlled operation of the grating. In orbit, after launch and with the changed gravity forces the grating controller parameters need to be re-established. Since this procedure requires real time interactions with the PACS instrument, it has been designed to fit into several 4hour test blocks of commissioning phase DTCPs. At present it is foreseen that 5 blocks (Grating_x, x=1,2,3,4,5) with 4 hours each will be sufficient to achieve specified performance of the grating in flight. AD06 and AD02 provide the procedure and the required scripts as MOIS import files.

MOC Procedure: H_COP_PAC_GCVD

6.5. Full Functional Test (FFT)

The procedure for the full functional test of PACS is given in AD02. FFT and SPT test results will allow a direct comparison to the respective data sets obtained during IST and TB/TV. This test will contain the first PACS cooler recycling in flight. The required sequence of AORs with detailed durations according tto X-HSPOT are listed hereafter (from PACS CoP proposal CPFFT):

CUS Definition	AOR Name	Dur. [sec]
PacsEng_Spec_setupGen	CPFFT_IST403_nStdSPECsetup_CSOFF_na_0001	358
PacsEng_Spec_HK_SetupGen	CPFFT_IST404_nStdSpecHK_Setup_na_0001	4
PacsEng_Spec_Gra_Diaghk_SINCOS_SetupGen	CPFFT_IST404_nStdSpecGraDiaghk_SINCOSSetup_na_0001	5
PacsEng_CONF_gratingGen	CPFFT_IST404_nStdCONFgrating_Slow_na_0001	261
PacsEng_Spec_Gra_HealthcheckGen	CPFFT_IST404_nStdSpecGra_Healthcheck_na_0001	226
PacsEng_Diaghk_ResetGen	CPFFT_IST404_nStdDiaghk_Reset_na_0001	4
PacsEng_ENTER_SAFE_ModeGen	CPFFT_IST405_nStdSAFEMode_na_na_0001	13
PacsEng_Spec_thermalGen	CPFFT_IST405_nStdSpecthermal_na_na_0001	8205
PacsEng_ENTER_SAFE_ModeGen	CPFFT_IST405_nStdSAFEMode_na_na_0002	13
PacsEng_Spec_setupGen	CPFFT_IST408_nStdSPECsetup_nominal_na_0001	358
PacsEng_Spec_spu_data_rateGen	CPFFT_IST408_nStdSpec_datarate_na_0001	691
PacsEng_Spec_cre_setup_lGen	CPFFT_IST408_nStdCREsetup_capa00_na_0001	9
PacsEng_Spec_spu_setupGen	CPFFT_IST408_nStdSPECspusetup_default_na_0001	9
PacsEng_Spec_Fil_Diaghk_SetupGen	CPFFT_IST408_nStdFilDiagSetup_na_na_0001	5
PacsEng_CONF_spec_fltwGen	CPFFT_IST408_nStdConfSpec_fltw_na_0001	4
PacsEng_Spec_Fil_nturnsGen	CPFFT_IST408_nStdSpec_Filnturns_na_0001	1070
PacsEng_Diaghk_ResetGen	CPFFT_IST408_nStdDiaghk_Reset_na_0001	4
PacsEng_Spec_spu_reset_lGen	CPFFT_IST408_nStdSpecspu_reset_na_0001	4
PacsEng_Background_AdjustmentGen	CPFFT_IST408_nStdBckgrd_Adj01_na_0001	961
PacsEng_Background_AdjustmentGen	CPFFT_IST408_nStdBckgrd_Adj02_na_0001	356
PacsEng_Background_AdjustmentGen	CPFFT_IST408_nStdBckgrd_Adj03_na_0001	356
PacsEng_Background_AdjustmentGen	CPFFT_IST408_nStdBckgrd_Adj04_na_0001	356
PacsEng_Background_AdjustmentGen	CPFFT_IST408_nStdBckgrd_Adj05_na_0001	356
PacsEng_Spec_FlashHeat_Diaghk_SetupGen	CPFFT_IST407_nStdFlashHeat_Diaghk_na_0001	5
PacsEng_Spec_cre_setup_lGen	CPFFT_IST407_nStdCREsetup_capa1212_na_0001	9
PacsEng_Spec_spu_setupGen	CPFFT_IST407_nStdSPECspusetup_default_na_0001	9
PacsEng_Spec_Gra_move_abs_rawGen	CPFFT_IST407_nStdGramove_abs_na_0001	4
PacsEng_Spec_Flash_ISTGen	CPFFT_IST407_nStdSpecFlash_IST_na_0001	644
PacsEng_Spec_Gra_move_abs_rawGen	CPFFT_IST407_nStdGramove_abs_na_0002	4
PacsEng_Spec_Flash_ISTGen	CPFFT_IST407_nStdSpecFlash_IST_na_0002	644
PacsEng_Spec_spu_reset_lGen	CPFFT_IST407_nStdSpecspu_reset_na_0001	4
PacsEng_Diaghk_ResetGen	CPFFT_IST407_nStdDiaghk_Reset_na_0001	4
PacsEng_Spec_fov_scan_imt409Gen	CPFFT_IST409_nStdSPEC_fovscan_na_0001	1473
PacsEng_WaveCalNoChopGen	CPFFT_IST410_nStdWaveCalNoChopEng_FilA_na_0001	1584
PacsEng_WaveCalNoChopGen	CPFFT_IST410_nStdWaveCalNoChopEng_FilB_na_0001	1584
PacsEng_Spec_cre_setup_lGen	CPFFT_IST406_nStdCREsetup_capa12_na_0001	9
PacsEng_Spec_spu_setupGen	CPFFT_IST406_nStdSPECspusetup_default_na_0001	9
PacsEng_Spec_Heat_FFTGen	CPFFT_IST406_nStdSpecHeat_FFT_na_0001	1122
PacsEng_Spec_spu_reset_lGen	CPFFT_IST406_nStdSpecspu_reset_na_0001	4
PacsEng_ENTER_SAFE_ModeGen	CPFFT_IST411_nStdSAFEMode_na_na_0001	13
PacsEng_BOLO_coolerGen	CPFFT_IST412_nStdBOLO_cooler_na_0001	8532

CUS Definition	AOR Name	Dur. [sec]
PacsEng_Phot_thermalGen	CPFFT_IST413_nStdPhotthermal_na_na_0001	5544
PacsEng_ENTER_SAFE_ModeGen	CPFFT_IST413_nStdSAFEMode_na_na_0001	13
PacsEng_PHOT_orbit_prologueGen	CPFFT_IST414_nStdPHOTsetup_nominal_na_0001	172
PacsEng_Phot_spu_setup_lGen	CPFFT_IST414_nStdPHOTspusetup_default_0001	9
PacsEng_Phot_Fil_Diaghk_SetupGen	CPFFT_IST414_nStdFilDiagSetup_na_na_0001	5
PacsEng_CONF_phot_fltwGen	CPFFT_IST414_nStdConfPhot_fltw_na_0001	4
PacsEng_Phot_Fil_nturnsGen	CPFFT_IST414_nStdPhot_Filnturns_na_0001	1069
PacsEng_Diaghk_ResetGen	CPFFT_IST414_nStdDiaghk_Reset_na_0001	4
PacsEng_Phot_spu_reset_lGen	CPFFT_IST414_nStdPhotspu_reset_na_0001	4
PacsEng_Phot_spu_data_rateGen	CPFFT_IST414_nStdPhot_datarate_na_0001	506
PacsEng_Phot_saturationGen	CPFFT_IST415_nStdPhot_saturation_na_0001	345
PacsEng_ENTER_SAFE_ModeGen	CPFFT_IST416_nStdSAFEMode_na_na_0001	13
	Total duration:	**36973**

6.6. Short Performance Test (SPT)

The procedure for the short performance test of PACS is given in AD02. FFT and SPT test results will allow a direct comparison to the respective data sets obtained during IST and TB/TV. The required sequence of AORs with detailed durations according to X-HSPOT are listed hereafter (from PACS CoP proposals CPSPTSPEC and CPSPTPHOT):

SPT-SPEC

CUS Definition	AOR Name	Dur. [sec]
PacsEng_Spec_setupGen	CPSPTSPEC_IST502_nStdSpecsetup_CSOFF_na_0001	358
PacsEng_Spec_dark_current_imt502Gen	CPSPTSPEC_IST502_nStddarkcurrent_na_na_0001	1347
PacsEng_ENTER_SAFE_ModeGen	CPSPTSPEC_IST503_nStdSAFEMode_na_na_0001	13
PacsEng_Spec_setupGen	CPSPTSPEC_IST503_nStdSPECsetup_default_na_0001	358
PacsEng_Spec_Gra_Diaghk_SINCOS_SetupGen	CPSPTSPEC_IST503_nStdDiaghk_SINCOS_na_0001	5
PacsEng_Spec_Gra_Slew_Time_CalGen	CPSPTSPEC_IST503_nStdGraSlewTime_Cal_na_0001	673
PacsEng_Diaghk_ResetGen	CPSPTSPEC_IST503_nStdDiaghk_reset_na_0001	4
PacsEng_Spec_Chopper_imt504Gen	CPSPTSPEC_IST504_nStdChopper_Perf_na_0001	358
PacsEng_Spec_QuickFullSpectrumGen	CPSPTSPEC_IST505_nStdQuickFullSpectrum_CS1_na_0001	3475
PacsEng_Spec_QuickFullSpectrumGen	CPSPTSPEC_IST505_nStdQuickFullSpectrum_CS2_na_0001	3475
PacsEng_WaveCalNoChopGen	CPSPTSPEC_IST506_nStdWaveCalEng_short_na_0001	683
PacsEng_Spec_Readouts_per_Ramp_TestGen	CPSPTSPEC_IST508_nStdReadouts_perRamp_na_0001	153
PacsEng_Spec_Readouts_per_Ramp_TestGen	CPSPTSPEC_IST508_nStdReadouts_perRamp_na_0002	153
PacsEng_Spec_Readouts_per_Ramp_TestGen	CPSPTSPEC_IST508_nStdReadouts_perRamp_na_0003	153
PacsEng_Spec_Readouts_per_Ramp_TestGen	CPSPTSPEC_IST508_nStdReadouts_perRamp_na_0004	153
PacsEng_Spec_Readouts_per_Ramp_TestGen	CPSPTSPEC_IST508_nStdReadouts_perRamp_na_0005	153
PacsEng_Spec_Readouts_per_Ramp_TestGen	CPSPTSPEC_IST508_nStdReadouts_perRamp_na_0006	153
PacsEng_Spec_detector_imt509Gen	CPSPTSPEC_IST509_nStdSpec_bias_na_0001	1149

CUS Definition	AOR Name	Dur. [sec]
PacsEng_Spec_cre_setup_lGen	CPSPTSPEC_IST510_nStdcre_setup_na_0001	9
PacsEng_Spec_spu_setupGen	CPSPTSPEC_IST510_nStdspusetup_025_na_0001	9
PacsEng_Spec_Time_Constant_ISTGen	CPSPTSPEC_IST510_nStdTime_Constant_na_0001	2184
PacsEng_Spec_spu_reset_lGen	CPSPTSPEC_IST510_nStdSpecspu_reset_na_0001	4
PacsEng_Spec_CS_imt511Gen	CPSPTSPEC_IST511_nStdSpecCS_Perf_na_0001	3905
PacsEng_ENTER_SAFE_ModeGen	CPSPTSPEC_IST514_nStdSAFEMode_na_na_0001	13
	Total duration:	**18940**

Note: Depending how the SPT-SPEC test block will be finally scheduled, it must be ensured that the calibration sources had sufficient time to cool down prior to the start of this test block. Should this not be the case, the first three observations could be optionally executed at the begin of the FFT test block.

SPT-PHOT

CUS Definition	AOR Name	Dur. [sec]
PacsEng_BOLO_coolerGen	CPSPTPHOT_IST516_nStdBOLO_cooler_na_0001	8532
PacsEng_PHOT_orbit_prologueGen	CPSPTPHOT_IST517_nStdPHOTsetup_nominal_na_0001	2272
PacsEng_Phot_cal_recipesGen	CPSPTPHOT_IST518_nStdCal_recipes_na_0001	1729
PacsEng_OBCP_chop_scan_photGen	CPSPTPHOT_IST519_nStdChopscan_phot_na_0001	1381
PacsEng_Phot_low_freqGen	CPSPTPHOT_IST520_nStdlowfreq_ddcs_na_0001	3649
PacsEng_Phot_low_freq_directGen	CPSPTPHOT_IST520_nStdlowfreq_direct_na_0001	3741
PacsEng_Phot_timeconst_fluxchangeGen	CPSPTPHOT_IST521_nStdTimeconst_fluxchange_na_0001	961
PacsEng_Phot_TestPatternGen	CPSPTPHOT_IST524_nStdTestPattern_na_na_0001	71
PacsEng_orbit_epilogue	CPPhotSetup_na_nStd_orbitepi_na_0010	13
	Total duration:	22349

6.7. Ge:Ga Detector Tuning

AD03 provides an extensive description of the test blocks GeGa_Bias_x, x=1,2,3,4. The test block GeGa_Dark should be executed between GeGa_Bias_2 and GeGa_Bias_3. However prior to the GeGa_Dark block, there must be no other PACS measurements for at least 24hours, such that the calibrations sources can cool down. The required sequence of AORs with detailed durations according tto X-HSPOT are listed hereafter (from PACS CoP proposal CPSpecGeGa):

CUS Definition	AOR Name	Dur. [sec]
BLOCK 1		
PacsEng_Spec_setupGen	CPSpecGeGa_na_nStdCPBlock101_SpecSetup_na_0001	358
PacsEng_Spec_spu_setup_wait_resetGen	CPSpecGeGa_na_nStdCPBlock102_SpuSetupReset_na_0001	2109
PacsEng_Spec_GeGa_Loop_CommGen	CPSpecGeGa_na_nStdCPBlock103_ParametersLoop_na_0001	33150
PacsEng_Spec_CuringGen	CPSpecGeGa_na_nStdCPBlock104_Curing4mA_na_0001	747

CUS Definition	AOR Name	Dur. [sec]
PacsEng_Spec_GeGa_Loop_CommGen	CPSpecGeGa_na_nStdCPBlock105_ParametersLoop_na_0002	35514
PacsEng_Spec_CuringGen	CPSpecGeGa_na_nStdCPBlock106_Curing2mA_na_0002	987
PacsEng_ENTER_SAFE_ModeGen	CPSpecGeGa_na_nStdCPBlock107_EnterSafeMode_na_0001	13
	Total Block duration:	**72878**
BLOCK 2		
PacsEng_Spec_setupGen	CPSpecGeGa_na_nStdCPBlock201_SpecSetup_na_0001	358
PacsEng_Spec_spu_setup_wait_resetGen	CPSpecGeGa_na_nStdCPBlock202_SpuSetupReset_na_0001	2109
PacsEng_Spec_GeGa_Loop_CommGen	CPSpecGeGa_na_nStdCPBlock203_ParametersLoop_na_0001	16602
PacsEng_Spec_Fov_ScanGen	CPSpecGeGa_na_nStdCPBlock204_FovScan_na_0001	376
PacsEng_Spec_Fov_ScanGen	CPSpecGeGa_na_nStdCPBlock205_FovScan_na_0002	376
PacsEng_Spec_GeGa_Chop_2_3Gen	CPSpecGeGa_na_nStdCPBlock206_Chop23_na_0001	807
PacsEng_Spec_GeGa_Chop_2_3Gen	CPSpecGeGa_na_nStdCPBlock207_Chop23_na_0002	807
PacsEng_Spec_CuringGen	CPSpecGeGa_na_nStdCPBlock208_Curing_na_0001	2097
PacsEng_ENTER_SAFE_ModeGen	CPSpecGeGa_na_nStdCPBlock209_EnterSafeMode_na_0001	13
	Total Block duration:	**23545**
DARK		
PacsEng_Spec_setupGen	CPSpecGeGa_na_nStdBlockDark1_SpecSetup_na_0001	358
PacsEng_Spec_spu_setup_wait_resetGen	CPSpecGeGa_na_nStdBlockDark2_SpuSetupReset_na_0001	2109
PacsEng_Spec_GeGa_Loop_CommGen	CPSpecGeGa_na_nStdBlockDark3_ParametersLoop_na_0001	4782
PacsEng_Spec_CuringGen	CPSpecGeGa_na_nStdBlockDark4_Curing4mA_na_0001	747
PacsEng_Spec_GeGa_Loop_CommGen	CPSpecGeGa_na_nStdBlockDark5_ParametersLoop_na_0002	16602
PacsEng_ENTER_SAFE_ModeGen	CPSpecGeGa_na_nStdBlockDark6_EnterSafeMode_na_0001	13
	Total Block duration:	**24611**
BLOCK 3		
PacsEng_Spec_setupGen	CPSpecGeGa_na_nStdCPBlock301_SpecSetup_na_0001	358
PacsEng_Spec_spu_setup_wait_resetGen	CPSpecGeGa_na_nStdCPBlock302_SpuSetupReset_na_0001	2109
PacsEng_Spec_Curing_ExploreGen	CPSpecGeGa_na_nStdCPBlock303_CuringExplore_na_0001	971
PacsEng_Spec_CuringGen	CPSpecGeGa_na_nStdCPBlock304_Curing4mA_na_0001	747
PacsEng_Spec_GeGa_Loop_CommGen	CPSpecGeGa_na_nStdCPBlock305_OneParamSet_na_0001	14486
PacsEng_Spec_GeGa_Loop_CommGen	CPSpecGeGa_na_nStdCPBlock306_ParametersLoop_na_0001	2478
PacsEng_Spec_CuringGen	CPSpecGeGa_na_nStdCPBlock307_Curing4mA_na_0001	747
PacsEng_ENTER_SAFE_ModeGen	CPSpecGeGa_na_nStdCPBlock308_EnterSafeMode_na_0001	13
	Total Block duration:	**21909**
BLOCK 4		
PacsEng_Spec_setupGen	CPSpecGeGa_na_nStdCPBlock401_SpecSetup_na_0001	358
PacsEng_Spec_spu_setup_wait_resetGen	CPSpecGeGa_na_nStdCPBlock402_SpuSetupReset_na_0001	2109
PacsEng_Spec_CuringGen	CPSpecGeGa_na_nStdCPBlock403_Curing_na_0001	747
PacsEng_Spec_BufferTransmissionGen	CPSpecGeGa_na_nStdCPBlock404_BufferTrans_na_0001	18000
PacsEng_Spec_Curing_ExploreGen	CPSpecGeGa_na_nStdCPBlock405_CuringExplore_na_0001	1535
PacsEng_ENTER_SAFE_ModeGen	CPSpecGeGa_na_nStdCPBlock406_EnterSafeMode_na_0001	13
	Total Block duration:	**22762**

6.8. Telescope Background Measurement

This measurement is carried out in PACS spectroscopy mode to test the telescope emission soon after the cryo-cover has been opened. The result provides a decision point whether the bolometer bias measurements can proceed or not. If the telescope emission is too strong at that point in time, further bolometer bias adjustments can only proceed once the telescope has further cooled down and the level of radiation is smaller. The test requires spectroscopy mode and is described in AD02, section 11.4.9. The required sequence of AORs with detailed durations according to X-HSPOT, are listed hereafter (from PACS CoP proposal CPSpecMisc):

CUS Definition	AOR Name	Dur. [sec]
PacsEng_SPEC_orbit_prologueGen	CPSpecMisc_IST408_nStdSPEC_orbitprologue_na_0001	2458
PacsEng_WaveCalNoChopGen	CPSpecMisc_IST410_nStdWaveCalEng_FilA_na_0001	1584
PacsEng_WaveCalNoChopGen	CPSpecMisc_IST410_nStdWaveCalEng_FilB_na_0001	1584
PacsEng_ENTER_SAFE_ModeGen	CPSpecMisc_IST416_nStdSAFEMode_na_na_0001	13
	Total duration:	**5639**

6.9. Bolometer Tuning

The activities to tune the bolometer biases during PACS commissioning phase up to the point where pointing related activities using the photometer could start are described in AD05. The measurements consist of 3 blocks BOLO_BIAS_x, x=0,1,2. These three measurement entities correspond to the sections Block 0, Block 1 and Block 2 of AD05. The required AORs with more detailed durations are listed hereafter:

Block 0

Purpose	CUS Script	AOR Name	Time [min]
Recycling	PacsEng_BOLO_cooler	CPPhotCooler_117_nStd_na_na_0001	142
PhotPrologue	PacsEng_PHOT_orbit_prologue	CPPhotSetup_na_nStd_orbitpro_na_0001	38
VRL-VHblind	PacsEng_Phot_VrlVhBlind	CPPhotBol_110A_nStd_VrlVhBlind_na_0001	87
PhotEpilogue	PacsEng_orbit_epilogue	CPPhotSetup_na_nStd_orbitepi_na_0001	1
Total			**268**

Note that it may be efficient to execute this test block right after SPT_PHOT_1, because then the recycling and the PhotPrologue is already covered. This is also the assumption made in the PACS commissioning phase spreadsheet (annex 7.1)

Block 1

Purpose	CUS Script	AOR Name	Time [min]
Recycling	PacsEng_BOLO_cooler	CPPhotCooler_117_nStd_na_na_0002	142
PhotPrologue	PacsEng_PHOT_orbit_prologue	CPPhotSetup_na_nStd_orbitpro_na_0002	38
Low gain No.1	PacsCal_Phot_lowGainBias1	CPPhot-Bol_111A_nStd_lowGainCSs_DarkField_0001	203
Telescope bck	PacsCal_Phot_telescBack	CPPhot-Bol_721A_nStd_firstBackGrd_DarkField_0001	51
PhotEpilogue	PacsEng_orbit_epilogue	CPPhotSetup_na_nStd_orbitepi_na_0002	1
Total			**435**

Block 2

Purpose	CUS Script	AOR Name	Time [min]
Recycling	PacsEng_BOLO_cooler	CPPhotCooler_117_nStd_na_na_0003	142
PhotPrologue	PacsEng_PHOT_orbit_prologue	CPPhotSetup_na_nStd_orbitproCSoff_na_0001	38
FOV Scan	PacsCal_OBCP_chop_scan_phot	CPPhotBol_310A_nStd_FOV_DarkField_0001	23
CSs setup	PacsEng_setCSsTemp	CPPhotSetup_na_nStd_setCSstemp_na_0001	38
Low gain No.2	PacsCal_Phot_lowGainBias2	CPPhotBol_111A_nStd_lowGainTel_DarkField_0001	165
FOV Scan	PacsCal_OBCP_chop_scan_phot	CPPhotBol_310A_nStd_FOV_DarkField_0002	23
Calib. blocks	PacsCal_OBCP_chopped_photometry	CPPhotBol_322A_nStd_calBlock_DarkField_0001..10	23
Glitch stat.	PacsCal_Phot_glitch	CPPhotBol_119A_nStd_glitch_DarkField_0001	30
Point src AOT	PACS PHOT AOT	CPPhotBol_311A_StdPSdith_M87_0001	14
Point src AOT	PACS PHOT AOT	CPPhotBol_311A_StdPSndith_M87_0001	14
Scan mode AOT	PACS PHOT AOT	CPPhotBol_311B_StdScan_M87_0001	43
PhotEpilogue	PacsEng_orbit_epilogue	CPPhotSetup_na_nStd_orbitepi_na_0003	1
Total			**554**

Note that it may be required to adjust the targets in this block for the actual target visibility situation at the time of execution of this block.

7 ANNEXES

7.1. Spreadsheet of PACS Commissioning Phase Activities

See spreadsheet: “HP Commissioning Phase Activities PACS 20081028.xls”

7.2. Analysis and Uplink-Feedback

Test Block	Time for Analysis	Feedback into Uplink	Feedback needed for
FDIR_1	real time	none	
SFT_1	8h	none	
Chopper_1	real time	none	
Chopper_2	real time	none	
Chopper_3	real time	none	
Chopper_4	real time	CalU-table	required for Chopper_5, GeGa_Bias_1, FFT_1, etc.
Grating_1	real time		
Grating_2	real time		
Grating_3	real time		
Grating_4	real time		
Grating_5	4h	CalU-table	required for GeGa_Bias_1, FFT_1, etc.
Use MPS from here onwards			
Chopper_5	2d	CalU-table	required for Chopper_6 or PV Phase
Chopper_6 (optional)	2d	CalU-table	required for PV Phase
GeGa_Bias_1	5d	X-HSPOT parameters	required for GeGa_Bias_2
FFT_1, SPT_SPEC_1, SPT_PHOT_1, BOLO_BIAS_0	5d, joint analysis for FFT_1, SPT_SPEC1, SPT_PHOT_1, BOLO_BIAS_0	default none, eventual CalU update	required for PV Phase
Cryo Cover Opening			
TEL_BCK	4h	decision point	required for BOLO_BIAS_1
BOLO_BIAS_1	2d	CUS code	required for BOLO_BIAS_2
GeGa_BIAS_2	2d	X-HSPOT parameters	required for GeGa_Bias_3
GeGa_DARK	n.a.	n.a.	required for PV phase
BOLO_BIAS_2	3d	CalU table	required for FPG/Pointing
GeGa_Bias_3	1d	X-HSPOT parameters	required for GeGa_Bias_4
GeGa_Bias_4	5d	operational or evtl. CUS code	required for PV Phase

7.3. List of PACS Commissioning Phase Proposals

CPFFT:	Full functional test
CFPSPTSPEC:	Short performance test spectroscopy
CPSPTPHOT:	Short performance test photometry
CPSpecMisc:	Container for various observations, at present telescope background measurement with spectroscopy.
CPPhotBol:	Bolometer bias optimization
CPPhotCooler:	Cooler Recycling
CPPhotSetup:	Orbit prologues and epilogues for photometry
CPSpecGeGa:	Ge:Ga detector bias optimization
CPMechChop:	Chopper mechanism controller parameter optimization

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