

SPIRE-CP-FUNC-SCAL4-PID Control Loop PID Tuning
 File: H_COP_SPI_SC4P.xls
 Author: L.Lucas-hp



Procedure Summary

Objectives

The purpose of this procedure is to confirm the SCAL4 Prime control loop PID parameters.

Based on Procedure:
 SPIRE_CP_SCAL4_PID(v3)

Summary of Constraints

Spacecraft Configuration

Start of Procedure

Mode = SPECSTBY or REDY

End of Procedure

Mode = SPECSTBY or REDY

Reference File(s)

Input Command Sequences

Output Command Sequences

HCSSC4P
 HCSSC4PY

Referenced Displays

ANDs	GRDs	SLDs
ZAZ90999		
SA_1_559		
SA_4_559		

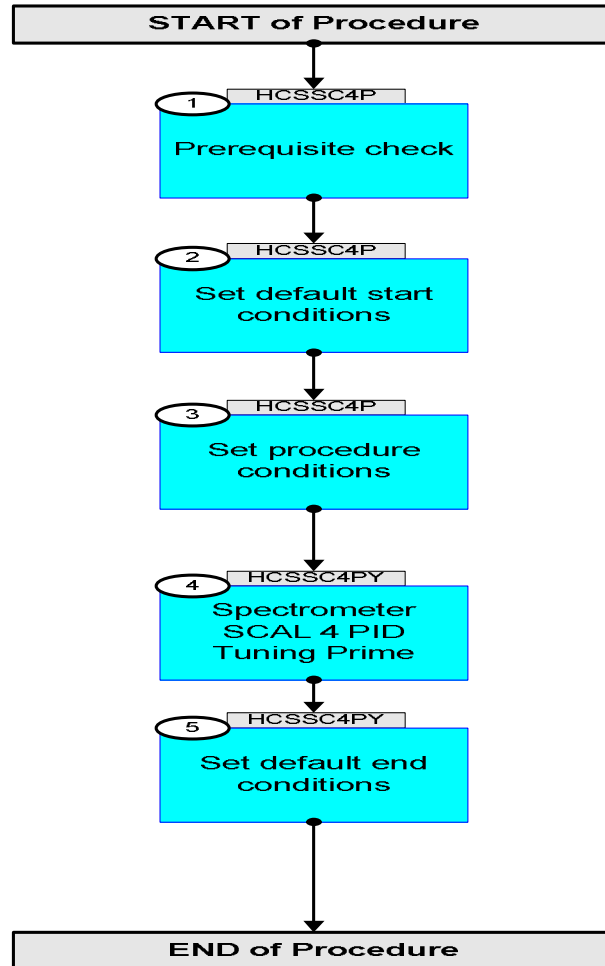
Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
16/01/09		1	Created	L.Lucas-hp	
20/01/09		1.01	Validation : Update AND	L.Lucas-hp	
27/01/09	2	2	Remove ETs for ease of Loading to manual stack	L.Lucas-hp	
27/02/09		3	Updated Halt VM command so that it is now manual	L.Lucas-hp	
04/03/09	2.1	4	Run VM parameters made into TPF parameters	L.Lucas-hp	
24/03/09	2.2	4.01	Validation : Title Updates	L.Lucas-hp	
07/04/09		5	Updated in line with updated received from SPIRE	L.Lucas-hp	
21/04/09		5.01	Validation : TEXT Updates	L.Lucas-hp	
21/04/09	2.3	5.02	Validation : Text Update	L.Lucas-hp	
04/05/09		6	Remove ET	L.Lucas-hp	
05/05/09	2.4	6.01	Validation : Text update to s/c start and end config	L.Lucas-hp	

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Procedure Flowchart Overview



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch	AIT Comment
Beginning of Procedure					
		TC Seq. Name :HCSSC4P (SCAL4 PID Tune Prime) TimeTag Type: N Sub Schedule ID: <input type="checkbox"/>			
1		Prerequisite check		Next Step: 2	
1.1		HSC/ICC input			
		Verify that the HSC has supplied a valid OBSID value: OBS_ID = 0xnnnn nnnn			
2		Set default start conditions		Next Step: 3	
		Note that a TM(5,1) packet [New_Step_Report] is generated after each of the following SET_OBS_STEP telecommands			
	ET+= UT+=00.00.00	SET_OBS_STEP SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 0 <hex> Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500	TC	
	ET+= UT+=00.00.01	SET_BBID SET_BBID Command Parameter(s) : BUILDING_BLOCK_ID SP01N500 80010001 <hex> Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SC001500	TC	
		Verify Telemetry BBFULLTYPE SM2LN500 = ClearObs		AND=ZAZ90999	
	ET+= UT+=00.00.00	SET_OBS_STEP SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 1 <hex> Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500	TC	
	ET+= UT+=00.00.01	SET_OBSID SET_OBSID Command Parameter(s) : OBSERVATION_ID SP00N500 00000000 <hex> Subsch. ID : 370 Det. descr. : SET OBSERVATION IDENTIFIER	SC000500	TC	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch	AIT Comment
		Verify Telemetry OBSID SM10N500	= 00000000 <hex>	AND=ZAZ90999	
	ET=+ UT=+00.00.00	SET_OBS_STEP SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500 0 <hex>	TC	
	ET=+ UT=+00.00.01	SET_BBID SET_BBID Command Parameter(s) : BUILDING_BLOCK_ID SP01N500 Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SC001500 80000000 <hex>	TC	
		Verify Telemetry BBFULLTYPE SM2LN500	= Null	AND=ZAZ90999	
	ET=+ UT=+00.00.00	SET_OBS_STEP SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500 0 <hex>	TC	
	ET=+ UT=+00.00.01	SET_BBID SET_BBID Command Parameter(s) : BUILDING_BLOCK_ID SP01N500 Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SC001500 80020001 <hex>	TC	
		Verify Telemetry BBFULLTYPE SM2LN500	= StartObs	AND=ZAZ90999	
3		Set procedure conditions		Next Step: 4	
	ET=+ UT=+00.00.00	RESET_DRCU_COUNTERS RESET_DRCU_COUNTERS Subsch. ID : 370 Det. descr. : RESET DRCU COUNTERS	SCD00505	TC	
		Verify that the TRESET parameter has the same value as the THSK parameter TRESET SM01T500	same as THSK	AND=SA_1_559	
		THSK SM00T500	any	AND=SA_1_559	
		Note that a TM(5,1) packet [New_Step_Report] is generated after each of the following SET_OBS_STEP telecommands			
	ET=+ UT=+00.00.00	SET_OBS_STEP SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500 1 <hex>	TC	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch	AIT Comment
	ET=+ UT=+00.00.01	SET_OBSID Command Parameter(s) : OBSERVATION_ID SP00N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION IDENTIFIER	SET_OBSID SC000500 OBS_ID	TC	
		Verify Telemetry OBSID SM10N500	OBS_ID	AND=ZAZ90999	
	ET=+ UT=+00.00.00	SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SET_OBS_STEP SC003500 0 <hex>	TC	
	ET=+ UT=+00.00.01	SET_BBID Command Parameter(s) : BUILDING_BLOCK_ID SP01N500 Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SET_BBID SC001500 80000000 <hex>	TC	
		Verify Telemetry BBFULLTYPE SM2LN500	= Null	AND=ZAZ90999	
	ET=+ UT=+00.00.00	SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SET_OBS_STEP SC003500 0 <hex>	TC	
	ET=+ UT=+00.00.01	SET_BBID Command Parameter(s) : BUILDING_BLOCK_ID SP01N500 Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SET_BBID SC001500 8A110001 <hex>	TC	
		Verify Telemetry is 8A11 (hex) BBFULLTYPE SM2LN500	8A11 (hex)	AND=ZAZ90999	
End of Sequence					
TC Seq. Name : HCSSC4PY (SCAL4 PID Tune Prime)					
TimeTag Type: Y Sub Schedule ID: <input type="checkbox"/>					
4		Spectrometer SCAL 4 PID Tuning Prime		Next Step: 5	
This TC (SCV02500: RUN_VM1) may need to be re-run. If this is the case a new TPF the the SPIRE Instrumetn team will be delivered and the entire procedure will be re-run. TC Parameters are described below for purely information purposes.					

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		TC Parameter SPV7N500 #01: a = Required SCAL temperature (ADC units) TC Parameter SPV7N500 #02: b = SCAL get temperature command TC Parameter SPV7N500 #03: c = SCAL set heater current command TC Parameter SPV7N500 #04: d = Loop period (us) TC Parameter SPV7N500 #05: e = Kp (PID parameter)-float																																																																
		TC Parameter SPV7N500 #06: f = Ki (PID parameter)-float TC Parameter SPV7N500 #07: g = Kd (PID parameter)-float TC Parameter SPV7N500 #08: h = Ki limit - float TC Parameter SPV7N500 #09: i = Low pass filter gain - float TC Parameter SPV7N500 #10: j = Low pass filter coefficient b1 - float																																																																
		TC Parameter SPV7N500 #11: k = Low pass filter coefficient b2 - float TC Parameter SPV7N500 #12: l = Max DAC value - int TC Parameter SPV7N500 #13: m = Pulse Width Modulation (PWM) flag (non-zero if used) TC Parameter SPV7N500 #14: n = TM flag (non-zero if DPU TM packets containing a copy of storage data are to be generated) TC Parameter SPV7N500 #15: o = Initialisation count (if non-zero this additional number of values will be read into the signal registers before starting PID) - try value >2																																																																
		Only send the next RUN_VM1 TC if advised by the Instrument Team																																																																
	ET=+ UT=+00.00.03	RUN_VM1 Command Parameter(s) : <table border="0" style="width: 100%;"> <tr><td style="text-align: right;">TABLEID_RUNVM1</td><td>SPV4N500</td><td>50 <hex></td></tr> <tr><td style="text-align: right;">INDEX_RUNVM1</td><td>SPV5N500</td><td>0 <hex></td></tr> <tr><td style="text-align: right;">N_RUNVM1</td><td>SPV6N500</td><td>15 <dec></td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>1</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>2</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>3</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>4</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>5</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>6</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>7</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>8</td></tr> <tr><td colspan="3"> </td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>9</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>10</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>11</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>12</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>13</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>14</td></tr> <tr><td style="text-align: right;">DATA_RUNVM1</td><td>SPV7N500</td><td>15</td></tr> </table> TC Control Flags : <table border="0" style="width: 100%;"> <tr><td style="text-align: right;">GBM IL DSE</td><td></td></tr> <tr><td style="text-align: right;">--Y -- --</td><td></td></tr> </table> Subsch. ID : 370 Det. descr. : EXECUTE COMMAND LIST HELD IN A TABLE BY S/W DRIVEN VM1	TABLEID_RUNVM1	SPV4N500	50 <hex>	INDEX_RUNVM1	SPV5N500	0 <hex>	N_RUNVM1	SPV6N500	15 <dec>	DATA_RUNVM1	SPV7N500	1	DATA_RUNVM1	SPV7N500	2	DATA_RUNVM1	SPV7N500	3	DATA_RUNVM1	SPV7N500	4	DATA_RUNVM1	SPV7N500	5	DATA_RUNVM1	SPV7N500	6	DATA_RUNVM1	SPV7N500	7	DATA_RUNVM1	SPV7N500	8				DATA_RUNVM1	SPV7N500	9	DATA_RUNVM1	SPV7N500	10	DATA_RUNVM1	SPV7N500	11	DATA_RUNVM1	SPV7N500	12	DATA_RUNVM1	SPV7N500	13	DATA_RUNVM1	SPV7N500	14	DATA_RUNVM1	SPV7N500	15	GBM IL DSE		--Y -- --		RUN_VM1 SCV02500	TC	
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	ET=+ UT=+00.00.01	SET_BBID Command Parameter(s) : <table border="0" style="width: 100%;"> <tr><td style="text-align: right;">BUILDING_BLOCK_ID</td><td>SP01N500</td><td>80000000 <hex></td></tr> </table> TC Control Flags : <table border="0" style="width: 100%;"> <tr><td style="text-align: right;">GBM IL DSE</td><td></td></tr> <tr><td style="text-align: right;">--- -- --</td><td></td></tr> </table> Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	BUILDING_BLOCK_ID	SP01N500	80000000 <hex>	GBM IL DSE		--- -- --		SET_BBID SC001500	TC																																																							
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		Now wait for the Instrument Team to monitor the progress of the SCAL4TEMP stabilisation A default wait time of 5 minutes is set in the procedure Check with the Instrument Team before executing the next block of TCs			
	ET=+ UT=+00.05.01	SET_BBID Command Parameter(s) : BUILDING_BLOCK_ID SP01N500 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SC001500 8A120001 <hex>	TC	
	ET=+ UT=+00.00.02	HALT_VM1 TC Control Flags : GBM IL DSE --- -- --- Subsch. ID : 370 Det. descr. : HALT VM1	SCV03500	TC	
	ET=+ UT=+00.00.04	SEND_DRCU_COMMAND Command Parameter(s) : DRCUCOMMAND SPD4N505 OVERRIDE SPD9N505 TC Control Flags : GBM IL DSE --- -- --- Subsch. ID : 370 Det. descr. : SEND A SINGLE COMMAND TO THE DRCU	SCD06505 a0cc0000 <hex> 0 <hex> (Def)	TC	
	ET=+ UT=+00.00.01	SET_BBID Command Parameter(s) : BUILDING_BLOCK_ID SP01N500 TC Control Flags : GBM IL DSE --- -- --- Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SC001500 80000000 <hex>	TC	
		Verify SCAL4 is OFF. Check TM reads 0ma +/-0.01mA SCAL4CURR SMS1A520	= 0.0 mA	AND=SA_4_559	
		Verify Telemetry reads 0V +/-0.01mV SCAL4V SMS1V520	= 0.0 V	AND=SA_4_559	
		Verify Telemetry is set to 0xFFFF VM1STAT SMV1N500		AND=SA_1_559	
5		Set default end conditions		Next Step: END	
		Note that a TM(5,1) packet [New_Step_Report] is generated after each of the following SET_OBS_STEP telecommands			

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch	AIT Comment
	ET=+ UT=+00.00.00	SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SET_OBS_STEP SC003500 0 <hex>	TC	
	ET=+ UT=+00.00.01	SET_BBID Command Parameter(s) : BUILDING_BLOCK_ID SP01N500 Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SET_BBID SC001500 80000000 <hex>	TC	
		Verify Telemetry BBFULLTYPE SM2LN500	= Null	AND=ZAZ90999	
	ET=+ UT=+00.00.00	SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SET_OBS_STEP SC003500 0 <hex>	TC	
	ET=+ UT=+00.00.01	SET_BBID Command Parameter(s) : BUILDING_BLOCK_ID SP01N500 Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SET_BBID SC001500 80030001 <hex>	TC	
		Verify Telemetry BBFULLTYPE SM2LN500	= EndObs	AND=ZAZ90999	
	ET=+ UT=+00.00.00	SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SET_OBS_STEP SC003500 1 <hex>	TC	
	ET=+ UT=+00.00.01	SET_OBSID Command Parameter(s) : OBSERVATION_ID SP00N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION IDENTIFIER	SET_OBSID SC000500 00000000 <hex>	TC	
		Verify Telemetry OBSID SM10N500	= 00000000 <hex>	AND=ZAZ90999	
	ET=+ UT=+00.00.00	SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SET_OBS_STEP SC003500 0 <hex>	TC	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch	AIT Comment
	ET=+ UT=+00.00.01	SET_BBID Command Parameter(s) : BUILDING_BLOCK_ID SP01N500 Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SC001500 80000000 <hex>	TC	
		Verify Telemetry BBFULLTYPE SM2LN500	= Null	AND=ZAZ90999	
End of Sequence					
End of Procedure					