

# SPS Software Test Cases

## PFS-SPS-PRU300005-01

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## Contents

<b>1</b>	<b>Version and Changelog</b>	<b>5</b>
<b>2</b>	<b>Introduction</b>	<b>5</b>
<b>3</b>	<b>Test Case SPS-ALERT-CTHIGH-010: Cooler Temperature Too High</b>	<b>6</b>
3.1	Description . . . . .	6
3.2	Pass/Fail Condition(s) . . . . .	6
3.3	Hardware constraints . . . . .	6
3.4	Initial conditions . . . . .	6
3.5	Procedure . . . . .	6
3.6	Additional Notes . . . . .	6
<b>4</b>	<b>Test Case SPS-ALERT-PPOWER1-020: PCM UPS Input Power Outside Range</b>	<b>7</b>
4.1	Description . . . . .	7
4.2	Pass/Fail Condition(s) . . . . .	7
4.3	Hardware constraints . . . . .	7
4.4	Initial conditions . . . . .	7
4.5	Procedure . . . . .	7
4.6	Additional Notes . . . . .	7
<b>5</b>	<b>Test Case SPS-ALERT-PPOWER2-030: PCM AUX Input Power Outside Range</b>	<b>8</b>
5.1	Description . . . . .	8
5.2	Pass/Fail Condition(s) . . . . .	8
5.3	Hardware constraints . . . . .	8
5.4	Initial conditions . . . . .	8
5.5	Procedure . . . . .	8
5.6	Additional Notes . . . . .	8

<b>6</b>	<b>Test Case SPS-ALERT-PPOWER2-040: Ion Gauge Pressure Outside Range</b>	<b>9</b>
6.1	Description . . . . .	9
6.2	Pass/Fail Condition(s) . . . . .	9
6.3	Hardware constraints . . . . .	9
6.4	Initial conditions . . . . .	9
6.5	Procedure . . . . .	9
6.6	Additional Notes . . . . .	9
<b>7</b>	<b>Test Case SPS-ALERT-TURBO-050: Turbo Speed Outside Range</b>	<b>10</b>
7.1	Description . . . . .	10
7.2	Pass/Fail Condition(s) . . . . .	10
7.3	Hardware constraints . . . . .	10
7.4	Initial conditions . . . . .	10
7.5	Procedure . . . . .	10
7.6	Additional Notes . . . . .	10
<b>8</b>	<b>Test Case SPS-ALERT-ION1-060: Ion Pump 1 Outside Range</b>	<b>11</b>
8.1	Description . . . . .	11
8.2	Pass/Fail Condition(s) . . . . .	11
8.3	Hardware constraints . . . . .	11
8.4	Initial conditions . . . . .	11
8.5	Procedure . . . . .	11
8.6	Additional Notes . . . . .	11
<b>9</b>	<b>Test Case SPS-ALERT-ION2-070: Ion Pump 2 Outside Range</b>	<b>12</b>
9.1	Description . . . . .	12
9.2	Pass/Fail Condition(s) . . . . .	12
9.3	Hardware constraints . . . . .	12
9.4	Initial conditions . . . . .	12
9.5	Procedure . . . . .	12
9.6	Additional Notes . . . . .	12
<b>10</b>	<b>Test Case SPS-ALERT-CTEMP-080: Cooler temperature Outside Range</b>	<b>13</b>
10.1	Description . . . . .	13
10.2	Pass/Fail Condition(s) . . . . .	13
10.3	Hardware constraints . . . . .	13
10.4	Initial conditions . . . . .	13
10.5	Procedure . . . . .	13
10.6	Additional Notes . . . . .	13
<b>11</b>	<b>Test Case SPS-ALERT-CPOWER-090: Cooler Power Outside Range</b>	<b>14</b>
11.1	Description . . . . .	14
11.2	Pass/Fail Condition(s) . . . . .	14
11.3	Hardware constraints . . . . .	14
11.4	Initial conditions . . . . .	14

11.5	Procedure . . . . .	14
11.6	Additional Notes . . . . .	14
<b>12</b>	<b>Test Case SPS-LOG-110: Process logging</b>	<b>15</b>
12.1	Description . . . . .	15
12.2	Pass/Fail Condition(s) . . . . .	15
12.3	Hardware constraints . . . . .	15
12.4	Initial conditions . . . . .	15
12.5	Procedure . . . . .	15
12.6	Additional Notes . . . . .	15
<b>13</b>	<b>Test Case SPS-IO-120: Test File I/O</b>	<b>16</b>
13.1	Description . . . . .	16
13.2	Pass/Fail Condition(s) . . . . .	16
13.3	Hardware constraints . . . . .	16
13.4	Initial conditions . . . . .	16
13.5	Procedure . . . . .	16
13.6	Additional Notes . . . . .	16
<b>14</b>	<b>Test Case SPS-TPROBE-130: Check temperature probes</b>	<b>17</b>
14.1	Description . . . . .	17
14.2	Pass/Fail Condition(s) . . . . .	17
14.3	Hardware constraints . . . . .	17
14.4	Initial conditions . . . . .	17
14.5	Procedure . . . . .	17
14.6	Additional Notes . . . . .	17
<b>15</b>	<b>Test Case SPS-PGAUGE-140: Check pressure gauge probes</b>	<b>18</b>
15.1	Description . . . . .	18
15.2	Pass/Fail Condition(s) . . . . .	18
15.3	Hardware constraints . . . . .	18
15.4	Initial conditions . . . . .	18
15.5	Procedure . . . . .	18
15.6	Additional Notes . . . . .	18
<b>16</b>	<b>Test Case SPS-SHUTTER-150: Shutter control</b>	<b>19</b>
16.1	Description . . . . .	19
16.2	Pass/Fail Condition(s) . . . . .	19
16.3	Hardware constraints . . . . .	19
16.4	Initial conditions . . . . .	19
16.5	Procedure . . . . .	19
16.6	Additional Notes . . . . .	19

<b>17 Test Case SPS-SLIT-160: Slit movement</b>	<b>20</b>
17.1 Description . . . . .	20
17.2 Pass/Fail Condition(s) . . . . .	20
17.3 Hardware constraints . . . . .	20
17.4 Initial conditions . . . . .	20
17.5 Procedure . . . . .	20
17.6 Additional Notes . . . . .	20
<b>18 Test Case SPS-REXM-170: Red exchange mechanism movement</b>	<b>21</b>
18.1 Description . . . . .	21
18.2 Pass/Fail Condition(s) . . . . .	21
18.3 Hardware constraints . . . . .	21
18.4 Initial conditions . . . . .	21
18.5 Procedure . . . . .	21
18.6 Additional Notes . . . . .	21
<b>19 Test Case SPS-BIA-180: Check Back Illumination Assembly Photoresistance</b>	<b>22</b>
19.1 Description . . . . .	22
19.2 Pass/Fail Condition(s) . . . . .	22
19.3 Hardware constraints . . . . .	22
19.4 Initial conditions . . . . .	22
19.5 Procedure . . . . .	22
19.6 Additional Notes . . . . .	22
<b>20 Test Case SPS-CCD-190: Check CCD bias/darks</b>	<b>23</b>
20.1 Description . . . . .	23
20.2 Pass/Fail Condition(s) . . . . .	23
20.3 Hardware constraints . . . . .	23
20.4 Initial conditions . . . . .	23
20.5 Procedure . . . . .	23
20.6 Additional Notes . . . . .	23
<b>Acronyms</b>	<b>24</b>
<b>Glossary</b>	<b>24</b>

# 1 Version and Changelog

The version of this document is **0.1** .

Version	Date	Author	Description
0.1	2019-07-10	H Siddiqui	First version

## 2 Introduction

This document describes the test cases used for demonstrating the validity of the software used for SPS commanding, prior to delivery of the SM1 module to Subaru at the end of 2019.

The intention is for these test cases to be run at during the summer of 2019. A report of the outcome would then be provided to the Project Office, who would then decide whether the software is of an adequate level for use at Subaru.

## 3 Test Case SPS-ALERT-CTHIGH-010: Cooler Temperature Too High

### 3.1 Description

Checks that expected alarm is raised when the cooler temperature exceeds the allowed upper limit.

### 3.2 Pass/Fail Condition(s)

**Pass** Expected alert seen on GUI and written to log when temperature is above the allowed limit.

**Fail** Any result otherwise. For example:

1. The expected alert is *not* raised when the temperature exceeds the limit.
2. An unexpected alert raised when temperature is in fact *within* the allowed range.

### 3.3 Hardware constraints

Cryostat is cooled?

### 3.4 Initial conditions

SM module and temperature board deactivated. AlertsActor deactivated.

### 3.5 Procedure

1. Set temporary range override: `alerts override key=coolerTemps field=0 limits=null,20` (see notes below)
2. Start alerts actor and SM module with temperature board activated
3. Monitor alerts
4. Restore nominal temperature range: `alerts dropOverride key=coolerTemps field=0`

### 3.6 Additional Notes

The temperature range is temporarily overridden to allow the alarm to be triggered without having to force a hardware change - ie., a change to the ambient temperature.

## 4 Test Case SPS-ALERT-PPOWER1-020: PCM UPS Input Power Outside Range

### 4.1 Description

Checks that expected alarm is raised when the PCM UPS Input Power is outside range.

### 4.2 Pass/Fail Condition(s)

**Pass** Expected alert seen on GUI and written to log when power is outside range

**Fail** Any result otherwise. For example:

1. No alert raised when voltage is outside range
2. Unexpected alert raised while power is in fact *within* allowed range

### 4.3 Hardware constraints

Cryostat is cooled?

### 4.4 Initial conditions

SM module and temperature board deactivated. AlertsActor deactivated.

### 4.5 Procedure

Repeat procedure described in 3.5, with `key=pcmPower1` and `limits=27,null`.

### 4.6 Additional Notes

None.

## 5 Test Case SPS-ALERT-PPOWER2-030: PCM AUX Input Power Outside Range

### 5.1 Description

Checks that expected alarm is raised when the PCM AUX Input Power is outside range.

### 5.2 Pass/Fail Condition(s)

**Pass** Expected alert seen on GUI and written to log when power is outside range

**Fail** Any result otherwise. For example:

1. No alert raised when voltage is outside range
2. Unexpected alert raised while power is in fact *within* allowed range

### 5.3 Hardware constraints

Cryostat is cooled?

### 5.4 Initial conditions

SM module and temperature board deactivated. AlertsActor deactivated.

### 5.5 Procedure

Repeat procedure described in 3.5, with `key=pcmPower2` and `limits=27,null`.

### 5.6 Additional Notes

None.



## 6 Test Case SPS-ALERT-PPOWER2-040: Ion Gauge Pressure Outside Range

### 6.1 Description

Checks that expected alarm is raised when the Ion Gauge Pressure is outside range.

### 6.2 Pass/Fail Condition(s)

**Pass** Expected alert seen on GUI and written to log when power is outside range

**Fail** Any result otherwise. For example:

1. No alert raised when ion gauge pressure is outside range
2. Unexpected alert raised while pressure is in fact *within* allowed range

### 6.3 Hardware constraints

Cryostat is cooled?

### 6.4 Initial conditions

SM module and temperature board deactivated. AlertsActor deactivated.

### 6.5 Procedure

Repeat procedure described in 3.5, with `key=pressure` and `limits=1e-10, 1e-02`.

### 6.6 Additional Notes

None.

## 7 Test Case SPS-ALERT-TURBO-050: Turbo Speed Outside Range

### 7.1 Description

Checks that expected alarm is raised when the turbo speed is outside range.

### 7.2 Pass/Fail Condition(s)

**Pass** Expected alert seen on GUI and written to log when turbo speed is outside range

**Fail** Any result otherwise. For example:

1. No alert raised when turbo speed is outside range
2. Unexpected alert raised while turbo speed is in fact *within* allowed range

### 7.3 Hardware constraints

Cryostat is cooled?

### 7.4 Initial conditions

SM module and temperature board deactivated. AlertsActor deactivated.

### 7.5 Procedure

Repeat procedure described in 3.5, with `key=turboSpeed` and `limits=89000, null`.

### 7.6 Additional Notes

None.

## 8 Test Case SPS-ALERT-ION1-060: Ion Pump 1 Outside Range

### 8.1 Description

Checks that expected alarm is raised when the ion pump 1 is outside range.

### 8.2 Pass/Fail Condition(s)

**Pass** Expected alert seen on GUI and written to log when ion pump 1 is outside range

**Fail** Any result otherwise. For example:

1. No alert raised when ion pump is outside range
2. Unexpected alert raised while ion pump is in fact *within* allowed range

### 8.3 Hardware constraints

Cryostat is cooled?

### 8.4 Initial conditions

SM module and temperature board deactivated. AlertsActor deactivated.

### 8.5 Procedure

Repeat procedure described in 3.5, with `key=ionpump1` and `1e-10`, `1e-05`.

### 8.6 Additional Notes

None.

## 9 Test Case SPS-ALERT-ION2-070: Ion Pump 2 Outside Range

### 9.1 Description

Checks that expected alarm is raised when the ion pump 2 is outside range.

### 9.2 Pass/Fail Condition(s)

**Pass** Expected alert seen on GUI and written to log when ion pump 2 is outside range

**Fail** Any result otherwise. For example:

1. No alert raised when ion pump is outside range
2. Unexpected alert raised while ion pump is in fact *within* allowed range

### 9.3 Hardware constraints

Cryostat is cooled?

### 9.4 Initial conditions

SM module and temperature board deactivated. AlertsActor deactivated.

### 9.5 Procedure

Repeat procedure described in 3.5, with `key=ionpump2` and `1e-10`, `1e-05`.

### 9.6 Additional Notes

None.

## 10 Test Case SPS-ALERT-CTEMP-080: Cooler temperature Outside Range

### 10.1 Description

Checks that expected alarm is raised when the cooler temperature is outside range.

### 10.2 Pass/Fail Condition(s)

**Pass** Expected alert seen on GUI and written to log when the cooler temperature is outside range

**Fail** Any result otherwise. For example:

1. No alert raised when cooler temperature is outside range
2. Unexpected alert raised while cooler temperature is in fact *within* allowed range

### 10.3 Hardware constraints

Cryostat is cooled?

### 10.4 Initial conditions

SM module and temperature board deactivated. AlertsActor deactivated.

### 10.5 Procedure

Repeat procedure described in 3.5, with `key=coolerTemps` and `null`, 32.

### 10.6 Additional Notes

None.

## 11 Test Case SPS-ALERT-CPOWER-090: Cooler Power Outside Range

### 11.1 Description

Checks that expected alarm is raised when the cooler power is outside range.

### 11.2 Pass/Fail Condition(s)

**Pass** Expected alert seen on GUI and written to log when the cooler power is outside range

**Fail** Any result otherwise. For example:

1. No alert raised when cooler power is outside range
2. Unexpected alert raised while cooler power is in fact *within* allowed range

### 11.3 Hardware constraints

Cryostat is cooled?

### 11.4 Initial conditions

SM module and temperature board deactivated. AlertsActor deactivated.

### 11.5 Procedure

Repeat procedure described in 3.5, with `key=coolerPowerXX` and range `XX, XX`.

### 11.6 Additional Notes

None.

## 12 Test Case SPS-LOG-110: Process logging

### 12.1 Description

Checks that logging is active for a typical process.

### 12.2 Pass/Fail Condition(s)

**Pass** Logging of INFO, FAIL and WARN messages are correctly written to the expected log file

**Fail** Any result otherwise.

### 12.3 Hardware constraints

None.

### 12.4 Initial conditions

/data and /software volumes are created.

### 12.5 Procedure

None..

Step	Description	Pass/FAIL	Comment
1	TBW		

### 12.6 Additional Notes

A test script installed in the /software folder would address this test effectively.

## 13 Test Case SPS-IO-120: Test File I/O

### 13.1 Description

Checks that data can be read and written from the input and output directories.

### 13.2 Pass/Fail Condition(s)

**Pass** Data can be written to and read from the /data volume, and software can be written to and read from the /software volume.

**Fail** Any result otherwise.

### 13.3 Hardware constraints

None.

### 13.4 Initial conditions

/data and /software volumes are created.

### 13.5 Procedure

For each volume:

Step	Description	Pass/FAIL	Comment
1	Create small files		
2	Read those files		
3	Copy those files to new locations within same volume and check that they are readable.		

### 13.6 Additional Notes

A test script installed in the /software folder would address this test effectively.



## 14 Test Case SPS-TPROBE-130: Check temperature probes

### 14.1 Description

Checks that the temperature probes for the CCD, cryostat and OBA are functioning.

### 14.2 Pass/Fail Condition(s)

**Pass** Temperature values read from the probes are in the expected range (1-100 K)

**Fail** If the temperature reads NaN or zero.

### 14.3 Hardware constraints

None.

### 14.4 Initial conditions

TBW.

### 14.5 Procedure

For each probe:

Step	Description	Pass/FAIL	Comment
1	On GUI check temperature value.		

### 14.6 Additional Notes

None.

## 15 Test Case SPS-PGAUGE-140: Check pressure gauge probes

### 15.1 Description

Checks that the pressure gauge is functioning correctly.

### 15.2 Pass/Fail Condition(s)

**Pass** The pressure gauge reads a realistic value.

**Fail** If the pressure reads NaN or zero.

### 15.3 Hardware constraints

None.

### 15.4 Initial conditions

TBW.

### 15.5 Procedure

For each probe:

Step	Description	Pass/FAIL	Comment
1	On GUI check pressure gauge value.		

### 15.6 Additional Notes

None.

## 16 Test Case SPS-SHUTTER-150: Shutter control

### 16.1 Description

Checks the SpS shutter movement

### 16.2 Pass/Fail Condition(s)

**Pass** Shutters open/close as expected

**Fail** Any result otherwise.

### 16.3 Hardware constraints

None.

### 16.4 Initial conditions

All shutter are in the closed position.

### 16.5 Procedure

For each shutter:

Step	Description	Pass/FAIL	Comment
1	Open Shutter		
2	Check that monitor shows that the shutter door is open		
3	Close shutter		
4	Check that the monitor confirms that the shutter door is closed		

### 16.6 Additional Notes

None..

## 17 Test Case SPS-SLIT-160: Slit movement

### 17.1 Description

Check the slit movement such that the expected positions are reached.

### 17.2 Pass/Fail Condition(s)

**Pass** The slit position is as intended, within the given tolerance.

**Fail** Any result otherwise.

### 17.3 Hardware constraints

None?

### 17.4 Initial conditions

None.

### 17.5 Procedure

1. for each position A, B, C, D, E:
  - (a) command slit to be moved to that position
  - (b) check whether the expected position is reached within tolerance 1 micron
  - (c) monitor slit movement throughout.

Step	Description	Pass/FAIL	Comment
1	Position A		
2	Position B		
3	Position C		
4	Position D		
5	Position E		

### 17.6 Additional Notes

None..

## 18 Test Case SPS-REXM-170: Red exchange mechanism movement

### 18.1 Description

Checks that the red exchange mechanism moves as expected.

### 18.2 Pass/Fail Condition(s)

**Pass** The REXM switches to the expected mode.

**Fail** Any result otherwise.

### 18.3 Hardware constraints

None?

### 18.4 Initial conditions

None.

### 18.5 Procedure

Step	Description	Pass/FAIL	Comment
1	Move REXM to low resolution mode		
2	Check position		
3	Move REXM to high resolution mode		
4	Check position		

### 18.6 Additional Notes

None..

## 19 Test Case SPS-BIA-180: Check Back Illumination Assembly Photoresistance

### 19.1 Description

Check photoresistance of BIA.

### 19.2 Pass/Fail Condition(s)

**Pass** The photoresistance is measured as expected.

**Fail** Any result otherwise.

### 19.3 Hardware constraints

None?

### 19.4 Initial conditions

None.

### 19.5 Procedure

Step	Description	Pass/FAIL	Comment
1	Check from the monitors that the protoresistance is 'saturated'.		

### 19.6 Additional Notes

None..

## 20 Test Case SPS-CCD-190: Check CCD bias/darks

### 20.1 Description

None.

### 20.2 Pass/Fail Condition(s)

**Pass** The CCD bias and darks are processed correctly.

**Fail** Processing fails.

### 20.3 Hardware constraints

None?

### 20.4 Initial conditions

None.

### 20.5 Procedure

Step	Description	Pass/FAIL	Comment
1	Take the bias and dark exposures.		
2	Check the FITS headers of the bias and dark files for any non-conformance.		
3	Process the CCD bias and darks against the 2D DRP pipeline.		

### 20.6 Additional Notes

None..

## Acronyms

**SPS** Spectrograph System.

## Glossary

**Spectrograph System** The software which commands cobra motions.