

SPIRE

**SUBJECT: Cold workmanship vibration test procedure
PFM**

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Date:

SPIRE

Project Document

Cold vibration test procedure

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Issue: 1
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Distribution

Change Record

ISSUE	DATE	
1	5/4/06	New issue

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Glossary

SPIRE Spectral and Photometric Imaging REceiver

References

Applicable Documents

No	Document	Ref
AD1	SPIRE PFM cold vibration test plan	SPIRE-RAL-PRC-002524

Reference Documents

1. SCOPE

This document describes the detailed procedure to be followed during the cold vibration testing on the FPU to be carried out at CSL, Liege.

It should be used in conjunction with AD1

2. ACCELEROMETER ALLOCATION

Channel No	Location	Type	Serial no	Code	Axis	Feed thro'
	FPU top of optics bench over cone	7724		FPUX	X	4
	FPU top	7724		FPUY	Y	5
	FPU top	7724		FPUZ	Z	6

3. TEMPERATURE SENSOR LOCATIONS

Sensor No	Location	CODE	Calibration Curve Prime	Calibration curve Redundant
1	RF filter	RF	X30977	X31056
2	Spectrometer 2K	SPEC	X29606	X29592
3	Photometer 2K	PHOT	X29601	X29603
4	Optical sub bench	OPSB	X30981	X29602
5	Input baffle	BAF	X29604	X31033
6	BSM/SOB interface	BSM	X29597	X31036

NB the redundant set will be used for this test

4. STEP BY STEP TEST SEQUENCE RECORD

No	Activity	Time	Date	Run number	Comments	Resp.
1	Test preparation					
1.1	Unpacking from container: As per AD1 Store container until the end of the test	3 hrs	8/5/06			
1.2	Visual inspection of the FPU Cover with cover provided while awaiting integration Fit the three accelerometers to the FPU.	2 hrs 1 hr	8/5/06		Record any anomalies	

2	Vibration Test in X axis					
2.1	<p>Test preparation</p> <p>Assuming test adaptor is fitted to the shaker</p> <p>Fit FPU to test adaptor in accordance with AD1</p> <p>Check torque of mounting feet</p> <p>8.1 Nm plus running torque for M6</p> <p>8.25 plus running torque or M8 Kaylock nut.</p> <p>2.1 Nm for the JFET bolts.</p> <p>Remove MGSE</p> <p>Fit temporary thermal straps between FPU and fixture, 4 straps at each end of the SOB.</p> <p>Cover detector harness connectors with copper tape to</p>	<p>3 hrs</p> <p>½ hrs</p> <p>½ hrs</p>	8/5/06			

	<p>provide ESD protection</p> <p>Check isolation and record results</p> <p>L1 to FPU FPU to fixture Spectrometer L0 to FPU Pump L0 to FPU Evaporator L0 to FPU</p> <p>Note JFET supports to be lifted from the fixture for this test</p> <p>Connect accelerometers carry out continuity check.</p>	<p>2 hrs</p>				
	<p>Carry out very low level test in ambient 0.25g 5 to 2000Hz</p> <p>Note The Kevlar suspended detectors will not tolerate significant levels when warm. This test is to verify the instrumentation only.</p>	<p>½ hrs</p>				

	<p>Connect temperature sensors</p> <p>Note These sensors do not record accurate temperatures at room temperature. Accurate only below 40K.</p> <p>Individual calibration curves will be supplied by SPIRE</p>					
3	TRR	4 hrs	9/5/06			
4	Shrouds installation, connection of pumps and fluid lines	2 days	9/5/06 10/5/06			
5	<p>Evacuation</p> <p>Monitor pressure during evacuation and check for consistence with evacuation rate requirement in AD1 Evacuation and re-pressurisation to be in accordance with AD1, max rate 50mb/min</p> <p>Note pressure values or attach</p>		11/5/06			

	record					
6	<p>Cool down</p> <p>Monitor temperature sensors during cool down and check for consistence with cool down requirements in AD1</p> <p>Max rate of change of BSM sensor is:- Ambient to 200K -- 5K/hour 200K to 100K -- 10K/hour Below 100K -- 50K/hour</p> <p>Maximum delta T between BSM and LTA is:- Ambient to 200K -- 35K 200K to 100K -- 40K. Below 100K, No restriction</p> <p>Note Temperature or attach temperature record of temperature sensors</p>		11/5/06 12/5/06 13/5/06 14/5/06			

20.1	<p>Resonance search</p> <p>Check results against those expected.</p> <p>Confirm levels for next test</p>	<p>1/2hr</p> <p>1hr</p> <p>1hr</p>	15/5/06		0.25g 5 to 2000Hz			
20.5	Low level Random test	1/2hr			<p>-12dB</p> <p>Full level is</p> <table border="1"> <tr> <td>Frequency Range Hz</td> <td>Acceptance levels</td> </tr> </table>	Frequency Range Hz	Acceptance levels	
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	test to AD1 at -12dB Check results	1/2hr				<table border="1"> <tr><td>20-100</td><td>+3dB/Oct</td></tr> <tr><td>100-150</td><td>0.032 g²/Hz</td></tr> <tr><td>150-300</td><td>0.0128 g²/Hz</td></tr> <tr><td>300-2000</td><td>-12 dB/Oct</td></tr> <tr><td>Global</td><td>2.77 g RMS</td></tr> </table>	20-100	+3dB/Oct	100-150	0.032 g ² /Hz	150-300	0.0128 g ² /Hz	300-2000	-12 dB/Oct	Global	2.77 g RMS			
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20.6	Intermediate level Random test test to AD1 at -6dB Check results	1/2hr 1/2hr	15/5/06		-6 dB	Full level is <table border="1"> <thead> <tr> <th>Frequency Range Hz</th> <th>Acceptance levels</th> </tr> </thead> <tbody> <tr><td>20-100</td><td>+3dB/Oct</td></tr> <tr><td>100-150</td><td>0.032 g²/Hz</td></tr> <tr><td>150-300</td><td>0.0128 g²/Hz</td></tr> <tr><td>300-2000</td><td>-12 dB/Oct</td></tr> <tr><td>Global</td><td>2.77 g RMS</td></tr> </tbody> </table>	Frequency Range Hz	Acceptance levels	20-100	+3dB/Oct	100-150	0.032 g ² /Hz	150-300	0.0128 g ² /Hz	300-2000	-12 dB/Oct	Global	2.77 g RMS	
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20.7	Acceptance level random test Carry out test to AD1 Check results	1/2hr 1/2hr	15/5/06		Full level <table border="1" data-bbox="1440 368 1912 624"><thead><tr><th>Frequency Range Hz</th><th>Acceptance levels</th></tr></thead><tbody><tr><td>20-100</td><td>+3dB/Oct</td></tr><tr><td>100-150</td><td>0.032 g²/Hz</td></tr><tr><td>150-300</td><td>0.0128 g²/Hz</td></tr><tr><td>300-2000</td><td>-12 dB/Oct</td></tr><tr><td>Global</td><td>2.77 g RMS</td></tr></tbody></table>	Frequency Range Hz	Acceptance levels	20-100	+3dB/Oct	100-150	0.032 g ² /Hz	150-300	0.0128 g ² /Hz	300-2000	-12 dB/Oct	Global	2.77 g RMS	
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20.8	Resonance search Carry out resonance search as before	1/2hr	15/5/06		0.25g 5 to 2000Hz													

	Compare with previous results	1/2hr				
20.9	Post test analysis Check completeness of data Carry out initial assessment	1/2hr 2hrs				
21	TRR					
22	Post Test Activities					

	<ul style="list-style-type: none">• check completeness of test data • Warm up Monitor temperature sensor during warm up and check for consistence with cool down requirements in AD1 Note Temperature or attach temperature record of temperature sensors Max rate of change of BSM sensor is:- Ambient to 200K -- 5K/hour 200K to 100K -- 10K/hour Below 100K -- 50K/hour Maximum delta T between BSM and LTA is:- Ambient to 200K -- 35K 200K to 100K -- 40K. Below 100K, No restriction		16/5/06 17/5/06 18/5/06			
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	<p>Venting Monitor pressure during venting and check for consistence with evacuation rate requirement in AD1 Note pressure values or attach record</p> <p>Max rate 50mb/min</p>	4hrs	19/5/06		
23	<p>Dismount dismounting of shrouds</p> <ul style="list-style-type: none"> • Visual inspection of test specimen • Removal of instrument (TBC) and 	4hrs 1hr 2hr	20/5/06		

	cleanliness inspection with UV light					
	<ul style="list-style-type: none">• Installation of the instrument inside its own container in accordance with AD1	2hr				
24	Transport		21/5/06			

