# SPIRE

**SUBJECT:** Cold vibration test procedure

	CQM		
PREPARED BY:	E Sawyer		
DOCUMENT No:	SPIRE-RAL-PRC-001956		
ISSUE:	3	Date:	30/3/04
CHECKED BY:		Date:	
APPROVED BY:		Date:	



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 2 of 2 Page:

# **Distribution**



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 3 of 3 Page:

# **Change Record**

ISSUE	DATE	
1	10/3/04	New issue
2	26/3/04	Modifications noted during TRR.
		Times added
		Torques added
		Accelerometer locations added
		Temperature sensor locations added
3	30/3/04	Intermediate level sine and random were optional, now
		mandatory



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 4 of 4 Page:

## **Table of Contents**

1.	SCOPE	. 7
2.	ACCELEROMETER ALLOCATION	. 7
3.	TEMPERATURE SENSOR LOCATIONS	. 7
4.	STEP BY STEP TEST SEQUENCE RECORD	. 8



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 Date: 30/3/04 Page: 5 of 5

#### Glossary

Spectral and Photometric Imaging REceiver SPIRE



Cold vibration test procedure

Ref: SPIRE-RAL-PRC-001956

Issue: 3
Date: 30/3/04
Page: 6 of 6

#### References

## **Applicable Documents**

No	Document	Ref
AD1	SPIRE cold vibration test plan	SPIRE-RAL-PRC-001955

**Reference Documents** 



Cold vibration test procedure

Ref: SPIRE-RAL-PRC-

001956

**Issue:** 3 **Date:** 30/3/04 **Page:** 7 of 7

#### 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	Code	Axis
F66	Photometer detector (side)	PHS.XY	X and Y
F72	Photometer detector (side)	PHS.Z	Z
F58	Photometer detector (end)	PHE.XY	X and Y
F56	Cooler	COOL	X
F73	FPU top of optics bench over cone	FPUX	X
F71	FPU top	FPUY	Y
F63	FPU top	FPUZ	Z
F51	Spectrometer detector	SPECX	X
F52	Spectrometer detector	SPECZ	Z
F53	Spectrometer detector	SPECY	Y
F61	Optics bench near SMEC	OBY	Y
F54	SMEC moving carriage	SMECLX	X
11030	Cold tip	CTIPY	Y
11606	SMEC top	SMECUX	X

#### 3. TEMPERATURE SENSOR LOCATIONS

Sensor number	Location	CODE	
1	RF filter	RF	
2	Spectrometer 2K	SPEC	
3	Photometer 2K	PHOT	
4	Optical sub bench	OPSB	
5	Input baffle	BAF	
6	BSM/SOB interface	BSM	



Cold vibration test procedure

Ref: SPIRE-RAL-PRC-001956

Issue: 3 **Date:** 30/3/04 8 of 8 Page:

## 4. Step by step test sequence record

No	Activity	Time	Date	Comments	Resp.
1	Test preparation				
1.1	Unpacking from container: As per AD1	3 hrs	29/3/04		
	Store container until the end of the test				
1.2	Visual inspection of the FPU	2 hrs		Record any anomalies	
	Cover with cover provided while awaiting integration				
	Accelerometers and temperature sensors will be fitted before delivery.				
2	Vibration Test in TBD axis				
2.1	Test preparation				
	Assuming test adaptor is fitted to the shaker				
	Fit FPU and JFETs to test adaptor in accordance with AD1	3 hrs			



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 9 of 9

Charle tomana of manufine fact			
Check torque of mounting feet			
<ul><li>8.1 Nm plus running torque for M6</li><li>8.25 plus running torque or M8</li><li>Kaylock nut.</li><li>2.1 Nm for the JFET bolts.</li><li>2.5 nm for the L3 straps to JFETS</li></ul>	½ hrs		
Remove MGSE	½ hrs		
Connect accelerometers carry out continuity check.			
Connect temperature sensors	½ hrs		
Note These sensors do not record accurate temperatures at room temperature. Accurate only below 40K.			
Individual calibration curves will be supplied by SPIRE			
Carry out very low level test in ambient 0.2g max.			
Note The Kevlar suspended detectors will not tolerate significant levels when warm. This test is to verify the instrumentation only.			
Shrouds installation, connection of pumps and fluid lines			



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 10 of 10

r		ı		
2.2	TRR	4 hrs	30/304	
2.2	Evacuation  Monitor pressure during evacuation and check for consistence with evacuation rate requirement in AD1		01/4/04	
	Note pressure values or attach record			
2.3	Cool down			
-0	Monitor temperature sensor during cool down and check for consistence with cool down requirements in AD1		03/04/04	
	Note Temperature or attach temperature record of temperature sensors			
2.4	Test readiness review			



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 11 of 11

2.5	TBD axis test		
2.6	Resonance search		
	Check results against those expected.		
	Check results against those expected.		
	Confirm levels for next test		
2.7	Intermediate sine test		
2.7	intermediate sine test		
2.0	P.U. I. C.		
2.8	Full level sine test		
	As per requirements in AD1		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 12 of 12

	Check results		
2.9	Resonance search		
	Cary out resonance search as before		
	~		
	Compare with previous results		
2.10	Low level Random test		
2.10	Low level Random test		
2.10	Low level Random test		
2.10			
2.10	Low level Random test  test to AD1 at -12dB		
2.10			
2.10	test to AD1 at -12dB		
2.10			
2.10	test to AD1 at -12dB		
2.10	test to AD1 at -12dB		
2.10	test to AD1 at -12dB		
2.10	test to AD1 at -12dB		
2.10	test to AD1 at -12dB		
2.10	test to AD1 at -12dB		
2.10	test to AD1 at -12dB		
	test to AD1 at –12dB  Check results		
2.10	test to AD1 at -12dB		
	test to AD1 at –12dB  Check results		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 13 of 13

	test to AD1 at –6dB		
	Check results		
2.12	Qualification level random test		
	Carry out test to AD1		
	Check results		
2.13	Resonance search		
	Cary out resonance search as before		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 14 of 14

	Compare with previous results		
2.14	Post test analysis		
	Check completeness of data		
	Carry out initial assessment		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 15 of 15

3.	Test in TBD axis		
3.2	Evacuation if required		
	Monitor pressure during evacuation and check for consistence with evacuation rate requirement in AD1		
	Note pressure values or attach record		
3.3	Cool down if required		
	Monitor temperature sensor during cool down and check for consistence with cool down requirements in AD1  Note Temperature or attach		
	temperature record of temperature sensors		
3.4	Test readiness review		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 16 of 16

3.5	TBD axis test		
3.6	Resonance search		
	Check results against those expected.		
	Confirm levels for next test		
3.7	Intermediate sine test		
3.8	Full level sine test		
	As per requirements in AD1		
	Check results		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 17 of 17

3.9	Resonance search		
	Cary out resonance search as before		
	Compare with provious results		
	Compare with previous results		
3.10	Low level Random test		
	test to AD1 at -12dB		
	test to AD1 at -12db		
	Check results		
3.11	Intermediate level Random test		
	test to AD1 at -6dB		
	Check results		
	CHECK TESUITS		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 18 of 18

3.12	Qualification level random test		
	Carry out test to AD1		
	Charle was 14		
	Check results		
3.13	Resonance search		
	Cary out resonance search as before		
	Compare with previous results		
	•		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3

**Date:** 30/3/04 Page: 19 of 19

3.14	Post test analysis		
	Check completeness of data		
	Carry out initial assessment		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 20 of 20

4	TBD axis test		
4.2	Evacuation if required		
	Monitor pressure during evacuation and		
	check for consistence with evacuation		
	rate requirement in AD1		
	Note pressure values or attach record		
	1		
4.3	Cool down if required		
	_		
	Monitor temperature sensor during cool		
	down and check for consistence with		
	cool down requirements in AD1		
	Note Temperature or attach		
	temperature record of temperature		
	sensors		
4.4	Test readiness review		
4.4	Test readiness review		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 21 of 21

TBD axis test	
Resonance search	
Check results against those expected.	
Confirm levels for next test	
Intermediate sine test	
Full level sine test	
As per requirements in AD1	
Chook recults	
Check results	
	Resonance search  Check results against those expected.  Confirm levels for next test



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 22 of 22

4.9	Resonance search		
	Cary out resonance search as before		
	Compare with previous results		
4.10	Low level Random test		
4.10	Low level Kandom test		
	test to AD1 at -12dB		
	Check results		
4.11	Intermediate level Random test		
	test to AD1 at -6dB		
	Check results		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 23 of 23

4.12	Qualification level random test		
	<b>Q</b>		
	Carry out test to AD1		
	Carry out test to TIE I		
	Check results		
	Check results		
4.13	Resonance search		
	Cary out resonance search as before		
	Compare with previous results		
	•		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 24 of 24

4.14	Post test analysis		
	Check completeness of data		
	Carry out initial assessment		
5	Post Test Activities		
	• 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		



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3

**Date:** 30/3/04 Page: 25 of 25

Venting  Monitor pressure during venting and check for consistence with evacuation rate requirement in AD1  Note pressure values or attach record	
Open cryostat.	
dismounting of shrouds	
<ul> <li>Visual inspection of test specimen</li> <li>Removal of instrument (TBC) and cleanliness inspection with UV light</li> </ul>	
• Installation of the instrument inside its own container in accordance with AD1	



Cold vibration test procedure

SPIRE-RAL-PRC-001956 Ref:

**Issue:** 3 **Date:** 30/3/04 Page: 26 of 26

6	Post Test Review		