

Description	Action	due date
<p>Wednesday and will continue on Friday / Saturday / even Sunday if needed (test was not planned to perform it within this week).</p> <p>Friday 24.08, situation will be reviewed and the continuation of the environmental test program will be agreed, (outstanding EMC subjects and if the vibration could start on Monday 27.08.</p>		
<p>4) AOB, Conclusion</p> <p>The ongoing test program Vibration / TV has to be reconvened.</p> <p>Back up Vibration facilities will be contacted.</p> <p><u>JEM-X FM1 EMC tests can start.</u></p>		
<h3>III) PTR for EMC test</h3>		
<h4>Agenda</h4>		
<ol style="list-style-type: none"> <li>1) Test configuration, deviations</li> <li>2) Tests performed, deviations</li> <li>3) Test results</li> <li>4) NCR's, open work</li> <li>5) AOB</li> <li>6) Conclusion</li> </ol>		
<p>Participants: Jaap v.d. Meulen, Paul Anker Jensen, Mauro Gorla, Peter Rumler, Arrien Tiemon p.t.</p>		
<h4><u>1) Test configuration, deviations</u></h4>		
<p>No deviation w.r.t. TRR</p>		
<h4><u>2) Tests performed, deviations</u></h4>		
<p>Deviations w.r.t. procedure and TRR:</p>		
<ul style="list-style-type: none"> <li>- Bonding of adjacent metallic parts was not performed (step 140), since this is an integration test.</li> <li>- CE-P/CM (step 400): test was done in frequency domain instead of time domain, in order to be able to verify the requirement of 100uA.</li> <li>- Ambient RE-E was skipped in order to save time, justified by emissions being in specification.</li> <li>- RE-E on opposite side of connectors were skipped, except for RE-E 10kHz-1GHz, vertical polarisation; lower results justify deletion.</li> <li>- RE-E BB bandwidths were not specified, and chosen to be 10 times the NB ones. Correction to 1MHz bandwidth was done numerically and without NB/BB discrimination.</li> <li>- RS-E on opposite side of connectors was skipped, and tests were performed up to 18GHz instead of 20GHz. This is considered</li> </ul>		

Description	Action	due date
<p>technically acceptable.</p> <ul style="list-style-type: none"> <li>- CS injection above 100kHz was performed with current probe injection instead of coupling capacitor.</li> <li>- CS injection starting frequency was 10kHz (instead 30Hz), and injection was done by sweep (max. emission +6dB) instead of discrete frequencies.</li> <li>- Injections on J04 signal connector were added, since initially they were forgotten.</li> </ul>		
<p><b>3) Test results</b></p>		
<p>Summary test results are attached in <b>annex 6</b>.</p>		
<p>Out-of Specification:</p>		
<ul style="list-style-type: none"> <li>- REE/NB, plots 10,12, 768MHz (Proton notch), 15dB over in vertical, 9dB over in horizontal. This is considered acceptable as JEMX is OFF during launch. See also SPI justifications in <b>annex 7</b>. DSRI will raise a RFW accordingly (IN-WV-JEM-0004).</li> <li>- REE/NB, 2.0-2.4GHz, plots 13b, 13c, +2.3dB at 2.2076GHz, +2dB at 2.07936GHz. Both are outside the receiver band at 2.039GHz. A NCR will be raised (IN-NC-JEM-1039).</li> <li>- RS-E 1-18GHz, 20V/m a slight increase in HV monitor noise (&lt;1%) was observed, exact frequency unknown.</li> <li>- CS-S/CM 60dBuV/m was injected across the whole frequency range (7-8dB above highest emission).</li> <li>- CS/CM rejection: susceptibility at 6.7 to 7.7MHz: at 5Vpp a CPU reset occurred (safe mode), injection levels were reduced to 2.5Vpp, 1.25Vpp and 0.625Vpp, with the latter being established as susceptibility threshold (gradual reduction of HV level disturbance). DSRI explains that they believe the problem originates from the test set-up disconnecting all the ground and shields for this injection. It should be considered to perform a CM current injection in flight configuration (and grounding) during S/C level CS tests. DSRI will write an NCR (IN-NC-JEM-1040).</li> </ul>		
<p><b>4) NCR's, open work</b></p>		
<p>2 NCR's and 1 RFW will be raised, see point 4) for details.</p> <p>All tests are considered to be performed, there is no open work.</p> <p>Note that ESD tests will be performed on QM/EM unit (detector/electronics). It is supposed to arrive here end of this week.</p> <p>The detailed planning for ESD is still TBD (depending on other tests planned within the EMC facility).</p>		
<p><b>5) AOB</b></p>		
<p>The ETS data report with all plots will be issued after the ESD test, and be delivered in 5 copies (1-DSRI, 2-ALS, 2-ESA) mid of Sept.</p>		

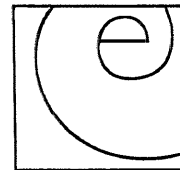
Description	Action	due date
<b>6) Conclusion</b>		
<p>The FM1 EMC test has been successfully completed, thanks to a considerable effort from DSRI and ETS, despite short term schedule changes caused by vibration test facility problems.</p> <p>Test dates, Start Wednesday afternoon, 22.8.2001, continued on Friday, 24.8.01, Saturday 25.8.01 and Monday 27.08.01.</p> <p>The JEMX FM1 is herewith released for the next test phase.</p>		
<hr/> <b>IV) Delta TRR for vibration</b>		
<b>Agenda</b>		
<ol style="list-style-type: none"> <li>1) Status of EMC test</li> <li>2) Vibration test facility status</li> <li>3) Test schedule</li> <li>4) AOB, conclusion</li> </ol>		
<ol style="list-style-type: none"> <li>1) Status of EMC test <p>The EMC test has been performed within the ESTEC EMC facility and finished on Monday, 27.08.01 14.00 hours, Release for vibration test was given.</p> </li> </ol>		
<ol style="list-style-type: none"> <li>2) Vibration test facility status <p>The 80 KN shaker has been repaired. All performed dry runs showed no anomaly anymore.</p> <p>The facility has performed the dry runs with the JEM-X test adapter already.</p> </li> </ol>		
<ol style="list-style-type: none"> <li>3) Test schedule <p>The present test schedule needs 3 days minimum. Due to the planned start of the INTEGRAL vibration on the 220 KN shaker the tests needs to be finished latest on Thursday 30.08.01</p> </li> </ol>		
<ol style="list-style-type: none"> <li>4) AOB, Conclusion <p>No open issues at the present status, which can have an impact on the test.</p> <p>JEM-X is ready for the vibration test.</p> </li> </ol>		

**Ref. No.: ETS/MOM/EMC/229**

# Minutes of Meeting

**Meeting Date: 22/08/01**

Sheet: 1 of 4 + annexes

ets european  
test  
services

Place: ESTEC, Room FJ111

**Subject: Facility readiness review for the JEM-X FM1 test in EMC facility**

**Agenda:**

- |     |  |   |
|-----|--|---|
| 1.  | Test Item & Requirements.....                | 2 |
| 2.  | Planning .....                               | 2 |
| 3.  | Responsibilities .....                       | 2 |
| 4.  | Test Equipment & Facility Configuration..... | 2 |
| 5.  | Instrumentation .....                        | 2 |
| 6.  | Facility Maintenance Status.....             | 2 |
| 7.  | Preparation status .....                     | 3 |
| 8.  | NCRs & Open actions .....                    | 3 |
| 9.  | Procedures & Documentation.....              | 3 |
| 10. | Safety, Security & Cleanliness .....         | 3 |
| 11. | AOB .....                                    | 3 |
| 12. | Conclusion .....                             | 3 |
|     | Action item initiation sheet .....           | 5 |

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## **1. TEST ITEM & REQUIREMENTS**

The aim of the Facility Readiness Review is to agree the readiness of the EMC test program.

The test item is JEM-X FM1.

The objective of the test is to perform the EMC test according to the procedure IN-TP-JEM-0002 issue3 revision1 "Electromagnetic compatibility test procedure". This procedure has been red marked by the customer and will be given to the facility operator prior to the test.

**Note: Conducted test on the redundant power lines will not be performed during test.**

## **2. PLANNING**

The following planning is foreseen:

22 Aug. 2001 TRR

22 Aug. 2001 Start test

Tbd End test to be reconsidered on Friday 24 Aug. 2001

## **3. RESPONSIBILITIES**

Test manager : J.P. Vessaz

Test Engineer : J. Vd Meulen

Facility operator : J. Vd Meulen

## **4. TEST EQUIPMENT & FACILITY CONFIGURATION**

The item will be installed in its nominal configuration in the chamber.  
All of the specifics fixing parts are available.

## **5. INSTRUMENTATION**

Standard instrumentation will be used for test and no specific requirements have to be considered.

## **6. FACILITY MAINTENANCE STATUS**

*The Facility Maintenance Status Reports are attached as follows:*

➤ EMC Maintenance records (see annex A)

All maintenance activities have been performed according to maintenance plan

*The Facility Calibration Status Reports are attached as follows:*

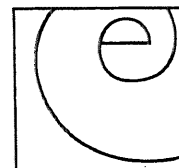
➤ EMC Calibration records (see annex B)

All equipment in use for this test is in validity period of calibration

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**ets** european  
test  
services

### **7. PREPARATION STATUS**

The preparation work related to this test is to get all relevant maintenance & calibration done in due time before the 22 August 2001 PM (see action 1&2).

### **8. NCRs & OPEN ACTIONS**

1 open NCRs (see annex C) :

01-797 Status -> IFI SMX 100. No impact on the test: work around solution is implemented.

### **9. PROCEDURES & DOCUMENTATION**

IN-TP-JEM-0002 issue3 revision1 "Electromagnetic compatibility test procedure" red marked.

### **10. SAFETY, SECURITY & CLEANLINESS**

- **Safety** Radioactivity of the calibration sources to be checked as well as to inform operators in regard of the attendance of beryllium parts. (See actions 3).
- **Cleanliness** Class 100.000
- **Temperature**  $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$
- **Humidity**  $40\% < H < 60\%$

### **11. AOB**

**Status of cranes:** - No crane will be used

**Status of buildings:** - No relevant problem linked to the EMC area

**Agreement on the insurance status:**

The customer requirements in matter of insurance is compatible with the level of insurance ETS as contracted for the test item as well as for the facility (see Action 4).

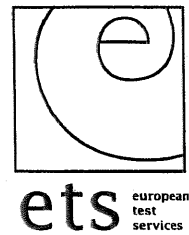
### **12. CONCLUSION**

The FRR board agrees that the facility is ready for testing providing that the action list attached is completed.

## Minutes of Meeting

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**ACTION ITEM INITIATION SHEET**

Action Nr.	Title and Description	Due Date	Actionee
<b>1</b>	To provide to the customer the list of equipment in use for the test	As part of the test report	J. vd Meulen
<b>2</b>	To verify the functioning of the equipment	22 Aug. 2001 PM	J. vd Meulen
<b>3</b>	To contact ADM-GTS for radioactive level measurement of JEM-X FM1 -> <i>As been done on 22/08/2001 AM and results are satisfying. No additional procedure is requested.</i>	22 Aug. 2001	Ph Cosio
<b>4</b>	To open an administrative task for the EMC test -> <i>Has been done on 22/08/2001 AM</i>	22 Aug. 2001	J.P. Vessaz

Visa:

# Facility maintenance

Checkdate	Item	Type	Date to	Date next	Validity months	Hours	Status
EMC							
Fixed							
Amplifier							
Amplifiers							
Cables							
Common							
Coupler							
Front End							
Variable							
Common							



ID No	Item	Title	Date last	Date next	Validity months left	Hours	Status
EM11/2/3	Software	Preparation	03-Jul-01	03-Oct-09	99		IN

# *NCR\_Report*

<i>NCR#</i>	<i>Facility</i>	<i>Title</i>	<i>The low band of the amplifier doesn't deliver any power</i>			<i>Test/Activity</i>	<i>Maintenance</i>	<i>Building</i>	<i>Date</i>
02 797	EMC amplifier								26-Mar-0
<input type="checkbox"/>	<i>No MRB</i>	<input checked="" type="checkbox"/>	<i>Minor</i>	<input type="checkbox"/>	<i>Class C</i>				
<input checked="" type="checkbox"/>	<i>MRB disposition</i>	<input type="checkbox"/>	<i>Major</i>	<input type="checkbox"/>	<i>Class B</i>				
<input type="checkbox"/>	<i>Closed</i>			<input type="checkbox"/>	<i>Class A</i>				

Use other amplifier in order to complete the field "culi brabor"  
 Amplifier to LEP for repair. Default of the PCB. Waiting for informations manufacturer / Upgraded PCB or Not (MRB to be held after answer)

JEM X test results			
Bonding			All measurements < 10 mΩ
Isolation			All measurements in spec
CE NB	Plot 1	J07 Positive power ambient	
	Plot 2	J07 positive power calibration mode	In spec
	Plot 3	J07 power return cal mode	In spec
	Plot 4	J07 common mode power lines	In spec ( no time domain measured)
	Plot 5	J04 common mode analog lines	Reference for CS
	Plot 6	J06 common mode digital lines	Reference for CS
RE NB	Plot 7	RE NB vertical pol calibration mode 10 KHz to 1 GHz	In spec
	Plot 8	RE NB Horz pol calibration mode 30 Mhz to 1 GHz	In spec
	Plot 9	RE NB vertical pol calibration mode 420 MHz slot	In spec
	Plot 10	RE NB vertical pol calibration mode 760 MHz slot	768 MHz 15 dB out .N.A.
	Plot 11	RE NB horizontal pol calibration mode 420 MHz slot	In spec
	Plot 12	RE NB horizontal pol calibration mode 760 MHz slot	768 MHz 9 dB out .N.A.
	Plot 13	RE NB vertical pol calibration mode 2- 2.4 GHz slot	Complete slot measured with given band with gives noise level above the spec.
	Plot 13B	RE NB vertical pol calibration mode 2- 2.4 GHz slot	Complete lot using preamp 3 harmonics of 32 MHz are upto 2.3 dB out
	Plot 13C	RE NB horz pol calibration mode 2- 2.4 GHz slot	Complete lot using preamp 1 harmonics of 32 MHz is 2 dB out
	Plot 14	RE NB vertical pol calibration mode 2035 to 2045 MHz	In spec BW 300 Hz
	Plot 15	RE NB horizontal pol calibration mode 2035 to 2045 MHz	In spec BW 300 Hz
	Plot 16	RE NB horizontal pol calibration mode 2013 to 2016 MHz	In spec BW 300 Hz
	Plot 17	RE NB vertical pol calibration mode 2013 to 2016 MHz	In spec BW 300 Hz
	Plot 18	RE BB vertical pol calibration mode 10 KHz to 1 GHz	Not corrected for MHz bw
	Plot 19	RE BB vertical pol calibration mode 10 KHz to 1 GHz	In spec Corrected to 1 MHz bw
	Plot 20	RE NB Horz pol calibration mode 30 MHz to 1 GHz	Not corrected for MHz bw
	Plot 21	RE NB Horz pol calibration mode 30 MHz to 1 GHz	In spec Corrected to 1 MHz bw
	Plot 22	RE NB vertical pol calibration mode 10 KHz to 1 GHz Rear side of instrument.	In spec Lower than plot 7
RS	Plot 23	RS 14 KHz to 1 GHz vertical pol	No susceptibility
	Plot 24	RS 230 MHz to 300 MHz vertical pol	No susceptibility Repetition of part of plot 23

	Plot 25	RS 220 MHz to 1 GHz horizontal pol	No susceptibility
	Plot 26	RS 230 MHz to 300 MHz horizontal pol	No susceptibility Repetition of part of plot 25
	Plot 27	RS 1GHZ to 18 GHz vertical pol	No susceptibility ✓
	Plot 28	RS 1GHZ to 18 GHz horizontal pol	No susceptibility
CS	Plot 29	CS CW power lines	No susceptibility
	Plot 30	CS common mode signal lines digital line	No susceptibility
	Plot 31	CS common mode signal lines digital line continuation at 2 MHz	No susceptibility
	Plot 32	CS common mode signal lines analog line	No susceptibility
	Plot 33	CS diff mode 10Usec pulse calibration	
	Plot 34	CS diff mode 10Usec pulse positive injection	No susceptibility
	Plot 35	CS diff mode 10Usec pulse negative injection	No susceptibility
	Plot 36	CS common mode rejection	Susceptibility detected at 4.1 MHz Repetition from 4 MHz showed a problem around 7 MHz
	Plot 37	CS common mode rejection unit in idle mode	Susceptibility detected at 6.8 MHz
	Plot 38	CS common mode rejection Continuation in diagnostic from 8 MHz	No susceptibility
	Plot 39	CS common mode rejection Repetition from 6 MHz to 8 MHz at 2.5 Vpp	Susceptibility at 6.8 MHz
	Plot 40	CS common mode rejection Repetition from 6 MHz to 8 MHz at 2.5 Vpp Reduced injection wire length	Susceptibility at 7.7 MHz
	Plot 41	CS common mode rejection Repetition from 6 MHz to 9 MHz at 2.5 Vpp Reduced injection wire length + 10 dB attenuator	Susceptibility at 7.7 MHz
	Plot 42	CS common mode rejection Repetition from 6 MHz to 9 MHz at 1.25 Vpp Reduced injection wire length + 10 dB attenuator	Susceptibility at 7.7 MHz
	Plot 42	CS common mode rejection Repetition from 6 MHz to 9 MHz at 0.625 Vpp Reduced injection wire length + 10 dB attenuator	Susceptibility at 7.7 MHz Threshold level.

*Plot 25  
enbise*

Acceptance rationale for RFW SPI-DR-423-94-CNES (Radiated Emission overrun in the 2000 – 2250MHz Notch fréquences):

Annexe 3:

We recall RFW SPI-DR-0-76-CNES:

a) 420 MHz... 460 MHz : *This notch frequency was specified to avoid interference with the Ariane Receiver during launch. Proton is today our launcher and the test at these frequencies is not regarded as necessary.*

b) 760 MHz... 780 MHz: *This notch frequency was specified to avoid interference with the Proton Receiver during launch. SPI is not switched-on during launch. However, the SPICOs are in launch-lock mode. The SPICO generated emissions measured with the SVM in ALS do not interfere with the Proton Receiver. The test at these frequencies is regarded as not necessary.*

Annexe 1, 2, 6:

We recall RFW SPI-DR-0-76-CNES:

*The Reduction of the TT&C Integral notch frequency band from 2000 MHz... 2400MHz to 2000 MHz... 2250MHz for the measurements is acceptable because the critical frequency range is still covered.*

*For information: The Receiver spot frequencies are 2039.2958 MHz and 2039.6458 MHz.  
The Transmitter is located at 2214.6199 MHz and 2215.0000 MHz.*

Annexe 4, 5:

We recall RFW SPI-DR-423-64-CNES:

*The waiver as given by UCSD was not acceptable.*

However, Radiated Emission was measured at SPI level (see attached extract of the SPI-RE-0-14078-ITS) and showed small non conformances (few spikes with a maximum of 6dB above the 10dB $\mu$ V/m specification) in the band of interest 2000MHz – 2250MHz.

The offending frequencies are 2044, 2069, 2118, 2142, 2172, 2200MHz ( $\pm$  1MHz).

The exact Receiver Notch is given in INT-RQ-A1-0026 "Transponder Requirement Specification" (see attached marked page 26).

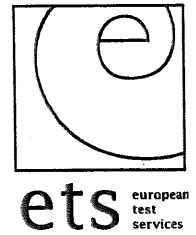
None of the spikes fall into the receiver Notch.

**This waiver is acceptable**

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### 7. **PREPARATION STATUS**

The preparation work related to this test is to get all relevant maintenance & calibration done in due time before the 22 August 2001 PM (see action 1&2).

### 8. **NCRs & OPEN ACTIONS**

1 open NCRs (see annex C) :

01-797 Status -> IFI SMX 100. No impact on the test: work around solution is implemented.

### 9. **PROCEDURES & DOCUMENTATION**

IN-TP-JEM-0002 issue3 revision1 "Electromagnetic compatibility test procedure" red marked.

### 10. **SAFETY, SECURITY & CLEANLINESS**

- **Safety** Radioactivity of the calibration sources to be checked as well as to inform operators in regard of the attendance of beryllium parts. (See actions 3).
- **Cleanliness** Class 100.000
- **Temperature** 20°C ± 2°C
- **Humidity** 40% < H < 60%

### 11. **AOB**

**Status of cranes:** - No crane will be used

**Status of buildings:** - No relevant problem linked to the EMC area

**Agreement on the insurance status:**

The customer requirements in matter of insurance is compatible with the level of insurance ETS as contracted for the test item as well as for the facility (see Action 4).

### 12. **CONCLUSION**

The FRR board agrees that the facility is ready for testing providing that the action list attached is completed.