END ITEM DATA PACKAGE

Nomenclature: JEM-X MASK Model - S/N: FM1

Identification No.: IN-JX-SR-DW-600

CI-Number: I 13 3000 FM Contract No.: CICYT PI 1545

PREPARED BY J. ZARAUZ DEPT.: Quality DATE 27-03-2000

SENER Quality Assurance

REVIEWED BY J.I.RUIZ DE URIEN DEPT.: Structures DATE

SENER Engineer Manager

28.04.2000

APPROVED BY J. ZARAUZ DEPT.: Quality DATE

SENER Product Assurance

18.04.2000

AUTHORISED BY T. VELASCO DEPT.: P.M. DATE

SENER Project Manager

18.04.2000

ACCEPTED BY DEPT.: DATE

Customer Product Assurance

Kurt Berg, Project Manager, DSRI

DELIVERABLE ITEMS LIST

EIDP No.: IN-JX-SR-EIDP-003 **Section:** 1 **Issue:** 1

Nomenclature: JEM-X MASK **Model - Serial Number:** FM1

Identification No.: IN-JX-SR-DW-600

CI-Number: I 13 3000 FM **Contract No.:** CICYT PI 1545

SEQ. No.	QTY.	NOMENCLATURE	DRAWING NUMBER	PART NUMBER	S/N	Q.A. STAMP	REMARKS
01	1	JEM-X MASK FM1	IN-JX-SR-DW-600	--	--		
02	1	Copy of EIDP	IN-JX-SR-EIDP-003	--	--		
03	1	Special Adaptor Tool for mask integration on PLM	------	--	--		
04	1	Transport plate assembly	IN-JX-SR-DW-410	--	--		
05	2	Optical Cubes Plastic Covers	-------	--	--		One set spare

LOOSE PARTS LIST

EIDP No.: IN-JX-SR-EIDP-003 Section: 1 Issue: 1

Nomenclature: JEM-X MASK Model - Serial Number: FM1

Identification No.: IN-JX-SR-DW-600

CI-Number: I 13 3000 FM Contract No.: CICYT PI 1545

SEQ. No.	QTY.	NOMENCLATURE	DRAWING NUMBER	PART NUMBER	S/N	DEDICATED PARTS	Q.A. STAMP	REMARKS
01	12	I/F Screws LN 29950-05 12B	IN-JX-SR-DW-600	31	--	Mask assembly		Assembled
02	12	I/F Washer LN 9016-05	IN-JX-SR-DW-600	32	--	Mask assembly		Assembled
03	4	Screws M10	IN-JX-SR-DW-410	03		Transport plate assembly		Assembled
04	4	Washers 10,5	IN-JX-SR-DW-410	04		Transport plate assembly		Assembled
05	1	Plastic cover	IN-JX-SR-DW-410	--		Transport plate assembly		Assembled
06	12	Srews M4	IN-JX-SR-DW-410	07		Transport plate assembly		Partially Assembled
07	12	Washers 4,3	IN-JX-SR-DW-410	08		Transport plate assembly		Partially Assembled
08	16	Screws M5	IN-JX-SR-DW-410	09		Transport plate assembly		Assembled
09	16	Washers 5,3	IN-JX-SR-DW-410	10		Transport plate assembly		Assembled

END ITEM DATA PACKAGE

Nomenclature: JEM-X MASK Model - S/N: FM2

Identification No.: IN-JX-SR-DW-700

CI-Number: I 13 3000 FM Contract No.: CICYT PI 1545

PREPARED BY J. ZARAUZ DEPT.: Quality DATE 27-03-2000

SENER Quality Assurance

REVIEWED BY J.I.RUIZ DE URIEN DEPT.: Structures DATE

SENER Engineer Manager 28.04.2000

APPROVED BY J. ZARAUZ DEPT.: Quality DATE

SENER Product Assurance 18.04.2000

AUTHORISED BY T. VELASCO DEPT.: P.M. DATE

SENER Project Manager 18.04.2000

ACCEPTED BY DEPT.: DATE

Customer Product Assurance

Kurt Clausen Project Manager, DSRI

DELIVERABLE ITEMS LIST

EIDP No.: IN-JX-SR-EIDP-004 **Section:** 1 **Issue:** 1

Nomenclature: JEM-X MASK **Model - Serial Number:** FM2

Identification No.: IN-JX-SR-DW-700

CI-Number: I 13 3000 FM **Contract No.:** CICYT PI 1545

SEQ. No.	QTY.	NOMENCLATURE	DRAWING NUMBER	PART NUMBER	S/N	Q.A. STAMP	REMARKS
01	1	JEM-X MASK FM2	IN-JX-SR-DW-700	--	--		
02	1	Copy of EIDP	IN-JX-SR-EIDP-004	--	--		
03	1	Special Adaptor Tool for mask integration on PLM	------	--	--		
04	1	Transport plate assembly	IN-JX-SR-DW-410	--	--		
05	1	Optical Cubes Plastic Covers	-----	--	--		One set spare

LOOSE PARTS LIST

EIDP No.: IN-JX-SR-EIDP-004 Section: 1 Issue: 1

Nomenclature: JEM-X MASK Model - Serial Number: FM2

Identification No.: IN-JX-SR-DW-700

CI-Number: I 13 3000 FM Contract No.: CICYT PI 1545

SEQ. No.	QTY.	NOMENCLATURE	DRAWING NUMBER	PART NUMBER	S/N	DEDICATED PARTS	Q.A. STAMP	REMARKS
01	12	I/F Screws LN 29950-05 12B	IN-JX-SR-DW-700	31	--	Mask assembly		Assembled
02	12	I/F Washer LN 9016-05	IN-JX-SR-DW-700	32	--	Mask assembly		Assembled
03	4	Screws M10	IN-JX-SR-DW-410	03		Transport plate assembly		Assembled
04	4	Washers 10,5	IN-JX-SR-DW-410	04		Transport plate assembly		Assembled
05	1	Plastic cover	IN-JX-SR-DW-410	--		Transport plate assembly		Assembled
06	12	Srews M4	IN-JX-SR-DW-410	07		Transport plate assembly		Partially Assembled
07	12	Washers 4,3	IN-JX-SR-DW-410	08		Transport plate assembly		Partially Assembled
08	16	Screws M5	IN-JX-SR-DW-410	09		Transport plate assembly		Assembled
09	16	Washers 5,3	IN-JX-SR-DW-410	10		Transport plate assembly		Assembled

UNIVERSITY OF VALENCIA	**MINUTES OF MEETING**	INTEGRAL PROJECT

Document Reference: IN-JX-UV-MIN-009	Date: 18th. April	Issue: 1.0

SUBJECT

JEM-X MASKS IRB & DRB MEETING

Present:	
Kurt Omø @ DSRI.	M. Notarnicola @ ALENIA
Giuseppe Sarri @ ESA	M. Pugliese @ ALENIA
A. Neverla @ ESA	I. Ruiz Urien @ SENER
Victor Reglero @ UV	J. Zaraiz @ SENER
Tirso Velasco @ UV	Jose Luis Gasent @ UV
Juana Mª Rodrigo @ UV	Jorge Alamo @ UV

Documents distributed:
1. IN-JX-UV-LIS-011 (FM1) - 012 (FM2). ISSUE 1.1. CIDL
2. IN-JX-UV-LIS-013 (FM1) - 014 (FM2) ISSUE 1.0 Compliance Matrix
3.
4.

Copies of minutes to:	
G. Sarri @ ESA.	I. Ruiz Urien & J. Zaraiz @ SENER
K. Omø @ DSRI	M. Notarnicola & Pluglíese @ ALENIA.

Minutes taken by: Kurt Omø & Juana Mª Rodrigo.

		ACTION
9'15	WELLCOME BY VICTOR REGLERO.	
	Prf. Reglero thanks to all attendants to visit U. of Valencia for helding the DRB Jem-X Mask Meeting.	
	theses subassemblies are the second flight configuration hardware finished by GACE. Five years ago, the group was involved in the ΔEGRI Instrument on board on MINISAT-01 satellite.	
	Now as part of the JEM-X consortium, GACE people is very happy to conclude ten years of work in the development, design, manufacturing and testing of the Coded Masks. This Instrument is very interesting because cover the field of application from X-Ray to γ-Ray.	
9'20	ADOPTION OF AGENDA:	
	O.K.	

ACTION

9'25 FM ACTIVITIES REVIEW

FM JEM-X Masks activities have been developed during last year : 12 mounths from the Mask CDR Meeting date.

Manufacturing phase has done in a period of six mounths and after one mounth for integration and four mounths for testing and documentation.

9'30 ACEPTANCE TEST RESULTS

Tirso Velasco presents all documents dedicated to the FM Masks tests (procedures and reports) in a list which shows documents including in the EID-P and others availables in GSCE facilities.

MASS

FM1 5.6335 ± 0.0002 kg
FM2 6.0853 ± 0.0002 kg
} Δm ≃ 0.5kg

QM 5.8085 ± 0.0002 kg

Diferences betweeen FM1 & FM2 are due to the diferent plates thickness:

FM1 0.43 mm ± 0.01 mm
FM2 0.56 mm ± 0.02 mm
} Δm ≃ 0.5 kg

FM2 Deviation from mass budget is reported in thie Non Conformance Report referenced: IN-JX-SR-NCR-007.

The ESA comment number four to the FM EID-P Documentation can be considered closed.

ACTION

stimated mass

1.614 kg
2.101 kg

ACTION

Electrical Check:

All values are within the requirement (< 5 m-Ω).

VIBRATION TEST

Tirso Velasco explain the test conditions which are according to the Assembly Integration and Test Plan (A.I.T. Plan).

Ignacio Ruiz Urien present a table which sumarises the results of the test and in the second slide the notching philosophy is explained.

Vibration Test Sequence Req:

- Resonance Survey: 0.5 g 5 - 2000 Hz Sweep Rate of 2 oct/min
- Sinusoidal Vibration: acceptance level 4 oct/min
- Resonance Survey: 0.5 g 5-2000 Hz 2 oct/min
- Random Vibration: -6.5 dB (-10 dB from QM Level) 30 sec.
- Random Vibration: Acceptance level (1 minute)
- Resonance Survey: 0.5 g 5-2000 Hz 2 oct/min
- " after thermal cycling: 0.5 5-2000 Hz 2 oct/min

Scelerometers configuration was the same that the QM configuration

Axial 1er frecuency FM1 = 210 Hz

FM2 = 198 Hz

QM = 197 Hz

this frecuency correspond to fundamental mode of the Mask.

2nd frecuency FM1 = 444 Hz

FM2 = 500 Hz

STM = 450 Hz

Notching in axial is showed in a dedicated table in Mr. Ruiz Vien slide presentation (Annexe 2)

First frecuency is higher in the FM1 due to the strong back contribution and in the second mode is more important the W plate contribution to the value

ACTION

Accelerations obtained are quite similar to the axial accelerations obtained during the STM/QM Test Campaign ⇒ the results are according to the models and are into the requirements said Mr. Ruiz Urien

ACTION

Random Vibration

Small diferences could be apreciate comparing the FM1 & FM2.

Lateral notching is applied due to quasi-static loads and with ESA agreement in order to limit the loads on W membrane.

Mr. Sarri, explain the results of the mechanical test in a satellite level. Comparing the results of the FM Masks test campaign with the satellite results, ESA has found a potencial problem.

Mr. Ruiz Urien explain that the accelerometers used in a satellite are mounted on the panels and they received señals coming for all parts.

the values measured on the panels are not the mask levels inputs. The mask number 7 accelerometers covers the satellite range: the largest ~~pique~~ peak is more higher that satellite ~~pique~~ peak in axial mode whic is the critical. (Accelerometer number 7 in the QM test campaign comparing with the level satellite curve).

ACTION

This statement is not agreed by Alenia/ESA

After a discussion on the accelerometers positions, loads induces on the masks by the ~~bes~~ PLM etc... Mr. Sarry explain that the goal is to verify that FM Masks ~~are~~ have the same workmanship as ~~is that~~ QM Mask. After a review of the FM test results ESA/ALENIA have found that lateral response of the accelerometer number four is not the same that accelerometer number four for the QM Mask.

Mr. Sarry explains that theie diferences have been found in accelerometers number 4y & 8y.

Mr. Ruiz Urien explains that INTA has changed the software adquisition and the accelerometer position could be little diferent from QM position because the accelerometer number four is mounted on the 20 mm areace in the strong back.

E.S.A. position on this matter is workmanship ~~consider~~ that FM & QM could be differents and this is implicated ~~in particular by due to~~ 4y & 8y accelerometers results

GACE., Prof. Reglero, are not in agreement and he consider that only after a detailed study of the situation could be demostrated that two systems (FM & QM) are not the same, ~~if any~~. All the rest of values are according to the QM test roults.

For GACE the important data is the acceleration and for ESA/SUENIA ~~the important both value is the~~ amplification and acceleration value are to be considered.

GACE/SENER opinion is that FM & QM systems are similars and we have not found sistemathic differences between FM & QM.

ACTION

A summary positions on vibration matter is:

ESA/ALENIA think that a possible difference exists between STM & FM masks. This difference may be critical w.r.t. to the s/c level FM test of the Mask.

considering the higher levels were measured on s/c STM w.r.t. to the mask qualification level, ~~mask can be accepted only if~~ full confidence must be achieved that no difference exists ~~is demostrate~~ between STM/QM and FM.

SENER/U.V. position is that levels measured on the s/c are not only the imput but already include the ouplut of the mask, therefore the qualification of the mask fully cover the s/c test level in the fundamental frcuencies.

ACTION

ACTION

Conclusions on the JEM-X mask vibration issue :

1. Tasks are accepted as far as the vibration test results are concerned.

2. Alenia will review in detail the QM/STM mechanical test results in order to confirm confidence on the similarity of STM and FM1 masks. All data will be provided by UV

3. In performing the above, support from UV/ Senor will be given to Alenia (Teleron and/or meeting)

4. If needed ESA/Alenia may ask a delta vibration characterization on STM/QM mask.

5. UV/ Senor will support the mechanical tests at S/C level.

12'30 THERMAL CYCLING.

ACTION

Only thermal cycling was performed according to TRR agreements; the test was performed with no major problem.

SENER P.A. Manager issued a NCR, ref. (IN-JX-SR-NCR-006 because during a short time (30 min.) the softw. adquisition was fault.

Comment number 2 of ESA is closed.

12'35. ALIGNMENT & POSITIONING

Presented by Victor Reglero. He explains that two main conclusions are:

- pixel position and size are one order better than requirements

- the position of the pixels does not change if the mask is free or bolted configuration.

After to measure 230 pixels (in the manufactiror workshop (200) and in the INTA facilities (30) for checking that they have not changed)

The results of the 30 pixels measured on INTA facilities shows that $\sigma = 0.005$ mm in FM1 & FM2 with a maximum desviation of 0.010 mm < than ± 0.05 mm required.

The pixels size uncertainty, after to measure 400 pixels (200 pixels by ws code), is ± 0.005 mm ; ten times better than specified. And the pixel center position on the YZ plane is 0.04 mm ; 7 times better than specified.

The Coded flatness, free configuration on the marble 3D machine, is 0.05 mm respect to the average of the X-axis values on the interface points.

The deviation angle between the code and i/f plane is 6 arc. sec. And this answer the Mr. Ømo comment about flatness.

The comment number 5 (Mr. Sarry comments to JEM-X Masks EIDP) is closed.

ACTION

Measurements with theodolites at INTA before and after test campaign, with the masks bolted and free, give following maximum differences:

FM1 : max +3" min -3"

FM2 : max +11" min -7"

This answer the ESA comment number 5 because the 55" measured is for the 3D machine with theodolites the precission is better like shows the above mentioned table.

Cubes do not move before and after test: the optical cubes mounting is stifness.

Error in theodolite system is 1 arcsec.

The Optical Cube position does not change (+5 arc sec) when the Mask is bolted according to the integration procedure.

For the FM integration activities, GSCE required to the ALENIA integration team that torqued applied will be 6 N.m in the interface holes.

ACTION

For JEM-X Instrument collaboration the position between mask and detector plane has to be around 15", said Prof. Reglero. A difference of 0.01 mm in the interface plane should not be critical for the instrument alignment.

ALENIA representative, Mr. Plugliese, expoes that they not consider possible to assure the torqued applied during the integration activities. GACE will provide a special tool for torking the critical interface screws (dificult to access in some points) and will support ALENIA during this operations because GACE team will be present during IBIS and Jem-X Mask integration on the S/C.

Comment number 7 is closed too.

ALENIA will sent the STM Mask integration procedure to UV for comments.

→ CLOSED

Comment number 3 of ESA: interface holes positioning ⇒ Ti Ring manufacturing drawing requirement is 0.05 and interface holes position req. in the interface drawing is 0.1. The NCR affects a the manufacturing drawing

ACTION

Action

ALENIA

13'30 APPLICABLE EID-P DOCS. REVIEW

ACTION

1. Items being delivered

Jem-X Mask FM1 & FM2 including
optical cubes for both assemblies
copy of EIDP docs (FM1 & FM2)
special adaptor tool for integration (2u.)
transport plate assembly (2u.)
Optical cubes plastic covers for 2 assemblies
I/f screws and washers for 2 assemblies + plus
one mask plastic cover (2u.)

2. CONFIGURATION STATUS

- CIDL

A new FM1 & FM2 CIDL issue is delivered during the meeting and a new FM1 & FM2 Compliance Matrix for the JEM-X Coded Mask.

FM1 CIDL : IN-JX-UU-LIS-011 Iss 1.1

FM2 CIDL : IN-JX-UU-LIS-012 Iss 1.1

Compliance Matrix FM1 : IN-JX-UU-LIS-013 Iss 1.0 } *
" FM2 : IN-JX-UU-LIS-014 Iss 1.0 }

DSRI has delivered to UU the EID-B Issue 5.2 during meeting.

* Matrix is a summary of all the parameters

Change Request (pending)

NoNe

Request for Waiver:

- ~~No open~~. UV will sent to ESA all RFW (1,2,3,4) for ESA closure.
- IN-JX-UV-RFW-003: the RFW concerning to the notching philosophy during QM test campaign is still open. ESA will formally ~~close it~~ process it.

3. COMPLETION & RESULTS of TEST PROGRAM

- IN-JX-UV-RFW-004: OK. Only cycling no vacuum thermal during TVT.

* ⇒ We could consider test campaign is closed

Test program was completed with the concern referenced above.

4. Non Conformances

All NCRs are closed. No major NCRs during FM.

002 → W roughtness out of tolerance and the plate has been used as is

004 → Holes ϕ4.5 OUT ⇒ repaired and closed

005 → The i/f holes positioning error is related to the ring manufacturing drawing and not to the

ACTION

ACTION
UV

ACTION
ESA

interface occasion. the NCR not affect to the S/C 004 and 005

ACTION

006 → thermal Cycling data adquisition software fault during 30 min. closed

007 → FM2 Mass Over Budget Accept and close

5. Open or Deffered work

None

6. Temporary Removals or Installations

Removal and segregation of the I/f screws
Removal Optical cubes Covers

7. RESIDUAL HAZARD and .....

Radiative Sources are not included and point 7 is not applicable.

8.13. PACKING, HANDLING & INTEGRATION PROCS.

ACTION

All activities, including integration, are explained in the Packing, Handling & Integration Procedure (IN-JX-USR-PRO-001 Issue 3.0).

~~ESA will verify that two masks will have protected with dedicates covers when they will be mounted on the S/C~~

~~ACTION ESA~~

Jewi-X Protection cover is foreseen when the subassemblies will be mounted (see Mr. R. Timm communication to UV after Mask TRR. Annexe number 3)

UV will support to ALENIA during integration activities. An Integration Plan could be defined between UV/SENER & ESA Project officce

ACTION ESA & UV

Open Point

- Identification Plates Label for each subassembly are on going.
- Set 1: includes the optical cubes covers

- Section 4 : includes the minutes - Section 6 : complet the LOG sheet - Section 7 : CIDL FM1 and FM2 new issue (delivered during meeting) - Section 8 : I/F drawing will be issue with the dates of the rest of Instrument or S/C A Change Notice has been issue according to this drawing (IN-J.X.-SR.-DW.-100) in order to remove the "TBD" dates (for instance: type of material of the interface, surface treatment ect)	ACTION ACTION SENER & ALENIA

ACTION

10. EIDP

The EIDP is available and complete with the update identified in this MoM.

11. INSPECTION of HW to be delivered.

The Two Jem-X masks were inspected in the 1000 clear room.

12. STATUS of SHIPPING preparation and schedule

The masks are ready to be shipped with one week notice. They will be kept in storage at UV until further notice.

The masks are accepted by DSRI / ESA / Alenia for the purpose of this DRB.

Attention is to be paid to the activities listed in page 10 of this MoM.