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Report on Partial Type Testing to RTCM SC110 of **Jotron 40S 406 MHz EPIRB**

DERA/SS/CI/TT27/99 -1.0

Cover + vi + 24 pages + Annex A to C

Issue 1.0 - Date: March 2000

Commissioned by;
JOTRON Electronics a.s
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NORWAY

NAMAS
TESTING
No. 1217

Issued by

Maritime Navigation Systems
DERA Fraser
Fort Cumberland Road
Portsmouth
England
PO4 9LJ

Authorisation

Position Held	Name	Signature	Date
Test Engineer	W T Harmer	W.T. Harmer.	27 Mar 00
Quality Manager	R. Rogers		28 Mar 00
Head of Test	B. Hawkins		27 Mar 00

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Issue	Date	Details of Change
1.0	March 2000	First issue

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1. Introduction

1.1. The Jotron Tron 40S EPIRB was partially tested in accordance with the RTCM Recommended Standards for 406 MHz Satellite Emergency Position-Indicating Radio Beacons (EPIRBs) RTCM SC110. [1]

1.2. This beacon type had previously been tested to COSPAS SARSAT Standard T.0007 by CNES. [2] and to MPT1259 by DERA [3]

1.3. The test laboratory at DERA Fraser has been accredited by UKAS under their NAMAS scheme and is a UKAS accredited Testing Laboratory No. 1217.

1.4. The Jotron 40S EPIRB is designed to operate in the temperature range -20^{o}C to +55^{o}C (class 2) and is float-free automatically-activated (category 1).

1.5. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

2. Equipment under test

2.1. Jotron Ltd supplied the following items on 16 Dec 99 for the duration of type testing.

ITEM	Type	ID Number
406 MHz EPIRB	TRON 40S	9KP05404
2 additional Battery Packs	-	-
Additional body with connector	-	-
Foat free bracket	FB4	4507

2.2. Photographs of the EPIRB can be seen in Annex A.

3. Test Location

3.1. The tests were executed at DERA Fraser, Fort Cumberland Road, Portsmouth, Hants.

4. Configuration of the EPIRB sample

4.1. For several of the tests the beacon required the beacon to be connected to the measuring equipment. This required a 50 ohm output from the beacon however the connector was not waterproof. For the tests that required the beacon to be totally immersed in water the beacon was configured with the standard upper body. For the other tests the beacon had the upper body replaced by one with a connector. An internal lead connected the output to this connector and the antenna was disconnected.

4.2. The changing of the configuration was carried out by DERA test engineers.

5. Tests

5.1. The Jotron 40S had previously been tested to COSPAS SARSAT T.007 and MPT 1259 and has been granted UK type approval. An application for type approval by the US Coastguard was rejected as the previous testing was not appropriate to RTCM SC110. (see letter dated 22 Feb 99 in Annex C). A proposed test plan was produced by DERA (see fax dated 29 Sept 99 in Annex C). The US Coastguard response to this (see faxes dated 8 Nov 99 & 10 Nov 99) was that all tests numbered 1 to 12 of the schedule of RTCM SC110 were required. A further exemption was that only a subset of the COSPAS SARSAT tests (number 11) need to be done. This subset consisted of the digital message generator and modulation tests only.

5.2. The summary of the RTCM tests is shown in section 7 and the subset of the COSPAS SARSAT tests in section 8.

5.3. An additional check was made on the auxiliary radio-locating device which confirmed that the Sweep Direction was upward.

6. Conclusions

6.1. The Jotron 40S EPIRB was tested and found to meet the requirements of RTCM Paper 4-97/SC110-STD in aspects as detailed in this report.

6.2. The Jotron 40S EPIRB is recommended for type approval as a class 2 category 1 beacon.

Section 7

SUMMARY OF RTCM TEST RESULTS

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (…°C)	$T_{amb.}$ (+20 °C)	$T_{max.}$ (+55 °C)	
1. INITIAL ALIVENESS TEST (A1.0)						
• Carrier Frequency	406.025 ± 0.002	MHz		406.025035		
• Power Output	35 - 39	dBm		37.5		
2. DRY HEAT CYCLE (A3.0)						
• Aliveness Test (during 2 hour period)						
- Carrier Frequency	406.025 ± 0.002	MHz			406.024898	
- Power Output	35 - 39	dBm			37.85	
• Aliveness Test (at end of 2 hour period)						
- Carrier Frequency	406.025 ± 0.002	MHz			406.024979	
- Power Output	35 - 39	dBm			37.94	

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (…°C)	$T_{amb.}$ (+20 °C)	$T_{max.}$ (+55 °C)	
3. DAMP HEAT CYCLE (A4.0)						
• Aliveness Test (during 2 hour period):						
- Carrier Frequency	406.025 ± 0.002	MHz			406.025010	
- Power Output	35 - 39	dBm			37.97	
• Aliveness Test (at end of 2 hour period):						
- Carrier Frequency	406.025 ± 0.002	MHz			406.025011	
- Power Output	35 - 39	dBm			37.95	
4. VIBRATION TEST (A5.0)						
• Exterior Mechanical Inspection	No damage					
• Aliveness Test:						
- Carrier Frequency	406.025 ± 0.002	MHz		406.02503		
- Power Output	35 - 39	dBm		38.4		
• Activation	No activation during test					

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (^{o}C)	$T_{amb.}$ (+20 ^{o}C)	$T_{max.}$ (^{o}C)	
5. BUMP TEST (A6.0)						
• Exterior Mechanical Inspection	No Damage					
• Aliveness Test:						
- Carrier Frequency	406.025 ± 0.002	MHz		406.02504		
- Power Output	35 - 39	dBm		38.4		
• Activation	No activation during test					
6. SALT FOG TEST (A7.0)						
• Exterior Mechanical Inspection	No damage					
• Aliveness test:						
- Carrier Frequency	406.025 ± 0.002	MHz		406.02504		
- Power Output	35 - 39	dBm		38.4		

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (...°C)	$T_{amb.}$ (...°C)	$T_{max.}$ (...°C)	
7-A. DROP TEST (A8.1)						
On Hard Surface						
• Exterior Mechanical Inspection	No damage					
• Aliveness Test:						
- Carrier Frequency	406.025 ± 0.002	MHz	406.02503			
- Power Output	35 - 39	dBm	38.6			
• Activation	No activation during test					
7-B DROP TEST (A8.2)						
In Water						
• Exterior Mechanical Inspection	No damage					
• Aliveness test:						
- Carrier frequency	406.025 ± 0.002	MHz		406.02502		
- Power Output	35 - 39	dBm		38.4		

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (-20°C)	$T_{amb.}$ (+20 °C)	$T_{max.}$ (+55°C)	
8. LEAKAGE AND IMMERSION TEST (A9.0)						
• Aliveness Test:						
- Carrier Frequency	406.025 ± 0.002	MHz		406.02502		
- Power Output	35 - 39	dBm		38.4		
• Interior Inspection	No water					
9. SPURIOUS EMISSIONS TEST (A10.0)						
• 406 MHz	Figure 2-1	(attach graphs)				Figures 1 to 6
• 121.5 MHz	Figure 2-6	(attach graphs)				Figures 7 to 9

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (-30°C)	$T_{amb.}$ (…°C)	$T_{max.}$ (+70°C)	
10. THERMAL SHOCK (A11.0)						
• Self-activation in water	≤ 5	minutes	2.5 (fresh) 0.1 (salt)		0.1 (fresh) 0.1 (salt)	
• Aliveness Test:						
- Carrier Frequency	406.025 ± 0.002	MHz	406.02504		406.02503	
- Power Output	35 - 39	dBm	38.4		38.1	
• Frequency Stability						
- short term stability	≤ 0.002	parts/ million in 100ms	0.00079		0.00025	
- medium term stability						
mean slope	≤ 0.001	parts/ million/ minute	0.00009		0.00009	
residual frequency variation	≤ 0.001	parts/ million	0.00074		0.0003	
11. COSPAS-SARSAT TYPE APPROVAL TESTS (A12.0)	C - S Certificate (attach test report)					See Section 8 for repeat of some C/S Tests

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (-20 °C)	$T_{amb.}$ (… °C)	$T_{max.}$ (…°C)	
12. OPERATIONAL LIFE, STROBE LIGHT AND SELF TESTS (A13.0)						The EPIRB was operated for 1 hour prior to the test commencing. See Annex B for manufacturer's statement on battery self discharge.
Operational Life						
• Frequency						
• Nominal Carrier	406.025 ± 0.002	MHz	406.02502			
• Short term stability	≤ 0.002	parts/ million in 100 ms	0.0009			
• Medium-term stability						
- Mean slope	≤ 0.001	parts/ million/ minute	0.00002			
- Residual variation	≤ 0.003	parts/ million	0.0003			
• RF output power	35 -39	dBm	37.8			
• Strobe flash rate	20 - 30	/min	21			
• Auxiliary radio-locating Peak envelope output power	14 – 20	dBm	18.7			

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (-20 °C)	$T_{amb.}$ (+20 °C)	$T_{max.}$ (+55 °C)	
13. STROBE LIGHT TEST (A13.2)						
• Flash rate	20 – 30	/min	21	21	21	
• Effective intensity	≥ 0.75	Cd	Not tested	Not tested	Not tested	Previously measured and reported [4]
• Pulse duration	10^{-6} to 10^{-2}	s	Not tested	Not tested	Not tested	
14. SELF TEST (A13.3)						
• RF pulse duration	≤ 0.444 sec					
• Frame synchronization pattern	0 1101 0000					
• Number of RF bursts	1-burst					

Section 8

SUMMARY OF COSPAS SARSAT TEST RESULTS (Digital message generator and modulation only)

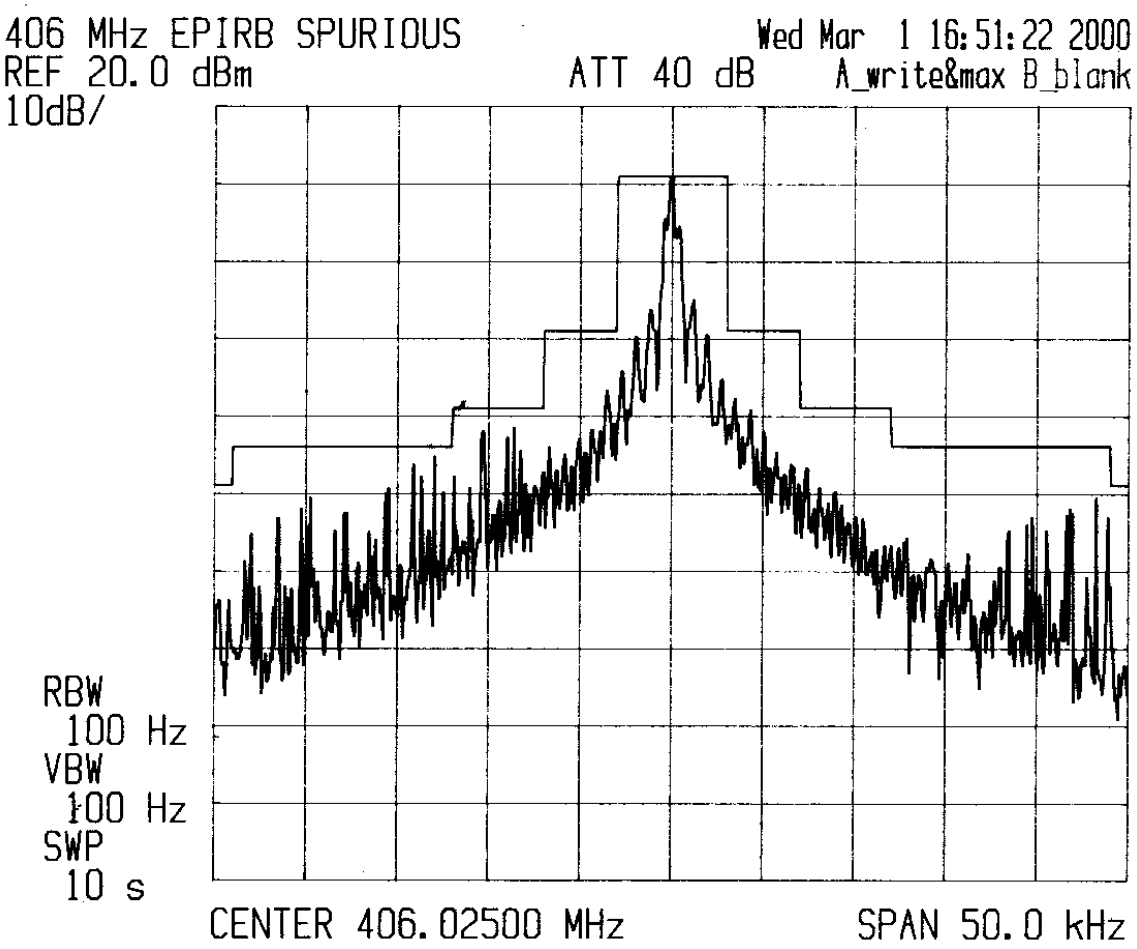
PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (-20 °C)	$T_{amb.}$ (20 °C)	$T_{max.}$ (+55 °C)	
3. DIGITAL MESSAGE GENERATOR						
• repetition rate **:						
minimum T_R =	47.5	seconds	48.3	48.3	48.3	
maximum T_R =	52.5	seconds	52.2	52.3	52.2	
• bit rate:						
minimum f_b =	396	bits/sec.	398.9	398.9	398.9	
maximum f_b =	404	bits/sec.	399.0	399.0	399.0	
• total transmission time:						
short message =	435.6 - 444.4	ms	440.5	440.2	440.5	
long message (optional) =	514.8 - 525.2	ms	-	-	-	
• unmodulated carrier						
minimum T_1 =	158.4	ms	159.3	158.9	159.0	
maximum T_1 =	161.6	ms	160.9	160.4	160.8	
• first burst delay	> 47.5	seconds	63	63	63	There is also a burst at 13 seconds with the frame sync inverted as for a self-test burst.

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (-20°C)	$T_{amb.}$ (20 °C)	$T_{max.}$ (55 °C)	
4. MODULATION						
• Biphase-L						
• rise time	50 - 250	microsec.	75	81	77	
• fall time	50 - 250	microsec.	119	120	120	
• phase deviation: positive	+ (1.0 to 1.2)	radians	+1.052	+1.10	+1.118	
• phase deviation: negative	- (1.0 to 1.2)	radians	-1.109	-1.11	-1.106	
• symmetry measurement	≤ 0.05					

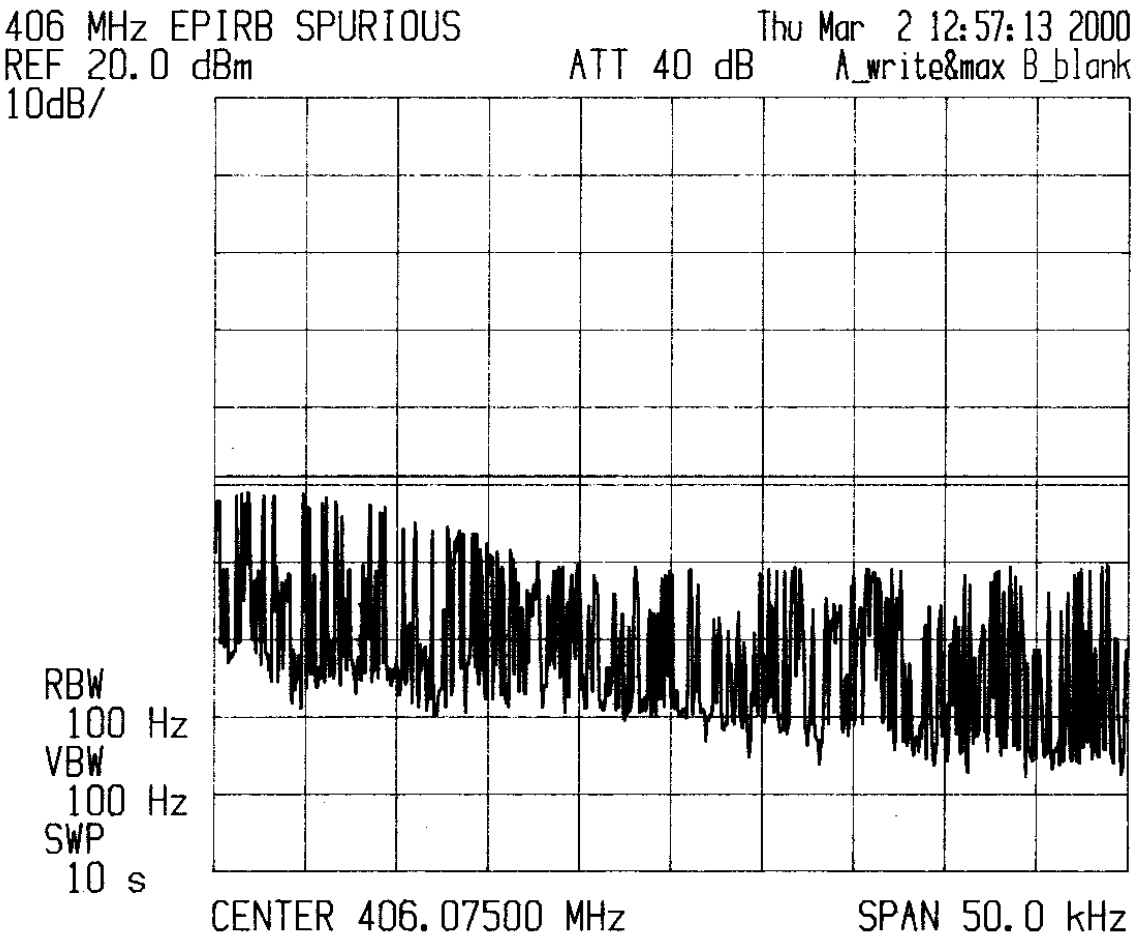
Section 9

Spurious Emissions Plots

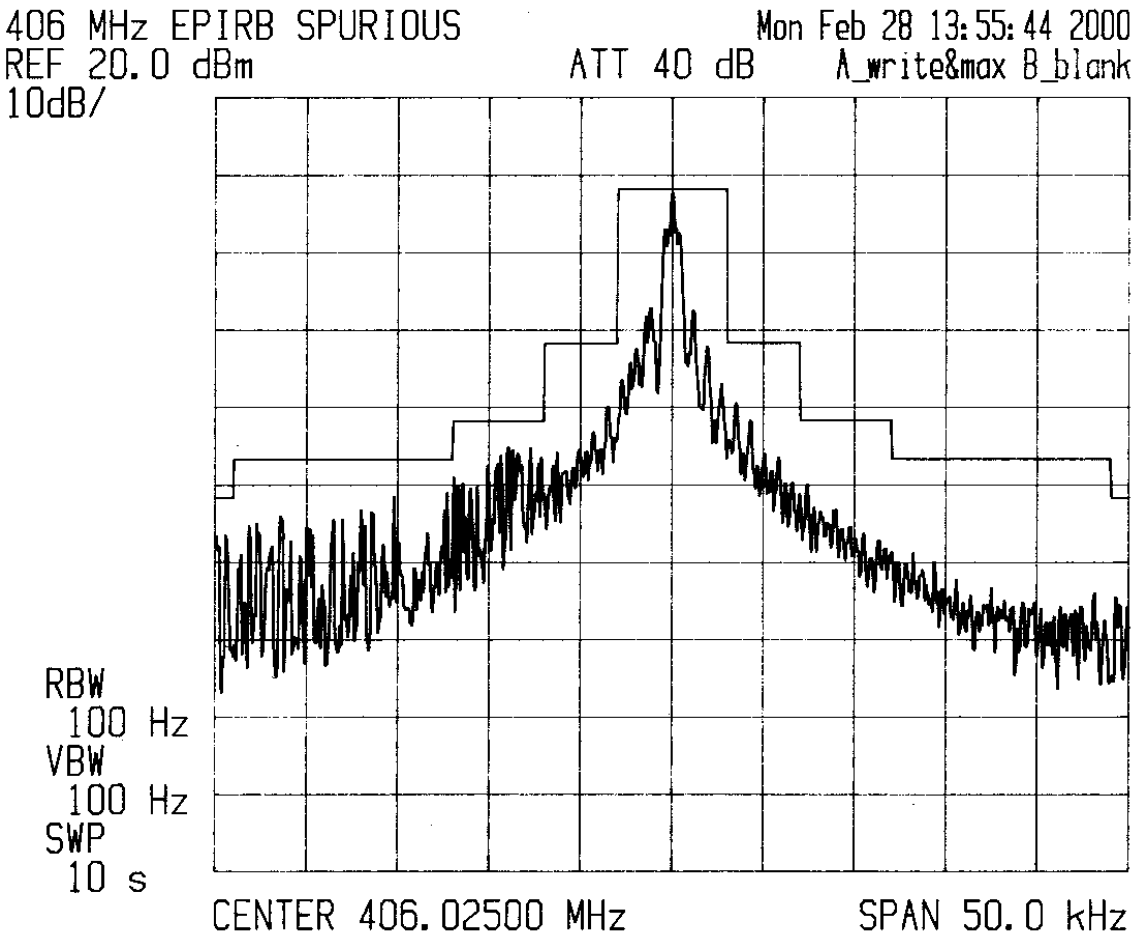
Title	Figure number	Page
Spurious Emissions at –20°C from 406 MHz to 406.05 MHz	**1**	**14**
Spurious Emissions at –20°C from 406.05 MHz to 406.1 MHz	**2**	**15**
Spurious Emissions at +20°C from 406 MHz to 406.05 MHz	**3**	**16**
Spurious Emissions at +20°C from 406.05 MHz to 406.1 MHz	**4**	**17**
Spurious Emissions at +55°C from 406 MHz to 406.05 MHz	**5**	**18**
Spurious Emissions at +55°C from 406.05 MHz to 406.1 MHz	**6**	**19**
Spurious Emissions at -20°C from 121.55 MHz to 121.75 MHz	**7**	**20**
Spurious Emissions at +20 °C from 121.55 MHz to 121.75 MHz	**8**	**21**
Spurious Emissions at +55 °C from 121.55 MHz to 121.75 MHz	**9**	**22**



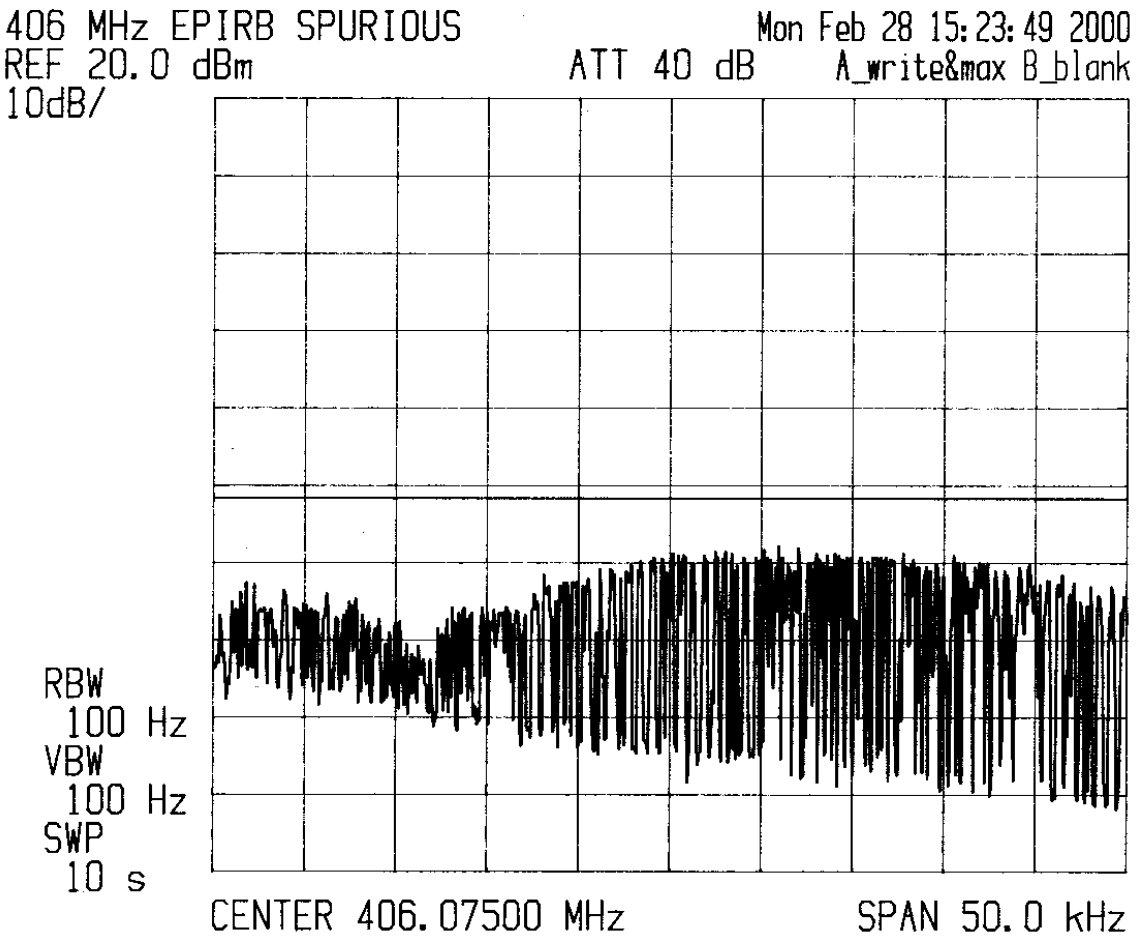
Spurious Emissions at –20°C from 406 MHz to 406.05 MHz Figure 1



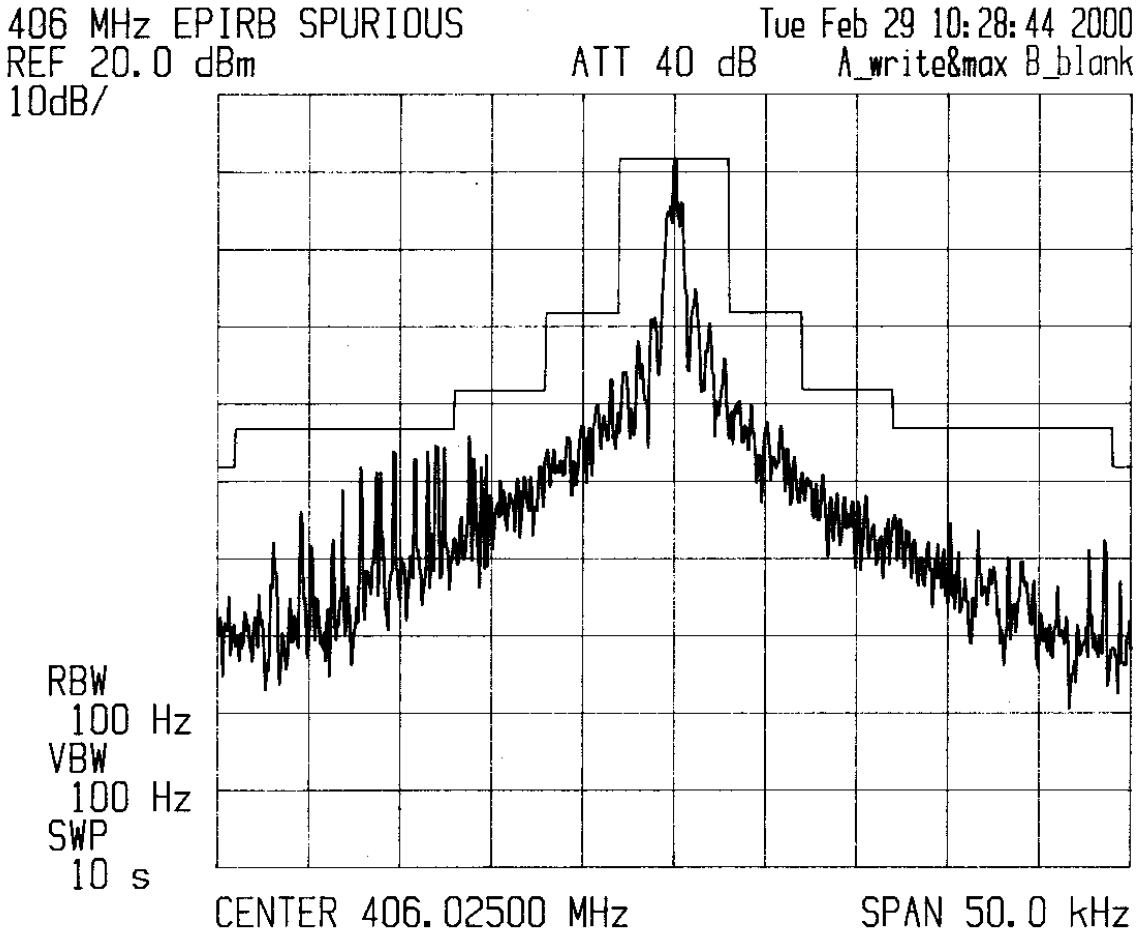
Spurious Emissions at –20°C from 406.05 MHz to 406.1 MHz Figure 2



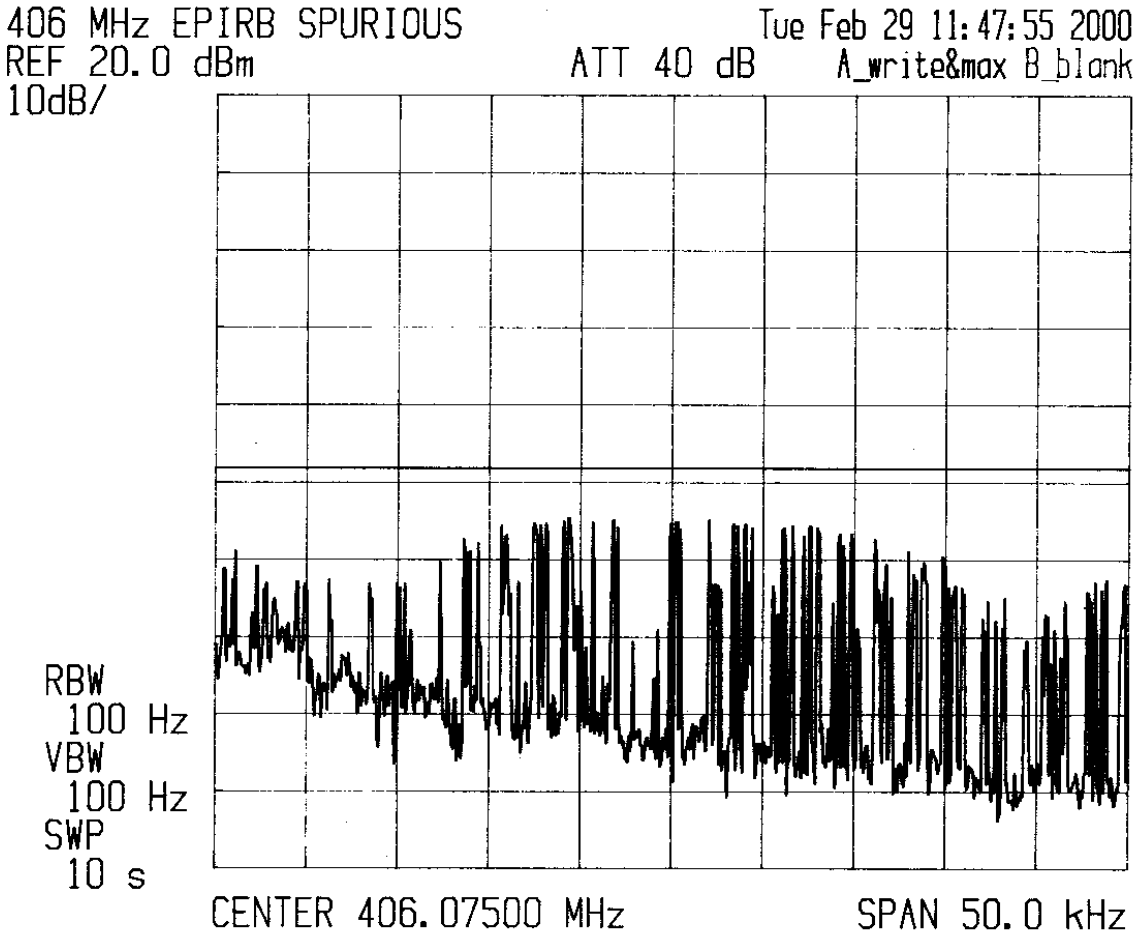
Spurious Emissions at +20°C from 406 MHz to 406.05 MHz Figure 3



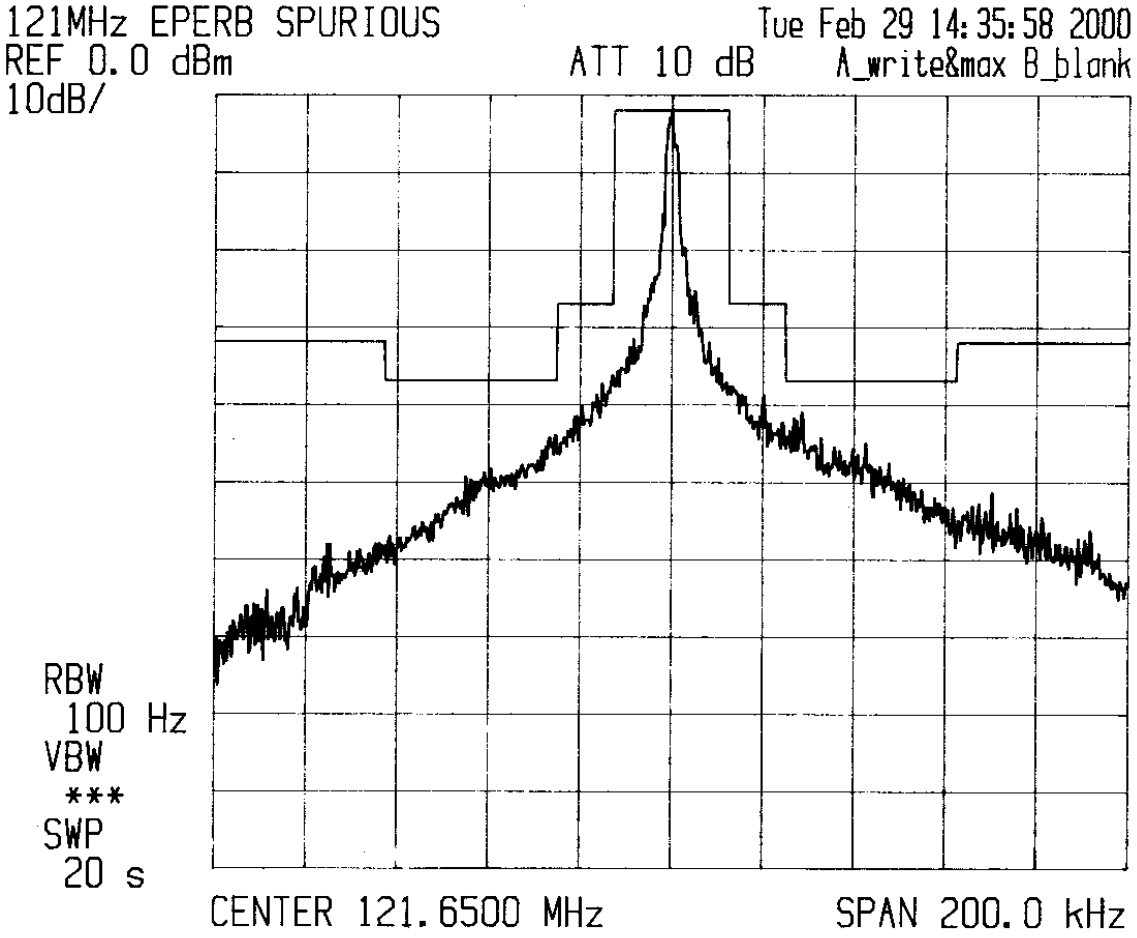
Spurious Emissions at +20°C from 406.05 MHz to 406.1 MHz Figure 4



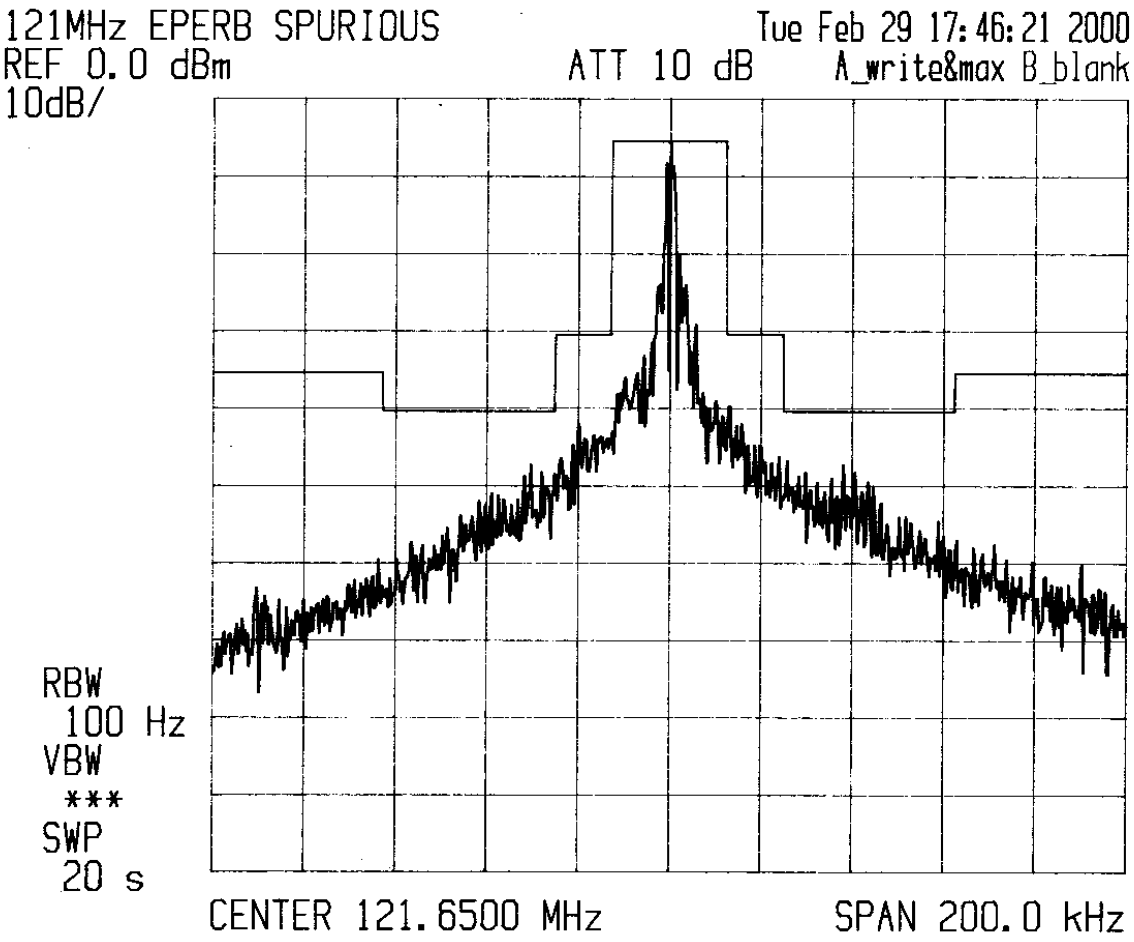
Spurious Emissions at +55°C from 406 MHz to 406.05 MHz Figure 5



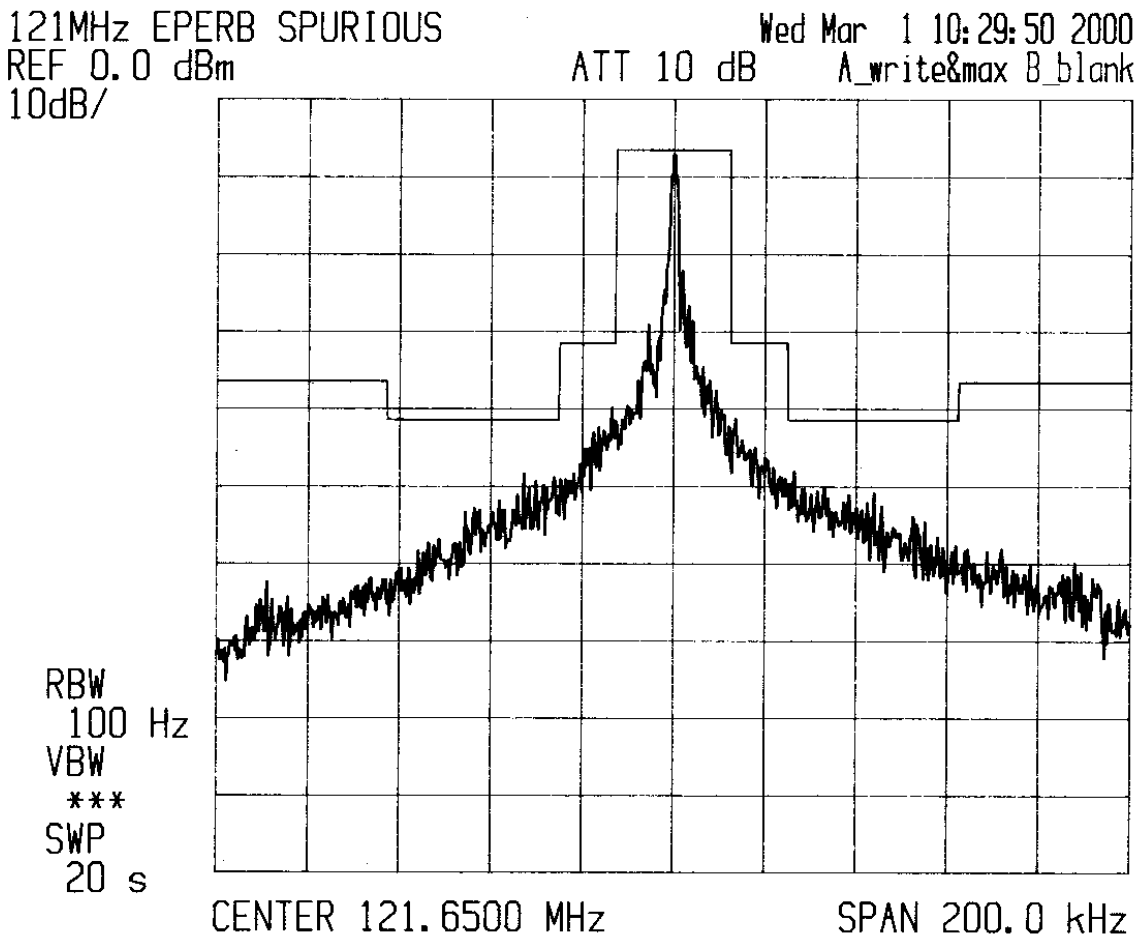
Spurious Emissions at +55°C from 406.05 MHz to 406.1 MHz Figure 6



Spurious Emissions at -20°C from 121.55 MHz to 121.75 MHz Figure 7



Spurious Emissions at +20°C from 121.55 MHz to 121.75 MHz Figure 8



Spurious Emissions at +55°C from 121.55 MHz to 121.75 MHz Figure 9

10. References

1 *RTCM Recommended Standards for 406 MHz Satellite Emergency Position-Indicating Radio Beacons (EPIRBs).* RTCM Paper 4-97/SC110-STD Version 2.0 February 5,1997.

2 *COSPAS/SARSAT 406 MHz Beacon Type Test Results* CNES-CT/RT/AD/LM No 96-399 7 November 1996

3 *Report on type testing Jotron 406MHz Type Tron 40S with FBH4 Bracket* DERA/SSW1/R/TT34/96/1.1 June 1997

4 *Test Report on light on Jotron 40S* BSI Testing Test Report 247/000040 May 1997

11. Distribution List

Copy No	Recipient	Location
1/2	Mr Eirik Storjordet	M JOTRON Electronics a.s P.O. BOX 84 N-3280 TJODALYNG NORWAY
Master	File TT 27/99	DERA Fraser, Portsmouth.

Annex A

Photographs of TRON 40S

Description	Figure
Jotron TRON 40S 406 MHz EPIRB	A1
TRON 40S EPIRB showing 50Ω connector & test lead	A2
TRON 40S in float-free bracket FB4	A3

Jotron TRON 40S 406 MHz EPIRB

Figure A1

Jotron TRON 40S EPIRB showing 50Ω connector and test lead.

Figure A2

TRON 40S in float-free bracket FB4

Figure A3

Annex B

Manufacturers Statement battery discharge

Harmer William T
From: Bjørn Allum [bjornallum@jotron.com]
Sent: 18 February 2000 08:11
To: WTHARMER@dera.gov.uk
Subject: Ad: Battery capacity

Bill,

I have calculated the discharge caused by selftest over a period of 4 years, which is the life cycle for the battery.

One selftest takes approx. 15 sec.
The current consumption in selftest is approx. the same as in operation.

If the beacon is tested once every week, this will amount to :

15 sec * 52 weeks * 4 years = 3210 sec's = 52 min.

Current consumption in "OFF" mode is less than 0.5mA.
For a four year period this will equal approx. 10 min. of operation.

Performing the selftest once every week for four years, and taking the discharge into account, will then equal approx. one hour of operation.

Best Regards

Bjørn

Annex C

Correspondence with US Coastguard

U.S. Department of Transportation
United States Coast Guard

Commandant
United States Coast Guard

U.S. Coast Guard (G-MSE-4)
2100 Second St. S.W.
Washington, DC 20593
Phone: (202) 267-1444
FAX: (202) 267-1069
E-mail: RMarkle@comdt.uscg.mil
www.uscg.mil/hq/g-m/mse4/mse4home.htm

16714/161.011/GEN
22 February 1999

Mr. Morton Flom
M. Flom Associates, Inc.
3356 North San Marcos Place, Suite 107
Chandler, AZ 85224-3100

Dear Mr. Flom:

We have completed the review of the material you sent on the Jotron 40S satellite EPIRB. We use a checklist for these reviews, with the Federal Communications Commission (FCC) rules and the applicable requirements from the Radio Technical Commission for Maritime Services (RTCM) in the left column, and the status of our review in the right column. As you can see, there are numerous items which were not covered in the submitted material. Most of these outstanding items should be self-explanatory, but others are discussed below.

The FCC has not yet formally incorporated the new RTCM satellite EPIRB standard into its regulations. However, in that the new version of the standard incorporates the "second-generation" water-activated switch, which we believe to be far superior to earlier switch arrangements, we are encouraging use of the new switch standard. In that the Jotron 40S includes the water-activation feature, the new RTCM switch requirements apply. We found three problems with the current switch arrangement:

1. The reed switch in proximity to the magnet in the bracket overrides the "ON" switch, preventing operation of the EPIRB when it is in the bracket. The RTCM committee had extensive discussions about this, and concluded that all satellite EPIRBs should be able to be operated in the bracket, even though shielding from the vessel structure might degrade the signal. This confirmed a similar requirement in the older (1987) RTCM standard. Therefore, this arrangement does not comply with either version of the RTCM satellite EPIRB standard. The circuit needs to be reconfigured so that the "ON" position overrides the reed switch.

2. The spring-loaded switch turns the EPIRB to the "ON" position when the safety pin is removed. This does not meet the requirement for two separate actions to activate the EPIRB. Unless we do not understand how the seal works, breaking or removing the seal is not counted as one of those actions, since these often go missing. In any case, the seal is mentioned only in the "Manual Operation" section of the manual, and is not described or

Subj: JOTRON 40S SATELLITE EPIRB

illustrated elsewhere in the package, so far as we could determine. Removing the EPIRB from the bracket is also not one of the actions, because the EPIRB must be able to be operated in the bracket. (See item 1.) Therefore, the switch needs to have the spring assist removed, and a detent added at the "ON" position, and possibly at other switch positions.

3. The "OFF" switch position needs to be identified as "READY." We found that in first generation EPIRBs, the term "OFF" was frequently misunderstood. It was originally meant to be a position that overrode all other switch settings, making the EPIRB completely dead. In the Jotron 40S design, the EPIRB in the "OFF" position is actually armed or "READY." We no longer permit the use of the term "OFF" except in connection with a well-guarded switch or switch position which completely deactivates a malfunctioning EPIRB.

The RTCM standard testing was either not done or not reported. We presumed that this was what Jotron had contracted M. Flom Associates to do. Some of the COSPAS SARSAT testing duplicates the RTCM tests, and to the extent that this is the case, that testing completed by CNES or DERA can be accepted, as long as it does not involve the RTCM sequenced tests.

In addition to the above, everything identified as needed or not reported in the checklist could not be found in the material submitted, and is required for acceptance of the unit. Please feel free to contact us for any assistance or clarifications you may require.

Sincerely,

R. L. MARKLE
Chief, Lifesaving and Fire Safety Standards Division
Office of Design and Engineering Standards
By direction of the Commandant

Encl: (1) Satellite EPIRB review checklist

Copy: FCC Equipment Authorization

MARINE TYPE APPROVALS
DERA Fraser, Fort Cumberland Road,
Easney, Portsmouth, PO4 9LJ
01705 334502 Fax 01705 830017

DERA

FACSIMILE MESSAGE

To		**From**	
Name	**R L MARKLE**	Name	**Peter Goddard**
Address	United States Coast Guard	Contact Number	-- 01705 334507
Fax Number	001 202 267 1069	Direct Fax	01705 830017

Subject/Ref. . . USCG Type Approval of Jotron 40S EPIRBs. No of Pages (Inc.) 9

Dear Bob

29-9-99

Following our telephone conversation on Friday, I have spoken to Jotron Electronics AS of Norway and they have agreed to conduct as much testing as necessary to the new Version 2 of the RTCM Specification (1997).

I have therefore prepared a test plan for the Jotron TRON 40S EPIRB beacon. A copy is attached for your information.

I believe that I have followed the guidelines of Clauses A1.0 & A2.0 correctly and the tests marked "to be conducted will where appropriate follow the defined sequence of A2.0. An "aliveness" test as detailed in Clause A1.0 will be conducted at the appropriate point of all tests. All testing proposed will be conducted in the COSPAS-SARSAT approved, DERA Fraser EPIRB test laboratory.

Could I ask you to let me know if you agree the test plan as proposed or if you have any additional requirements.

Thank you very much for your consideration, I await your reply. My fax number is +44 1705 830017.

Best regards

P J Goddard

Peter J Goddard
Senior Consultant/Engineer – Type Approvals

CC Eirik Storjordet / Bjørn Allum - Jotron A/S — Copy For Information

RTCM - TEST PLAN
Jotron Electronics AS - TRON 40S EPIRB

The Comments column is used to show each of the tests to be conducted U S Coastguard (RTCM) approval. Tests already conducted and identical show date of test.

TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (…°C)	$T_{amb.}$ (+20 °C)	$T_{max.}$ (+40 °C)	
1. INITIAL ALIVENESS TEST (A1.0) - Carrier Frequency Power Output	 406.025 ± 0.002 35 - 39	 MHz dBm		 406.0248		A near identical test was conducted as part of a "Performance Check" during/after each test marked as Conducted
2. DRY HEAT CYCLE (A3.0) - Aliveness Test (during 2 hour period): - Carrier Frequency - Power Output - Aliveness Test (at end of 2 hour period): - Carrier Frequency - Power Output	 406.025 ± 0.002 35 - 39 406.025 ± 0.002 35 - 39	 MHz dBm MHz dBm			 406.0246 406.0246	Raised to +70°C and maintained for >10 hours. Temperature then lowered to +55°C Measurement at +55°C **Identical Test Conducted** On 07-01-97
3. DAMP HEAT CYCLE (A4.0) - Aliveness Test (during 2 hour period): - Carrier Frequency - Power Output - Aliveness Test (at end of 2 hour period): - Carrier Frequency Power Output	 406.025 ± 0.002 35 - 39 406.025 ± 0.002 35 - 39	 MHz dBm MHz dBm			 406.0245 406.0245	Raised to +40°C and maintained for >10 hours. Temperature then maintained at +40°C Measurement at +40°C **Identical Test Conducted** On 13-01-97

TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (…°C)	$T_{amb.}$ (+20 °C)	$T_{max.}$ (+40 °C)	
4. VIBRATION TEST (A5.0)						
- Exterior Mechanical Inspection	No damage					**Test to be Conducted**
- Aliveness Test:						
- Carrier Frequency	406.025 ± 0.002	MHz				The EUT will be vibrated in the hydrostatic mount.
- Power Output	35 - 39	dBm				
- Activation	No activation during test					
5. BUMP TEST (A6.0)						
- Exterior Mechanical Inspection	No Damage					
- Aliveness Test:						**Test to be Conducted**
- Carrier Frequency	406.025 ± 0.002	MHz				
- Power Output	35 - 39	dBm				The EUT will be bumped in the hydrostatic mount.
Activation	No activation during test					
6. SALT FOG TEST (A7.0)						
- Exterior Mechanical Inspection	No damage					
- Aliveness test:						**Test to be Conducted**
- Carrier Frequency	406.025 ± 0.002	MHz				
Power Output	35 - 39	dBm				The EUT will be in hydrostatic mount.

TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (…°C)	$T_{amb.}$ (+20 °C)	$T_{max.}$ (+40 °C)	
7-A. DROP TEST (A8.1) **On Hard Surface** - Exterior Mechanical Inspection - Aliveness Test: - Carrier Frequency - Power Output - Activation	 No damage 406.025 ± 0.002 35 - 39 No activation during test	 MHz dBm				**Test to be Conducted**
7-B DROP TEST (A8.2) **In Water** - Exterior Mechanical Inspection - Aliveness test: - Carrier frequency Power Output	 No damage 406.025 ± 0.002 35 - 39	 MHz dBm		406.0248		This test was conducted satisfactory, three drops were made each from 20M above the water surface. Beacon upright Beacon horizontal Beacon inverted **Identical Test Conducted** On 04-12-96
8. LEAKAGE AND IMMERSION TEST (A9.0) - Aliveness Test: - Carrier Frequency - Power Output - Interior Inspection	 406.025 ± 0.002 35 - 39 No water	 MHz dBm				**Test to be Conducted**

TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (…°C)	$T_{amb.}$ (+20 °C)	$T_{max.}$ (+40 °C)	
9. SPURIOUS EMISSIONS TEST (A10.0) - 406 MHz - 121.5 MHz	 Figure 2-1 Figure 2-6	 (attach graphs) (attach graphs)				**Test to be Conducted**
10. THERMAL SHOCK (A11.0) - Self-activation in water - Aliveness Test: - Carrier Frequency - Power Output - Frequency Stability - short term stability - medium term stability mean slope residual frequency variation	 ≤ 5 406.025 ± 0.002 35 - 39 ≤ 0.002 ≤ 0.001 ≤ 0.001	 minutes MHz dBm PPM in 100ms PPM/ minute PPM				**Test to be Conducted**
11. COSPAS-SARSAT TYPE APPROVAL TESTS (A12.0)	C - S Certificate (attach test report)					**Identical Test Conducted** Testing was conducted by CNES in France. See Test Report CNES CT/RT/AD/LM No 96-399

TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (…°C)	$T_{amb.}$ (+20 °C)	$T_{max.}$ (+40 °C)	
12. OPERATIONAL LIFE, STROBE LIGHT AND SELF TESTS (A13.0)						**Test to be Conducted**
Operational Life						
- Frequency						
- Nominal Carrier	406.025 ± 0.002	MHz				
- Short term stability	≤ 0.002	PPM in 100ms				
- Medium-term stability	≤ 0.001	PPM/ minute				
- Mean slope						
- Residual variation	≤ 0.003	PPM				
- RF output power						
- Strobe flash rate	35 -39	dBm				
- Auxiliary radio-locating Peak envelope output power	20 - 30	/min	21			
	14 – 20	dBm				
13. STROBE LIGHT TEST (A13.2)						**Test Conducted**
- Flash rate	20 – 30	/min	21	22	21	Strobe light tests were conducted under DERA Fraser control by BSI testing at Hemel Hampstead
- Effective intensity	≥ 0.75	Cd		0.99 to 1.4		
- Pulse duration	10^{-6} to 10^{-2}	s				BSI Report available

TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (…°C)	$T_{amb.}$ (+20 °C)	$T_{max.}$ (+40 °C)	
14. SELF TEST (A13.3) - RF pulse duration Frame synchronization pattern - Number of RF bursts	≤ 0.444 0 1101 0000 1-burst					**Test to be Conducted**
15. AUTOMATIC RELEASE MECHANISM TEST (A14.0) - Normal mounted orientation - Rolling 90° starboard - Rolling 90° port - Rolling 90° bow down - Rolling 90° stern down Upside down	Release and float free before 4 meters; automatic activation			.		**Identical Test Conducted** On 04-12-96 The EPIRB in its Hydrostatic Backet was lowered into the 5 metre test tank for each of the stated orientations. For two additional tests the EPIRB in Bracket was cooled/heated to -30°C and +65°C before test.
16. STABILITY AND BUOYANCY TEST (A15.0) - Time to upright - Reserve buoyancy - Float upright; Antenna base	≤ 2 ≥ 5 > 4	s % cm				**Test to be Conducted**

TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (…°C)	$T_{amb.}$ (+20 °C)	$T_{max.}$ (+40 °C)	
17. INADVERTENT ACTIVATION TEST (A16.0) - Activation release	EUT should not release from bracket or automatically activate					**Identical Test Conducted** On 29-04-97 EPIRB Beacon in Hydrostatic bracket was mounted vertically on a wall and subjected to a water jet of approximately2300 L/m from a 63.5mm Dia Nozzle.
18. AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST (A17.0) - Carrier frequency - PERP - Duty Cycle - Modulation - Frequency - - Direction - Duty cycle - Factor - Sweep repetition rate	 121.5 ± 0.006 (see comment) 14 – 20 100 ≥ 700 Hz within range of 300 – 1600 Hz Upward 33 – 55 0.85 – 1.0 2 – 4	 MHz dBm % Hz % # Hz		 121.65 100 383.5 - 1408.5 2.6		A test of the 121 MHz homing signal was conducted to the UK MPT 1256 specification. **Test is to a similar to RTCM 1987.** **Conducted** On 01-04-97 The modulation sweep direction was noted as downward Notes: The transmitter frequency is offset to 121.65 MHz
- Antenna - Pattern - Polarization VSWR	 Omnidirectional Vertical ≤ 1.5:1			 Integral antenna		

PARAMETERS TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ (…°C)	$T_{amb.}$ (+20 °C)	$T_{max.}$ (… °C)	
19. HUMIDITY TEST (A18.0) - Aliveness Test: - Carrier Frequency - Power Output	 406.025 ± 0.002 35 - 39	 MHz dBm				**Test to be Conducted**
20. ORIENTATION TEST (A19.0) VERTICAL - Aliveness Test: - Carrier Frequency - Power Output UPSIDE DOWN - Aliveness test: - Carrier frequency - Power Output HORIZONTAL - Aliveness test: - Carrier frequency - Power Output	 406.025 ± 0.002 35 - 39 406.025 ± 0.002 35 - 39 406.025 ± 0.002 35 - 39	 MHz dBm MHz dBm MHz dBm				**Test to be Conducted**

SUMMARY OF TESTS:-

Tests considered already tested and complete:-

A3.0, A4.0, A8.2, A13.2, A14.0, A16.0 & A17.0
A12.0 (Full COSPAS-SARSAT tests detailed in CNES Report CT/RT/AD/LM No 96-399)

Tests to be conducted specifically for USCG Report to RTCM Specification Ver 2:-

In Sequence; A5.0, A6.0, A7.0, A8.1, A9.0, A10.0, A11.0, A13.1, A13.3
As convenient; A15.0, A18.0 & A19.0

U.S. Department of Transportation
United States Coast Guard

Lifesaving and Fire Safety Stds Division
United States Coast Guard (G-MSE-4)

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DATE:	8 November, 1999

TOTAL PAGES INCLUDING THIS PAGE: 1

SUBJECT: JOTRON 4OS EPIRB

I'm sorry to be so late getting back to you. I did receive the page you faxed to ENS Rydzewski at my request. Unfortunately, it was page 3, rather than page 4. The original report you sent me had two page 3s and no page 4, so I now have 3 copies of page 3, and none of page 4.

Nevertheless, I think I can address the basic issue. The RTCM tests identified as numbers 1 – 14 on the test forms (A1 –A13) are designed to be conducted cumulatively on a single test unit. Therefore, selected tests in this series done previously on a different unit could not be credited. (See sec. A2.0 and figure A-1 in the RTCM standard.)

We can agree to credit the following tests as you proposed:

15 (A14.0) – The automatic release mechanism on the U.S. version will apparently be the same as the one you tested.

17 (A16.0) – (Same comment as above.)

18 (A17.0) – Note however that the U.S. version will be required to have an upward swept homing beacon. You will need to confirm this.

U.S. Department of Transportation
United States Coast Guard

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DATE:	**10 November, 1999**

TOTAL PAGES INCLUDING THIS PAGE: 1

SUBJECT: JOTRON 4OS EPIRB

Page 4 turned out to be critical, I see.

The RTCM test series 1-12 in paragraph A2.0, requires only an aliveness test at the conclusion of each environmental test; i.e., measurement of power, carrier frequency, and data message. This aliveness test is the minimum test to show that the beacon is still operating at the conclusion of each environmental test. We envisioned that the C-S testing would then ensure that the stressed beacon would still meet the complete beacon spec, after completing all of the environmental tests.

We think that the whole series 1-12 needs to be completed, but we will agree to an abridged version of the COSPAS-SARSAT testing, at test 11. Test 11 should consist of the C-S T.007 data message generator and modulation tests. These tests will ensure that the data message --at the end of the environmental tests -- still meet the specifications, including modulation rise/fall times, etc.

I trust that will be satisfactory, and explains our rationale adequately.