

Toulouse, 18 July 2001

O/Réf. M3223-RTCM

**RTCM TEST REPORT OF  
406 MHz EPIRB**

**MANUFACTURER : ACR Electronics Inc.  
BEACON MODEL : RLB35**

Written: 18 July 2001  
By: Gérard PEYROU

Visa:

Approved: 23 July 2001  
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Quality Control: 24 July 2001  
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Visa:

**Distribution :**

- Mr Cal HAVENS  
- ITS/AP/ET

ACR Electronics, Inc.  
INTESPACE.

(2 copies)  
(1 copy)

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## CHAPTER 1

<b>A1.0- ADMINISTRATION, GENERAL COMMENTS AND SUMMARY OF TESTS</b>
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## 1.1 GENERAL COMMENTS

This document reports the procedures and results of certification tests on 406-MHz SARSAT beacons. The tests were conducted for the United States Coast Guard (USCG) by INTESPACE (ITS) under a Center National d'Etudes Spatiales (C.N.E.S., the French Space Agency) contract.

## 1.2 ADMINISTRATION

### 1.2.1 WORK ORDER

Manufacturer : ACR Electronics, Inc.

Address : 5757 Ravenswood Road – FORT LAUDERDALE, FL 33312-6645 USA

Represented by : Mr Cal HAVENS

### 1.2.2 INTESPACE TEST CENTER

The test operations have been conducted by : Mr Gérard PEYROU

### 1.2.3 SCHEDULE

Start of test : 17 April 2001

End of test : 22 June 2001

### 1.2.4 WORK REFERENCE : **M3223-RTCM**

### 1.2.5 EQUIPEMENT UNDER TEST

The results from this test report concern only the equipment here after referenced :

Equipement Under Test (EUT)	Model	Beacon serial number	Float free system auto-release mechanism	Comments
1	RLB35	07		- Antenna disconnected - 50 $\Omega$ RF Output Connector
2	RLB35	01	ACR Model : Universal Sea Shelter Id 18560	

### 1.3 TEST FACILITIES

- ARGOS – COSPAS/SARSAT Certification Test Bench
- INTESPACE Environmental Test Equipements
- Toulouse CNES MCC

### 1.4 STANDARDS AND TEST PROCEDURES APPLICABLES

- COSPAS-SARSAT standards :
  - "C/S T. 001- Issue 3 - Revision 3 - October 1999 "
  - "C/S T. 007- Issue 3 - Revision 7 - October 2000"
- RTCM Recommended Standards for 406 MHz Satellite Emergency Position-Indicating Radiobeacons (EPIRBs) - Version 2.0 - February 5, 1997
- INTESPACE Radiobeacon Test Procedures

### 1.5 TEST SEQUENCE

#### 1.5.1 SERIES OF TESTS RUN IN ORDER \* : (RTCM item)

1 - Initial Aliveness Test	(A 1.0)
2 - Dry Heat Test	(A 3.0)
3 - Damp Heat Test	(A 4.0)
4 - Vibration Test	(A 5.0)
5 - Bump Test	(A 6.0)
6 - Salt Fog Test	(A 7.0)
7 - Drop Tests	(A 8.0)
8 - Leakage and Immersion Tests	(A 9.0)
9 - Spurious Emission Test	(A 10.0)
10 - Thermal Shock Tests	(A 11.0)
11 - Cospas-Sarsat C/S T.007 Tests	(A 12.0)
12 - Operational Life, Strobe Light and Self Tests	(A 13.0)

\* Except for the Salt Fog Test . It was done before item 4-Vibration Test

**1.5.2 SERIES OF TESTS TO BE RUN ANY TIME DURING THE SEQUENCE :**

- Automatic Release Mechanism & Automatic Activation Tests (A 14.0)
- Stability & Buoyancy Test (A 15.0)
- Inadvertent Activation Test (A 16.0)
- Auxillary Radio-Locating Device Transmitter Test (A 17.0)
- Humidity Test (A 18.0)
- Orientation Test (A 19.0)

The two electronic beacon are identical :

- EUT 1 : RLB35 S/N 07 was used for environmental and electrical tests RTCM items A 2.0 to A 13.0, A16, A 17 (partial), A 18, A19

- EUT 2 : TRON 40GPS n° 7000 was used for tests RTCM items A 12.0 (partial), A14.0, A15 and A 17 (partial) .

**1.6 RESULTS**

See following pages Summary of Test results and following chapters Test Result Reports (data and graphs)

*General remark :*

*Regarding the issue of the measurement results performed on the certification test bench, due to the numbering of the computer data sheets, the beacon serial number alters from one curve to the other although the same beacon is concerned.*

## **SUMMARY OF TESTS**

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. ( $\pm 3^{\circ}\text{C}$ ) ( $-\dots^{\circ}\text{C}$ )	T amb. ( $\pm 3^{\circ}\text{C}$ ) ( $22^{\circ}\text{C}$ )	T max. ( $\pm 3^{\circ}\text{C}$ ) ( $+70$ to $+55^{\circ}\text{C}$ )	
<b>1. INITIAL ALIVENESS TEST (A1.0)</b> * Carrier Frequency * Power Output * Data Message	406.025 $\pm$ 0.002 35 - 39 must be correct	MHz dBm $\checkmark$	406.024511 37.2 $\checkmark$	406.024502 37.6 $\checkmark$	<b>Chapter 2</b> 18 April 2001 (C/S Elec. & Funct. Test at amb Temp. Chapter 12.)	
<b>2. DRY HEAT CYCLE (A3.0)</b> * Aliveness Test (during 2 hour period) * Carrier Frequency * Power Output * Data Message * Aliveness Test (at end of 2 hour period) * Carrier Frequency * Power Output * Data Message	406.025 $\pm$ 0.002 35 - 39 must be correct  406.025 $\pm$ 0.002 35 - 39 must be correct	MHz dBm $\checkmark$  MHz dBm $\checkmark$	406.024511 37.2 $\checkmark$	406.024502 37.6 $\checkmark$  406.024503 37.6 $\checkmark$	<b>Chapter 3</b> 18 & 19 April 2001 (C/S Elec. & Funct. Test at $+55^{\circ}\text{C}$ Chapter 12.)	



PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. ( $\pm 3^{\circ}\text{C}$ ) ( $-\text{ }^{\circ}\text{C}$ )	T amb. ( $\pm 3^{\circ}\text{C}$ ) ( $22^{\circ}\text{C}$ )	T max. ( $\pm 3^{\circ}\text{C}$ ) ( $+40^{\circ}\text{C}$ )	
<b>3. DAMP HEAT CYCLE (A4.0)</b> • Aliveness Test (during 2 hour period) • Carrier Frequency • Power Output • Data Message • Aliveness Test ( end of 2 hour period)	$406.025 \pm 0.002$ 35 - 39 must be correct	MHz dBm $\checkmark$			$406.024504$ 37.5 $\checkmark$	<b>Chapter 4</b> 19&20 April 2001
<b>4. VIBRATION TEST (A5.0)</b> • Exterior Mechanical Inspection • Aliveness Test • Carrier Frequency • Power Output • Data Message	No damage $406.025 \pm 0.002$ 35 - 39 must be correct	$\checkmark$ MHz dBm $\checkmark$		$\checkmark$	$406.024506$ 37.5 $\checkmark$	<b>Chapter 5</b> 30&31 may, 2001

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. ( $\pm 3^{\circ}\text{C}$ ) ( <u>        </u> $^{\circ}\text{C}$ )	T amb. ( $\pm 3^{\circ}\text{C}$ ) ( $22^{\circ}$ )	T max. ( $\pm 3^{\circ}\text{C}$ ) ( <u>        </u> $^{\circ}\text{C}$ )	
<b>5. BUMP TEST (A6.0)</b> * Exterior Mechanical Inspection  * Aliveness Test  * Carrier Frequency * Power Output * Data Message	No damage	√	√			<b>Chapter 6</b> 1 June, 2001
	$406.025 \pm 0.002$ 35 - 39 must be correct	MHz dBm √	406.024460 37.4 √			
<b>6. SALT FOG TEST (A7.0)</b> * Exterior Mechanical Inspection  * Aliveness Test  * Carrier Frequency * Power Output * Data Message	No damage	√	√			<b>Chapter 7</b> 27 April to 4 May, 2001
	$406.025 \pm 0.002$ 35 - 39 must be correct	MHz dBm √	406.024474 37.4 √			

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. ( $\pm 3$ °C) (-40 °C)	T amb. ( $\pm 3$ °C) (22 °C)	T max. ( $\pm 3$ °C) ( _____ °C)	
<b>7-A. DROP TEST (A8.1)</b>  <b>On Hard Surface</b> <ul style="list-style-type: none"> <li>• Exterior Mechanical Inspection</li> <li>• Aliveness Test</li> <li>• Carrier Frequency</li> <li>• Power Output</li> <li>• Data Message</li> </ul>	No damage  $406.025 \pm 0.002$ 35 - 39 must be correct	✓  MHz dBm ✓	✓  406.024460 37.5 ✓			Chapter 8 5 June 2001
<b>7-B. DROP TEST (A8.2)</b>  <b>Into Water</b> <ul style="list-style-type: none"> <li>• Exterior Mechanical Inspection</li> <li>• Aliveness Test</li> <li>• Carrier Frequency</li> <li>• Power Output</li> <li>• Data Message</li> </ul>	No damage  $406.025 \pm 0.002$ 35 - 39 must be correct	✓  MHz dBm ✓	✓  406.024461 37.7 ✓			6 June 2001

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. ( $\pm 3^{\circ}\text{C}$ ) (- 40 $^{\circ}\text{C}$ )	T amb. ( $\pm 3^{\circ}\text{C}$ ) ( 22 $^{\circ}\text{C}$ )	T max. ( $\pm 3^{\circ}\text{C}$ ) ( 55 $^{\circ}\text{C}$ )	
<b>8. LEAKAGE AND IMMERSION TEST (A9.0)</b> <ul style="list-style-type: none"> <li>• Aliveness Test</li> <li>• Carrier Frequency</li> <li>• Power Output</li> <li>• Data Message</li> <li>• Interior Inspection</li> </ul>	406.025 $\pm$ 0.002 35 - 39 must be correct  No water	MHz dBm ✓ ✓	406.024458 37.3 ✓ ✓			Chapter 9 8-12 June 2001
<b>9. SPURIOUS EMISSIONS TEST (A10.0)</b> <ul style="list-style-type: none"> <li>• 406 MHz</li> <li>• 121.5 MHz</li> </ul>	Figure 2-1  Figure 2-6	✓ (attach graphs)  ✓ (attach graphs)	✓  ✓	✓  ✓		Chapter 10 and Chapter 12 (C/S T.A. Tests Results )  April 18 <sup>th</sup> , to April 27 <sup>th</sup> , 2001

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. ( $\pm 3^{\circ}\text{C}$ ) ( <u>        </u> $^{\circ}\text{C}$ )	T amb. ( $\pm 3^{\circ}\text{C}$ ) ( <u>        </u> $^{\circ}\text{C}$ )	T max. ( $\pm 3^{\circ}\text{C}$ ) ( <u>        </u> $^{\circ}\text{C}$ )	
<b>10. THERMAL SHOCK TEST (A11.0)</b>  • Self-activation in water  • Aliveness Test : • Carrier Frequency • Power Output • Data Message  • Frequency Stability • Short term stability  • Medium term stability : • mean slope  • residual frequency variation	$\leq 5$  $406.025 \pm 0.002$ $35 - 39$ must be correct  $\leq 0.002$  $\leq 0.001$  $\leq 0.003$	minutes  MHz dBm ✓  parts/ million in 100 ms  parts/ million /minute  parts/ million	LOW TEMPERATURE - $31^{\circ} \rightarrow 0.1^{\circ}\text{C}$  $< 0.2$  $406.024495$ $36.7$ ✓  $\leq 0.0002$  $< 0.001$  $< 0.002$	HIGH TEMPERATURE + $70^{\circ} \rightarrow +31^{\circ}\text{C}$  $< 0.2$  $406.024472$ $37.5$ ✓  $\leq 0.0002$  $< 0.001$  $< 0.002$	<b>Chapter 11</b>  12-14 june 2001	
<b>11. COSPAR-SARSAT TYPE (A12.0) APPROVAL TESTS</b>	C-S Certificate (attach test report)	✓	$-40^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ✓	$22^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ✓	$55^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ✓	<b>Chapter 12</b>

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. ( $\pm 3^{\circ}\text{C}$ ) ( $-40^{\circ}\text{C}$ )	T amb. ( $\pm 3^{\circ}\text{C}$ ) ( $\text{---}^{\circ}\text{C}$ )	T max. ( $\pm 3^{\circ}\text{C}$ ) ( $\text{---}^{\circ}\text{C}$ )	
<b>12. OPERATIONAL LIFE, STROBE LIGHT AND SELF TESTS (A13.0)</b>  Operational Life <ul style="list-style-type: none"> <li>• Frequency</li> <li>• Nominal Carrier</li> <li>• Short-term stability</li> </ul>	$406.025 \pm 0.002$ $\leq 0.002$	MHz parts/ million in 100 trs	406.024539 $< 0.0003$			<b>Chapter 13</b> 17-20 June 2001  Results after 48 hours (C/S Oper. Life Test at min Temp. Chapter 12)
<ul style="list-style-type: none"> <li>• Medium term stability :</li> <li>• Mean slope</li> </ul>	$\leq 0.001$	parts/ million /min	$< 0.0001$			
<ul style="list-style-type: none"> <li>• Residual variation</li> </ul>	$\leq 0.003$	parts/ million	$< 0.0002$			
<ul style="list-style-type: none"> <li>• RF output power</li> </ul>	35-39	dBm	36.0			
<ul style="list-style-type: none"> <li>• Strobe flash rate</li> </ul>	20-30	/min	21			
<ul style="list-style-type: none"> <li>• Auxiliary radio-locating Peak Envelope output Power</li> </ul>	14-20	dBm	18.3			

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. ( ± 3 °C ) ( - 40 °C )	T amb. ( ± 3 °C ) ( 22 °C )	T max. ( ± 3 °C ) ( 55 °C )	
<b>13. STROBE LIGHT TEST (A13.2)</b>  • Flash rate • Effective intensity • Pulse duration	20-30	/min	21	21	21	<b>Chapter 13 and Chapter 12</b> ( C/S Elec. & Funct. Test at min, amb, and max Temp. )
	0.75	Cd	0.85	0.85	0.80	
	$10^{-6}$ to $10^{-2}$	S		$5 \cdot 10^{-3}$		
<b>14. SELF TEST (A13.3)</b>  • RF pulse duration • Frame synchronization pattern • Number of RF bursts	$\leq 0.444$ sec	✓	✓	✓	✓	<b>Chapter 13 and Chapter 12</b> ( C/S Elec. & Funct. Test at min, amb, and max Temp. P 43 )
	0 1101 0000	✓	✓	✓	✓	
	1-burst	✓	✓	✓	✓	

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. ( $\pm 3^{\circ}\text{C}$ ) ( $-50^{\circ}\text{C}$ )	T amb. ( $\pm 3^{\circ}\text{C}$ ) ( $22^{\circ}\text{C}$ )	T max. ( $\pm 3^{\circ}\text{C}$ ) ( $70^{\circ}\text{C}$ )	
<b>15. AUTOMATIC RELEASE MECHANISM TEST (A14.0)</b> <ul style="list-style-type: none"> <li>• Normal mounted orientation</li> <li>• Rolling <math>90^{\circ}</math> starboard</li> <li>• Rolling <math>90^{\circ}</math> port</li> <li>• Rolling <math>90^{\circ}</math> bow down</li> <li>• Rolling <math>90^{\circ}</math> stern down</li> <li>• Upside down</li> </ul>	Release and float free before 4 meters ; automatic activation	✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓	✓	<b>Chapter 14</b>  7-8 June 2001  Just acceptable at lower stowage temperature	
<b>16. STABILITY AND BUOYANCY TEST (A15.0)</b> <ul style="list-style-type: none"> <li>• Time to upright</li> <li>• Reserve buoyancy</li> <li>• Float upright ; Antenna base</li> </ul>	$\leq 2$ $\geq 5$ $> 4$	s % cm	1 0.4 > 4		<b>Chapter 15</b>  24 July 2000  OK with old method of specification measurement	
<b>17. INADVERTENT ACTIVATION TEST (A16.0)</b> <ul style="list-style-type: none"> <li>• EUT not release from bracket</li> <li>• EUT not automatically activate</li> </ul>		✓ ✓	✓ ✓		<b>Chapter 16</b>  12 June 2001	



PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. (±3 °C) (-40 °C)	T amb. (±3 °C) (22 °C)	T max. (±3 °C) (55 °C)	
<b>18. AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST (A17.0)</b>						<b>Chapter 17 and Chapter 12 (C/S T.A. Tests Results)</b> April 18 <sup>th</sup> , to June 22 <sup>th</sup> , 2001  Just on the limits  May 16 <sup>th</sup> , 2001  Not checked (Antenna integrated)
• Carrier frequency	121.5 ± 0.006	MHz	121.4983	121.4996	121.4996	
• PERP	14-20	dBm	18.1	17.96	17.6	
• Duty Cycle	100	%	100	100	100	
• Modulation						
* Frequency	≤ 700 Hz within range of 300-1600 Hz	Hz	300 → 1460	290 → 1460	300 → 1460	
* Direction	Upward	√	√	√	√	
* Duty cycle	33-55	%	39	41	40	
* Factor	0.85-1.0	#	> 0.85	> 0.85	> 0.85	
* Sweep repetition rate	2 - 4	Hz	2.6	2.6	2.6	
• Antenna		√				
* Pattern		√				
* Polarization		√				
* VSWR	Omnidirectional Vertical ≤ 1.5:1	√				

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. ( $\pm 3^{\circ}\text{C}$ ) ( $\underline{\hspace{2cm}}$ $^{\circ}\text{C}$ )	T amb. ( $\pm 3^{\circ}\text{C}$ ) ( $22^{\circ}\text{C}$ )	T max. ( $\pm 3^{\circ}\text{C}$ ) ( $40^{\circ}\text{C}$ )	
<b>19. HUMIDITY TEST (A18.0)</b> <ul style="list-style-type: none"> <li>* Aliveness Test :</li> <li>* Carrier frequency</li> <li>* Power Output</li> <li>* Data Message</li> </ul>	406.025 $\pm$ 0.002 35-39 must be correct	MHz dBm ✓		406.024461 37.75 ✓	Chapter 18 June 7 <sup>th</sup> & 8 <sup>th</sup> , 2001	
<b>20. ORIENTATION TEST (A19.0)</b>  <b>VERTICAL</b> <ul style="list-style-type: none"> <li>* Aliveness Test :</li> <li>* Carrier frequency</li> <li>* Power Output</li> <li>* Data Message</li> </ul> <b>UPSIDE DOWN</b> <ul style="list-style-type: none"> <li>* Aliveness Test :</li> <li>* Carrier frequency</li> <li>* Power Output</li> <li>* Data Message</li> </ul> <b>HORIZONTAL</b> <ul style="list-style-type: none"> <li>* Aliveness Test :</li> <li>* Carrier frequency</li> <li>* Power Output</li> <li>* Data Message</li> </ul>	406.025 $\pm$ 0.002 35-39 must be correct  406.025 $\pm$ 0.002 35-39 must be correct  406.025 $\pm$ 0.002 35-39 must be correct	MHz dBm ✓  MHz dBm ✓  MHz dBm ✓	406.024460 37.6 ✓  406.024454 37.6 ✓  406.024455 37.6 ✓	Chapter 19 and Chapter 12 (C/S T.A. Tests Results )  June 8 <sup>th</sup> , 2001		

## **CHAPTER 2**

### **A1.0-INITIAL ALIVENESS TEST**

## **2.1. TEST SPECIFICATIONS AND SEQUENCE**

The parameters defined in sections A 1.0 of the RTCM document are to be measured using a

- COSPAS/SARSAT test bench

- Measurements at ambient temperature :

- Transmitter power output,
- Digital Message,
- Digital Message Generator,
- Modulation,
- Transmitted frequency ,
- Spurious output,
- VSWR check,
- Self-test mode

## **2.2. EQUIPMENT UNDER TEST**

Beacon Unit : 1/2

Name : ACR

Type : RLB35

Number : 07

## **2.3 TEST SITE**

Toulouse Space Center (CST) - INTESPACE - AP/ET.

## **2.4. TEST EQUIPMENT**

- Argos - Cospas/Sarsat Test Bench.

## **2.5. RESULTS**

Data and graphs are reported next page

**INITIAL ALIVENESS TEST RESULTS**

Beacon Unit : 1/2  
 Name : ACR  
 Type : RLB35  
 Number : 07  
 Date : 18 April 2001

**406 MHZ MEASUREMENTS**

<b>1 – Environmental Temperature ( ° C)</b>		22.5 ° C
<b>2 – POWER OUTPUT</b>		
- Transmission power	dBm	37 ± 2
- Power risetime	ms	< 5
- Power falltime	ms	< 5
<b>3 – SPURIOUS OUTPUT</b>		
- In band	*	OK
- Carrier harmonics	*	
<b>4 – DIGITAL MESSAGE GENERATOR</b>		
- Repetition rate	**	OK
- Bit rate	bits/S	400 ± 4
- Transmission time	ms	440 ± 4,4
- CW preamble	ms	160 ± 1,6
<b>5 – DIGITAL MESSAGE</b>		
- Bit and frame sync	bits	1-24
- Format flag	bit	25
- Protocol flag	bit	26
- Country code	bits	27-36
- Protocol	bits	37-40
- Encoded Position Data Source	bits	111
- Homing	bits	112
- BCH 1 code read / calculated	bits	86-106 / 25-85
- BCH 2 code read / calculated	bits	133-144 / 107-132
<b>6 – FREQUENCY</b>		
- Nominal value	KHz	406 025 ± 2
- Short term stability		< 2x10 <sup>-9</sup> /100 ms

\* See graphs page 2.7

\*\* See graph page 2.5

Constructeur     ACR  
 Modele            RLB35  
 Numero de serie  07  
 Reference         M3223-1  
 Type              SARSAT

Type de certification : Nominal  
 Date des mesures     : 18 Apr 2001 10:21:21  
 Temperature de palier : 22 °C  
 Temperature lue     : 22.4656293 °C

**Message balise**

Message reçu                   (1-144): FFFE2F96EE2BC0012C00221D917769FCB6D1  
 Format flag                    (25): 1  
 Protocole flag                 (26): 0  
 Code pays                      (27-36): 0366  
 Pays                            : USA  
 Code protocole                 (37-40): 1110  
 Protocole utilise             : Standard - Test  
 Identification                 :  
 Numero                         :  
 BCH 1 lu/calculé           (86-106/25-85): 087645/087645  
 BCH 2 lu/calculé           (133-144/107-132): 6D1/6D1  
 Pos. Data Source             (111): Internal  
 121.5 MHz Homing            (112): Yes  
 Position GPS de reference    : N 43°33'34'' E 1°28'48  
 Position GPS                  : Yes  
 Position GPS par defaut      : No  
 Latitude position             : 43°33'32'' Nord  
 Longitude position            : 1°28'44'' Est  
 Delta position                : 0 km

**Controle du message**

Duree de la porteuse pure	mS	158.4<	<162.6	160.37 +-	.01
Duree minimale				160.37	
Duree maximale				160.38	
Duree de l'emission	mS	513.8<	<526.2	519.35	

**Frequence des bits**

Frequence de modulation	Hz	395.4<	<404.6	401.29 +-	.01
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**Mesures d'indice**

Excursion de phase totale	rd	<= 2.48	2.27	
Excursion de phase positive	rd	0.96<	<1.24	1.15
Excursion de phase negative	rd	-1.24<	<-0.96	-1.12
Symetrie de l'excursion	%	<= 5	-1.21	

**Stabilite de frequence**

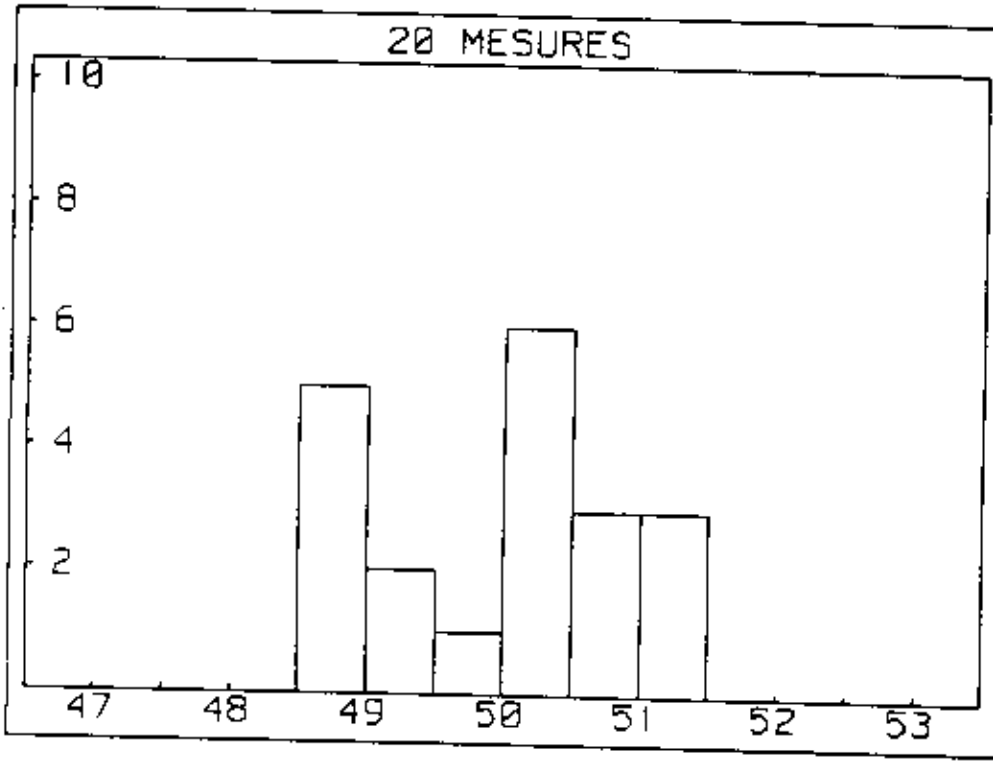
Frequence moyenne F2	Hz	406024511.70		
SIGMA2	F2-F1	3.234E-10		
SIGMA3	F3-F2	1.341E-10		
Slope	min.	-1E-9<	<1E-9	-2.989E-12
Residual frequency variation		<= 3E-9	1.087E-10	

Puissance 340.6 MHz, dBm 37.52

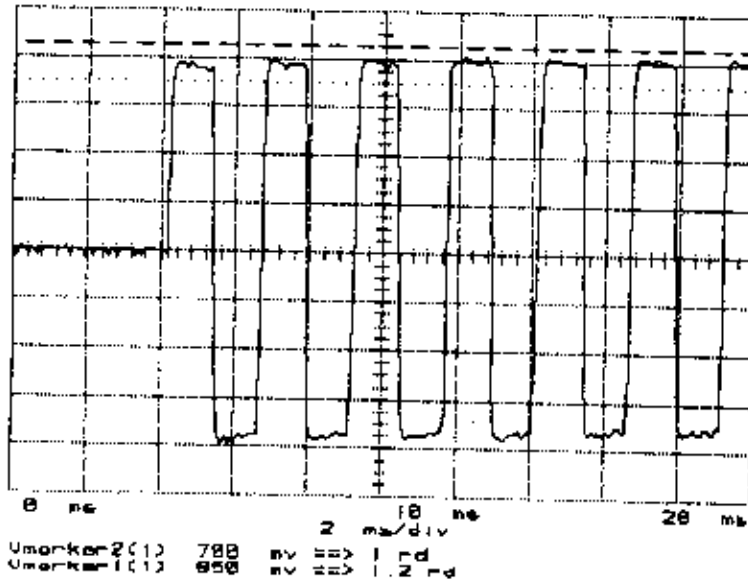
Frequence moy 121.5 MHz 121499.63

Puissance 37.9 - 20 = 17.9 dBm

Recurrence des emissions

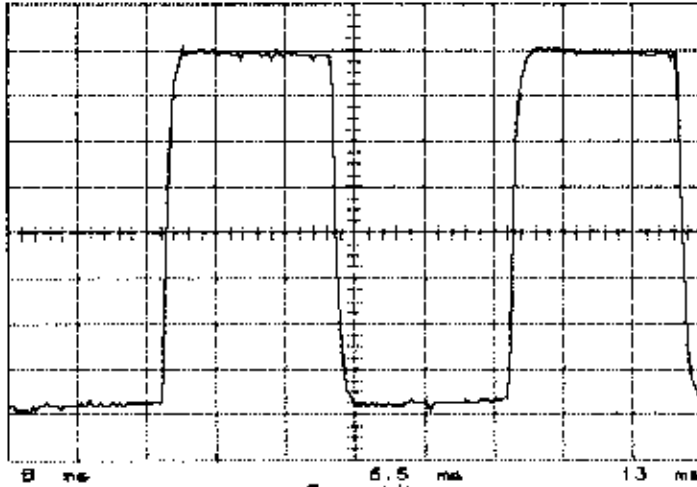


Oscilloscope

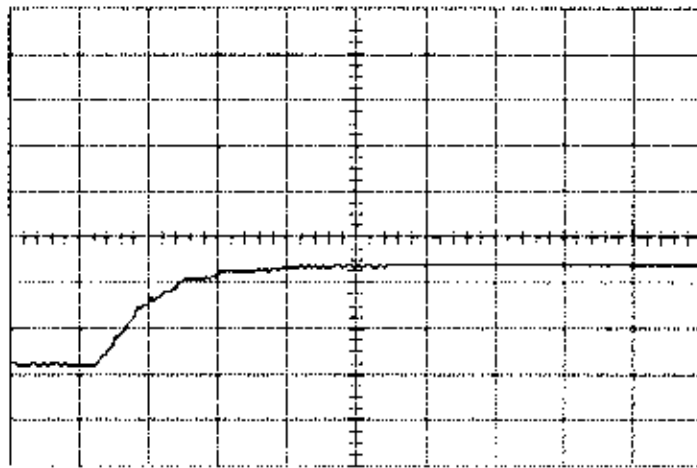


DUTY CYCLE : 2.0E-02

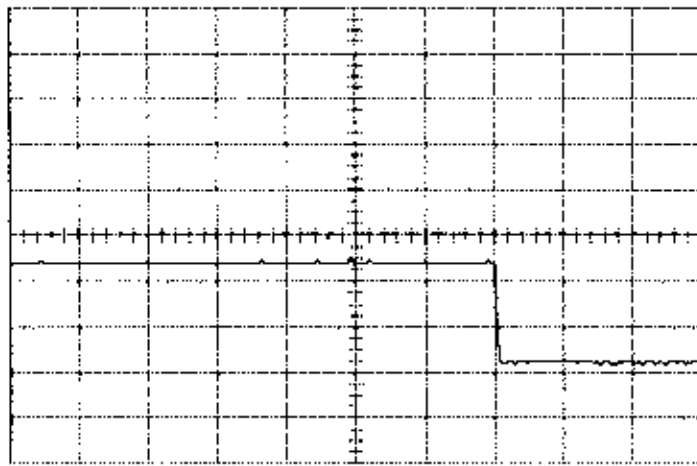
DUTY CYCLE : .8200001212051



0 ns 5 ns/div 13 ns  
 falltime(1) <= 89.8285 us rise(1) <= 89.8285 us  
 width(1) 1.21756 ns -width(1) 1.26746 ns



-1 ns 5 ns/div 4 ns  
 risetime(1) <= 768.463 ns



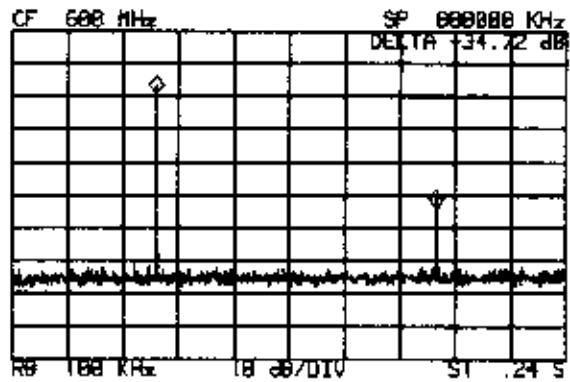
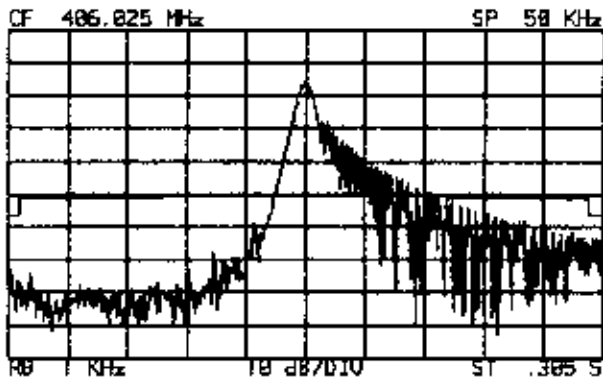
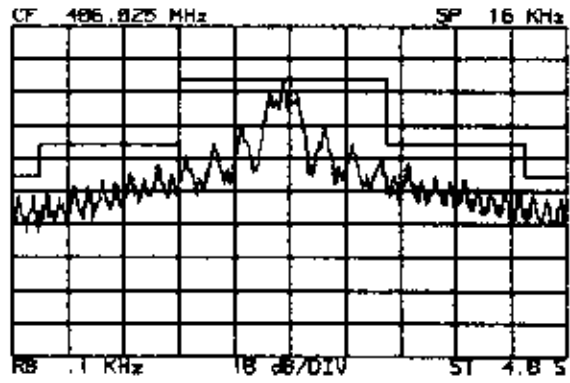
-3.5 ns 5 ns/div 1.5 ns  
 risetime(1) <= 768.463 us falltime(1) <= 19.95 ns



Spurious

---

ACR  
RLB35  
97  
18 Apr 2001  
486 MHz  
TEMP : 22°C



## **CHAPTER 3**

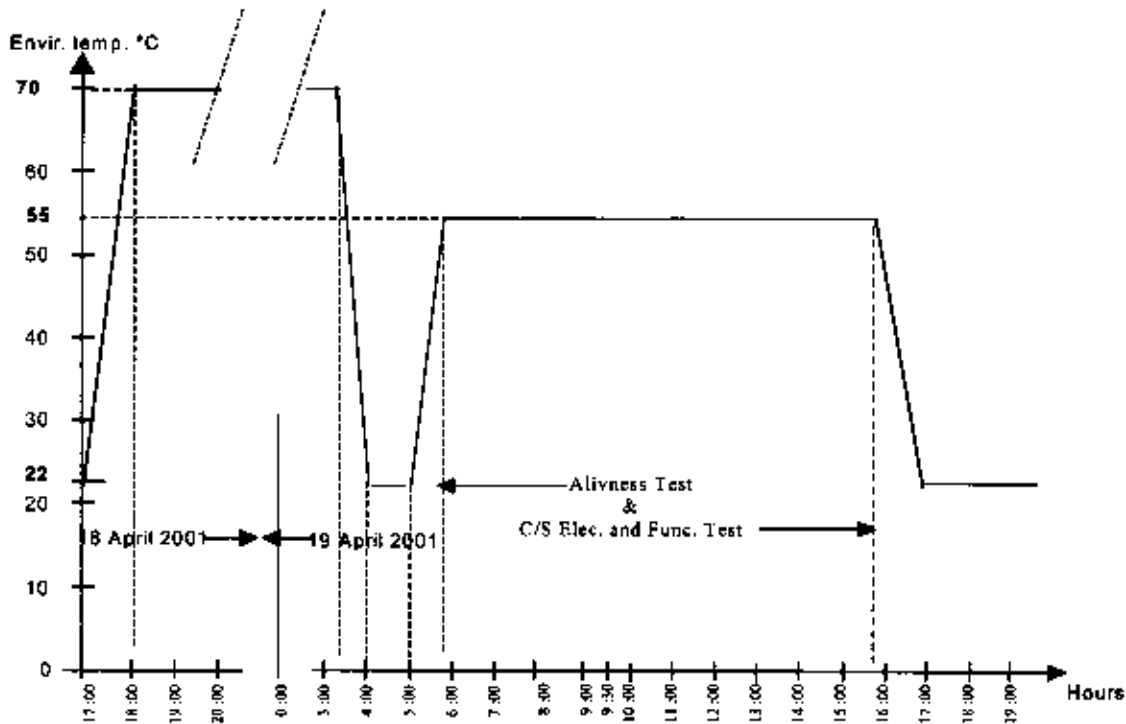
### **A3.0-DRY HEAT TEST**

### 3.1. TEST SPECIFICATIONS AND SEQUENCE

The parameters defined in appendix A 3.0 of the RTCM document have been measured using a  
- SARSAT Test Bench

We have used also Intespace Radiobeacon Test Procedure N° 553/AP/QA/F : Essai de Chaleur Sèche

#### 3.1.1 DRY HEAT CYCLE PROGRAMME



#### 3.1.2 MEASUREMENTS AT + 55° C :

- Transmitter power output,
- Digital Message,
- Digital Message Generator,
- Modulation,
- Transmitted frequency ,
- Spurious output,
- VSWR check,
- Self-test mode

### 3.2. EQUIPMENT UNDER TEST

Beacon Unit : 1/2

Name : ACR  
 Type : RLB35  
 Number : 07

Bracket : ACR Universal Sea Shelter Id 18560

### 3.3 TEST SITE

Toulouse Space Center (CST) - INTESPACE - AP/ET.

### 3.4. TEST EQUIPMENT

- Climatic chamber : CLIMATS F.C.H. – Type: Austral 137H60/1,5E - S/N: S4880.
- KEITHLEY thermometer/multimeter ,Type : 2000, S/N 0678112 with CU-CT thermocouple.
- Argos - Cospas/Sarsat Test Bench.

### 3.5. RESULTS

#### 3.5.1 C/S T.007 CHECKS RESULTS

See chapter 12 : C/S Type Approval Test Report – Electrical and Functional Test at 55° C

#### 3.5.2 ALIVENESS SUMMARY TEST RESULTS

Date : 19 April 2001

<b>1 – Environmental Temperature ( °C)</b>			54.3 °C
<b>2 – POWER OUTPUT</b>			
- Transmission power	dBm	37 ± 2	37.6
- Power risetime	ms	< 5	0.85 ms
- Power falltime	ms	< 5	0.03 ms
<b>3 – SPURIOUS OUTPUT</b>			
- In band	*		OK
- Carrier harmonics	*		
<b>4 –DIGITAL MESSAGE GENERATOR</b>			
- Repetition rate	*		OK
- Bit rate	bits/S	400 ± 4	401.29
- Transmission time	ms	440 ± 4.4 / 520 ± 5.2	519.35
- CW preamble	ms	160 ± 1.6	160.35
<b>5 – DIGITAL MESSAGE</b>			
- Bit and frame sync	bits	1-24	FFFE2F
- Format flag	bit	25	1
- Protocol flag	bit	26	0
- Country code	bits	27-36	0366
- Protocol	bits	37-40	1110
- Encoded Position Data Source	bits	111	1
- Homing	bits	112	1
- BCH 1 code read / calculated	bits	86-106 / 25-85	1029B4 / 1029B4
- BCH 2 code read / calculated	bits	133-144 / 107-132	66C / 66C
<b>6 – FREQUENCY</b>			
- Nominal value	KHz	406 025 ± 2	- 0.49796
- Short term stability		< 2x10 <sup>-9</sup> /100 ms	1.05 x 10 <sup>-10</sup>

\* See graphs on chapter 12 : C/S Type Approval Test Report – Electrical and Functional Test at 55° C

## CHAPTER 4

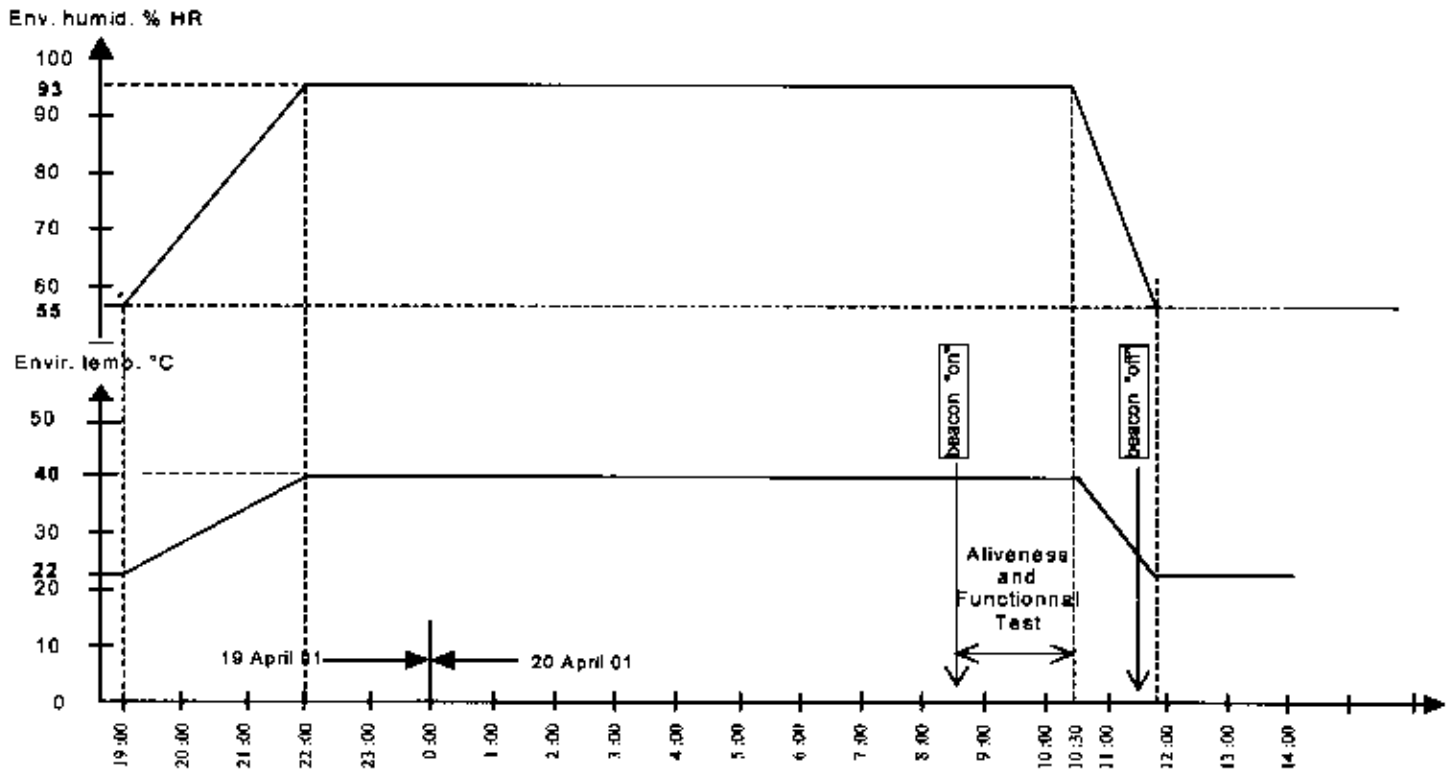
### **A4.0-DAMP HEAT TEST**

#### 4.1. TEST SPECIFICATIONS AND SEQUENCE

The parameters defined in sections A4.0 of the RTCM document are measured using a SARSAT test bench .

We have used also Intespace Radiobeacon Test Procedure N° 554/AP/QA/f : Essai de Chaleur Humide

##### 4.1.1 DRY HEAT CYCLE PROGRAMME



##### 4.1.2 MEASUREMENTS AT 40° C ± 3° C and 93 % ± 2 % HR :

- Transmitter power output,
- Digital Message,
- Digital Message Generator,
- Modulation,
- Transmitted frequency ,
- Spurious output,

## 4.2. EQUIPMENT UNDER TEST

Beacon Unit : 1/2  
 Name : ACR  
 Type : RLB35  
 Number : 07

Bracket : ACR Universal Sea Shelter Id 18560

## 4.3 TEST SITE

Toulouse Space Center (CST) - INTESPACE - AP/ET.

## 4.4. TEST EQUIPMENT

- Climatic chamber : CLIMATS F.C.H. – Type: Austral 137H60/1,5E - S/N: S4880.
- KEITHLEY thermometer/multimeter ,Type : 2000, S/N 0678112 with CU-CT thermocouple.
- COLE PARMER thermo-hygrometer, Type : TriSense S/N : 37000-00
- Argos - Cospas/Sarsat Test Bench.

## 4.5. RESULTS

### 4.5.1 SUMMARY OF MEASUREMENTS RESULTS

Date : 20 April 2001

<b>1 - Environmental Temperature (° C / HR )</b>			+ 40. ° C ± 1 / 93 % ± 2
<b>2 - POWER OUTPUT</b>			
- Transmission power	dBm	37 ± 2	37.5
- Power risetime	ms	< 5	0.81 ms
- Power falltime	ms	< 5	0.03 ms
<b>3 - SPURIOUS OUTPUT</b>			
- In band	*		OK
- Carrier harmonics	*		
<b>4 -DIGITAL MESSAGE GENERATOR</b>			
- Repetition rate	**		OK
- Bit rate	bits/S	400 ± 4	401.29
- Transmission time	ms	440 ± 4.4 / 520 ± 5.2	519.35
- CW preamble	ms	160 ± 1.6	160.37
<b>5 - DIGITAL MESSAGE</b>			
- Bit and frame sync	bits	1-24	FFFE2F
- Format flag	bit	25	1
- Protocol flag	bit	26	0
- Country code	bits	27-36	0366
- Protocol	bits	37-40	1110
- Encoded Position Data Source	bits	111	1
- Homing	bits	112	1
- BCH 1 code read / calculated	bits	86-106 / 25-85	1029B4 / 1029B4
- BCH 2 code read / calculated	bits	133-144 / 107-132	66C / 66C
<b>6 - FREQUENCY</b>			
- Nominal value	KHz	406 025 ± 2	- 0.49548
- Short term stability		< 2x10 <sup>-9</sup> /100 ms	1.76 x 10 <sup>-10</sup>

\* See graphs page 4.8

\*\* See graph page 4.5

### 4.5.2 DATA AND GRAPHS OF MEASUREMENTS RESULTS

**Laboratoire de certification**  
**Balise COSPAS/SARSAT**


---

Constructeur      ACR  
 Modele            RLB35  
 Numero de serie   07  
 Reference        M3223-2  
 Type              SARSAT

Type de certification : Nominal  
 Date des mesures     : 20 Apr 2001 08:33:01  
 Temperature de palier : 40 °C / 93 2/3 °F  
 Temperature lue      : 39.9839561 °C

**Message balise**


---

Message reçu                    (1-144): FFPE2F96EE2EC0017FDFFCOA6D3783E0F66C  
 Format flag                      (25): 1  
 Protocole flag                  (26): 0  
 Code pays                        (27-36): 0366  
 Pays                              : USA  
 Code protocole                  (37-40): 1110  
 Protocole utilise               : Standard - Test  
 Identification                  :  
 Numero                          :  
 BCH 1 lu/calculé                (86-106/25-85): 1029B4/1029B4  
 BCH 2 lu/calculé (133-144/107-132): 66C/66C  
 Pos. Data Source                (111): Internal  
 121.5 MHz Homing                (112): Yes  
 Position GPS de reference      : N 43°33'34'' E 1°28'48  
 Position GPS                    : Yes  
 Position GPS par default       : Yes

**Controle du message**


---

Duree de la porteuse pure	ms	158.4<	<162.6	160.36 +-	.01
Duree minimale				160.36	
Duree maximale				160.37	
Duree de l'emission	ms	513.8<	<526.2	519.35	

**Frequence des bits**


---

Frequence de modulation	Hz	395.4<	<404.6	401.29 +-	.01
-------------------------	----	--------	--------	-----------	-----

**Mesures d'indice**

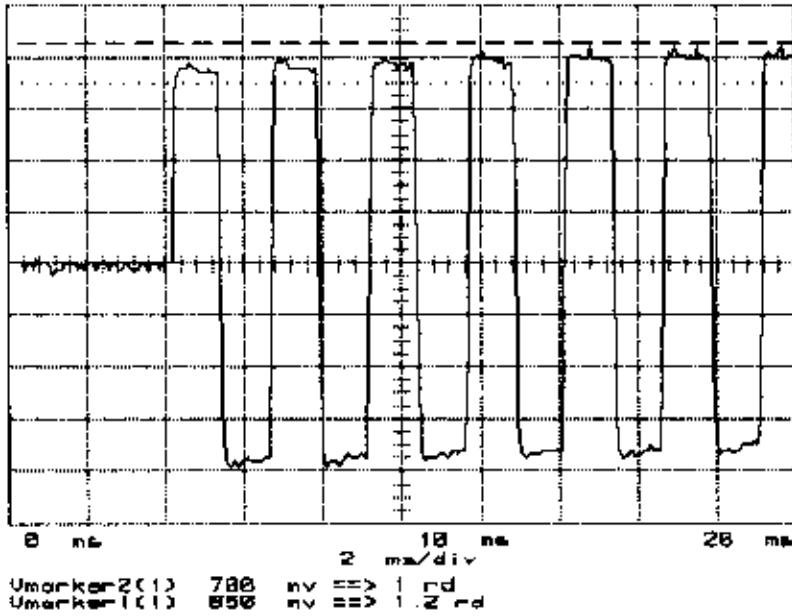

---

Excursion de phase totale	rd	<= 2.48	2.22	
Excursion de phase positive	rd	0.96<	<1.24	1.14
Excursion de phase negative	rd	-1.24<	<-0.96	-1.08
Symetrie de l'excursion	%	<= 5	-2.94	

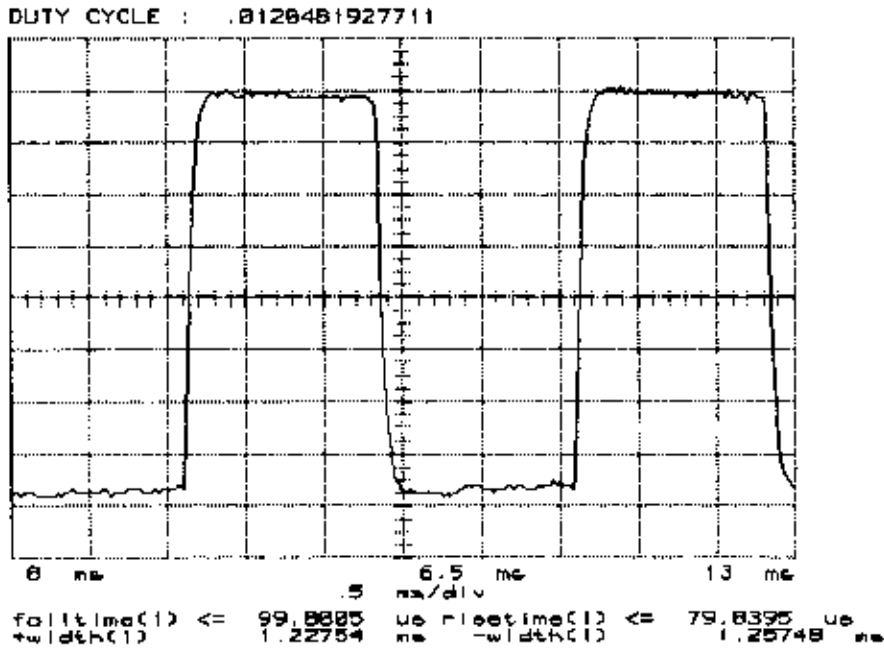


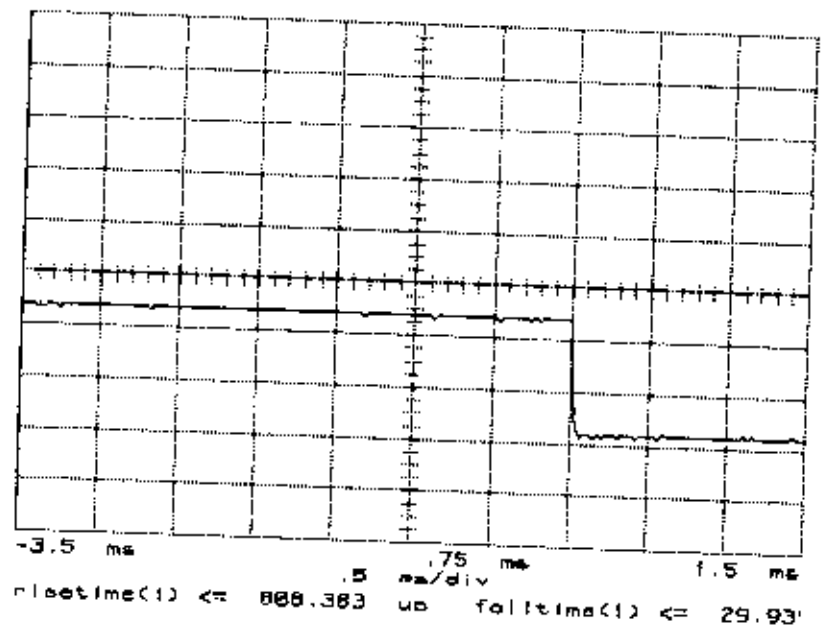
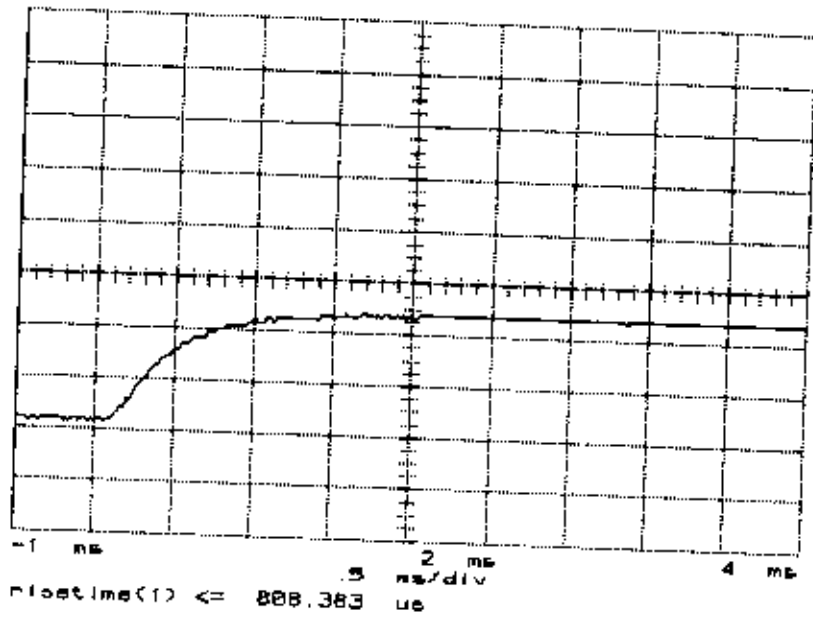


Oscilloscopes



DUTY CYCLE : 1.2E-02

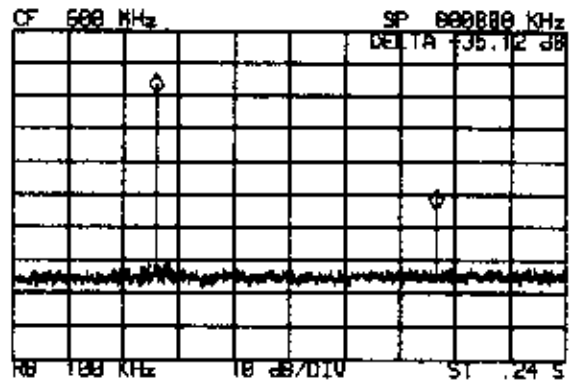
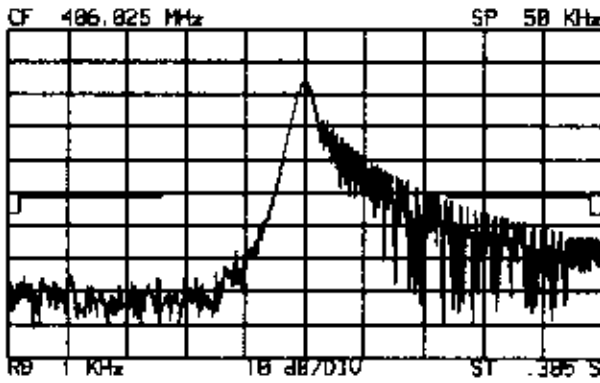
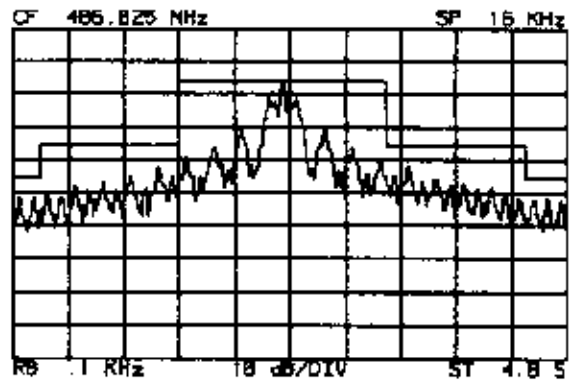




Spurious

---

ACR  
RLB35  
87  
29 Apr 2001  
486 MHz  
TEMP : 48 °C



## **CHAPTER 5**

### **A5.0-VIBRATION TEST**

## **5.1 ADMINISTRATIVE INFORMATION**

### **5.1.1 CLIENT**

ACR Electronics Inc.

### **5.1.2. REPRESENTATIVES PRESENT**

For the Client : G. PEYROU ITS/AP/ET

For the Test Laboratory : J. M. BUCHMAN

### **5.1.3. DATES**

Start of test : May 30<sup>th</sup>, 2001

End of test : May 31<sup>th</sup>, 2000

### **5.1.4. INTESPACE FILE REFERENCE : M3223-ETS/IEC**

## **5.2. UNIT UNDER TEST (UUT)**

Beacon Unit : 1/2  
Name : ACR  
Type : RLB35  
Number : 07

Bracket : ACR Universal Sea Shelter Id 18560

## **5.3. PURPOSE OF THE TEST**

Functional checkout of hardware after vibration testing.

## **5.4. TEST EQUIPMENT**

### **5.4.1. TEST DEVICES**

Electrodynamic vibration table, type 80 kN-2 and 67 kN with GR3  
Spectral Dynamics SD2225 digital control panel

### **5.4.2. METROLOGICAL EQUIPMENT**

Vibration Control : accelerometer (analysis and processing)  
Vibration Measurements : Spectral Dynamics SD2225  
Electrical Beacon Checking : Argos - Cospas/Sarsat Test Bench.

## **5.5. TEST PROCEDURE**

### **5.5.1. AXIS (See photograph in § 5.7 page 5.4)**

X-axis : parallel to the Beacon Bracket fixing plane and Beacon « widthways »  
Y-axis : perpendicular to the Beacon Bracket fixing plane and Beacon « widthways »  
Z-axis : parallel to the Beacon Bracket fixing plane and Beacon « lengthways »

### 5.5.2. MOUNTING

The beacon in its bracket is secured to a light-alloy supporting square.  
 The complete assembly is firmly attached to the moving part of the vibration table according to the required axis.

### 5.5.3. TEST SPECIFICATIONS AND SEQUENCE

Vibrations following Section A5.0 of RTCM Recommended Standards for 406 MHz Satellite EPIRBs (Version 2.0 Feb 5,1997)

Sinewave vibrations on three axis :

Frequency (Hz)	Peak to Peak Amplitude (mm)
4-10	5
10-15	1.6
15-25	0.8
25-33	0.4

Sweep rate : 1.2 oct/min

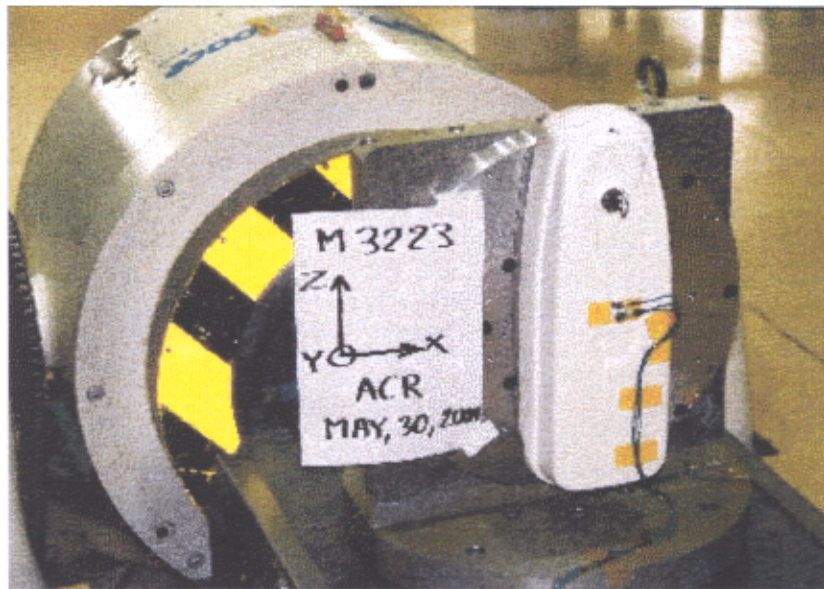
Duration : 30 minutes on each axis

Beacon control : Visual inspection and Aliveness test after the Vibrations Tests

### 5.6 LIST OF SERVO AND CONTROL SENSORS

Sensor	Location	N° acc.	Cable	Sensitivity pC/g
P (servo)	Screwed on test holder sheet	CP91	BU03	9.32
1X (control)	Glued on Beacon Necklace	10922	12/2	2.80
1Y (control)	Glued on Beacon Necklace	5326	13/3	7.10
1Z (control)	Glued on Beacon Necklace	3748	11/4	6.40

**5.7. PHOTOGRAPH**



**5.8. TEST SCHEDULE**



Date / Test n°	Specifications	Paragraph	Test equipment	Events - Observations
May 30 <sup>th</sup> , 2001 <b>001Y</b>	Sinewave vibrations : Y axis 5 mm p-p from 4 to 10 Hz 1.6 mm p-p from 10 to 15 Hz 0.8 mm p-p from 15 to 25 Hz 0.4 mm p-p from 25 to 33 Hz Sweep duration : 2 min 30 s	5.9.1	Nominal.	Set up the beacon on test table on Y axis (80 kN) .  Functional testing : nominal.
May 30 <sup>th</sup> , 2001 <b>001X</b>	Sinewave vibrations : X axis 5 mm p-p from 4 to 10 Hz 1.6 mm p-p from 10 to 15 Hz 0.8 mm p-p from 15 to 25 Hz 0.4 mm p-p from 25 to 33 Hz Sweep duration : 2 min 30 s	5.9.2	Nominal	Set up the beacon on test table on X axis (80 kN) .  Functional testing : nominal.

Date / Test n°	Specifications	Paragraph	Events - Observations	
			Test equipment	Unit under test
May 31 <sup>th</sup> , 2001 <b>001Z</b>	Sinewave vibrations : Z axis 5 mm p-p from 4 to 10 Hz 1.6 mm p-p from 10 to 15 Hz 0.8 mm p-p from 15 to 25 Hz 0.4 mm p-p from 25 to 33 Hz Sweep duration : 2 min 30 s	5.9.3	Normal	Set up the beacon on test table on Z axis (80 kN)  Functional testing : nominal  Removal of beacon
Visual inspection		5.9.4.1		Nothing abnormal to note
EPIRB Aliveness Test		5.9.4.2	Cospas Sarsat Test Bench	Nominal

## **5.9. TEST RESULTS**

### **5.9.1. RESULTS OF Y VIBRATION AXIS**

## Sine Version 4.8.0 Test Summary Listing

Data Storage File Name: RTCM.005  
 Current Date: Wed May 30 2001 14:52:15

## DOCUMENTATION:

Title 1: 001Y TEST : RTCM MAY,2,1997  
 Title 2: M3223 - EPIRB ACR RLB35 S/N: 07  
 Title 3:

## TEST RESULTS:

Test Function: Test  
 Date at Shutdown: 30-May-2001  
 Time at Shutdown: 11:23:07  
 Test Completed Normally  
 Elapsed Time 000:30:00  
 Remaining Time 000:00:00  
 Elapsed Sweeps 12.00  
 Remaining Sweeps 0.00  
 Frequency at Shutdown: 4.01 Hz  
 Test Level: 0.00 dB  
 Maximum Control Error: -9.93 dB @ 10.00 Hz  
 Table of Alarms Occurrences Maximum Value  
 Alarm Lines Out: 0  
 Maximum Drive: 0  
 Input Overload: 0

## CONTROL PARAMETERS:

CONTROL STRATEGY -  
 Control Spectrum: Maximum  
 Filter Type: Proportional  
 Filter Specification: Fundamental 160.00 %, RMS 255. mcyc  
 Sweep Mode: Log

## SWEEP/COMPRESSION TABLE -

Segment Number	Ending Frequency (Hz)	Sweep Rate (Oct/min)	Compression (%)
1	33	1.218	65

## REFERENCE TABLE:

REFERENCE PARAMETERS -  
 Minimum Frequency: 4.000 Hz  
 Maximum Frequency: 33.000 Hz  
 Frequency Points: 200.000  
 Box Tolerance: Disable

## SPECTRUM DYNAMIC LIMITS -

Acceleration Range: 15.918 dB  
 Minimum Acceleration (0-pk): 0.161 g  
 Maximum Acceleration (0-pk): 1.006 g  
 Maximum Velocity (0-pk): 0.157 m/s  
 Maximum Displacement (pk-pk): 5.000 mm

## CHANNEL TABLE:

Channel Number	Channel Type	Loop Check	Sensitivity (mV/Units)	Input Coupling	Transducer Type	Units	Control Weighting	Profile Number	Measurement Process
1	Control	Yes	93.20	AC	Accel	g	0.00		BB RMS
2	Auxiliary	No	88.55	AC	Accel	g			BB RMS
3	Auxiliary	No	71.00	AC	Accel	g			BB RMS
4	Auxiliary	No	64.00	AC	Accel	g			BB RMS

(Continued for Labels...)

Channel Number	Channel Type	Loop Check	Sensitivity (mV/Units)	Channel Label	Documentation Label
1	Control	Yes	93.20	PILOTE P	Label 2
2	Auxiliary	No	88.55	1X SENSOR	
3	Auxiliary	No	71.00	1Y SENSOR	
4	Auxiliary	No	64.00	1Z SENSOR	

(12 Inactive Channels)

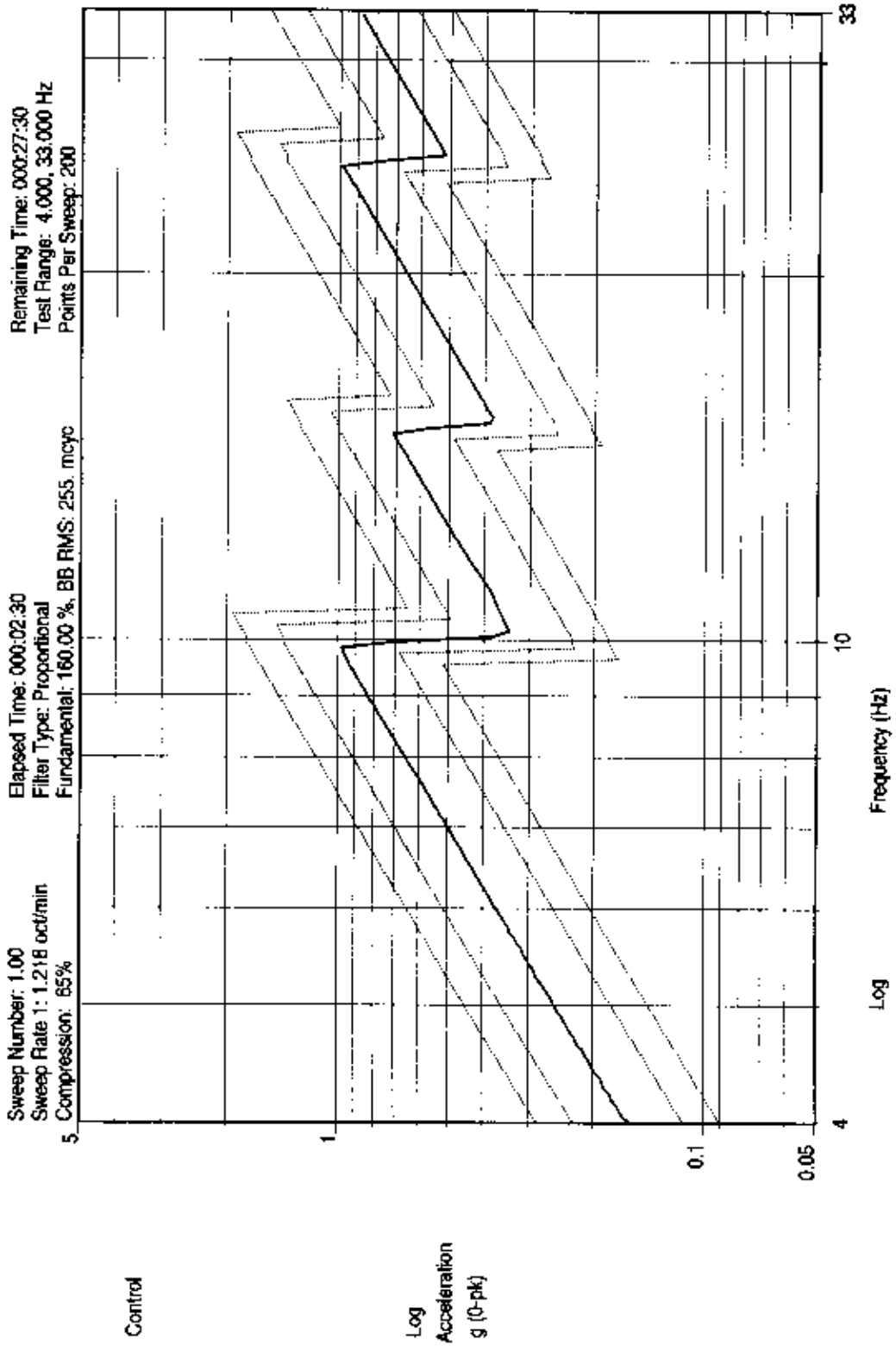
TRANSFER FUNCTION PAIR TABLE:

Enable H(f) Measurement:			No
H(f) Pair	Response Channel	Reference Channel	Label
1	2	1	H(f) Pair Label 1

End of Sine Test Summary

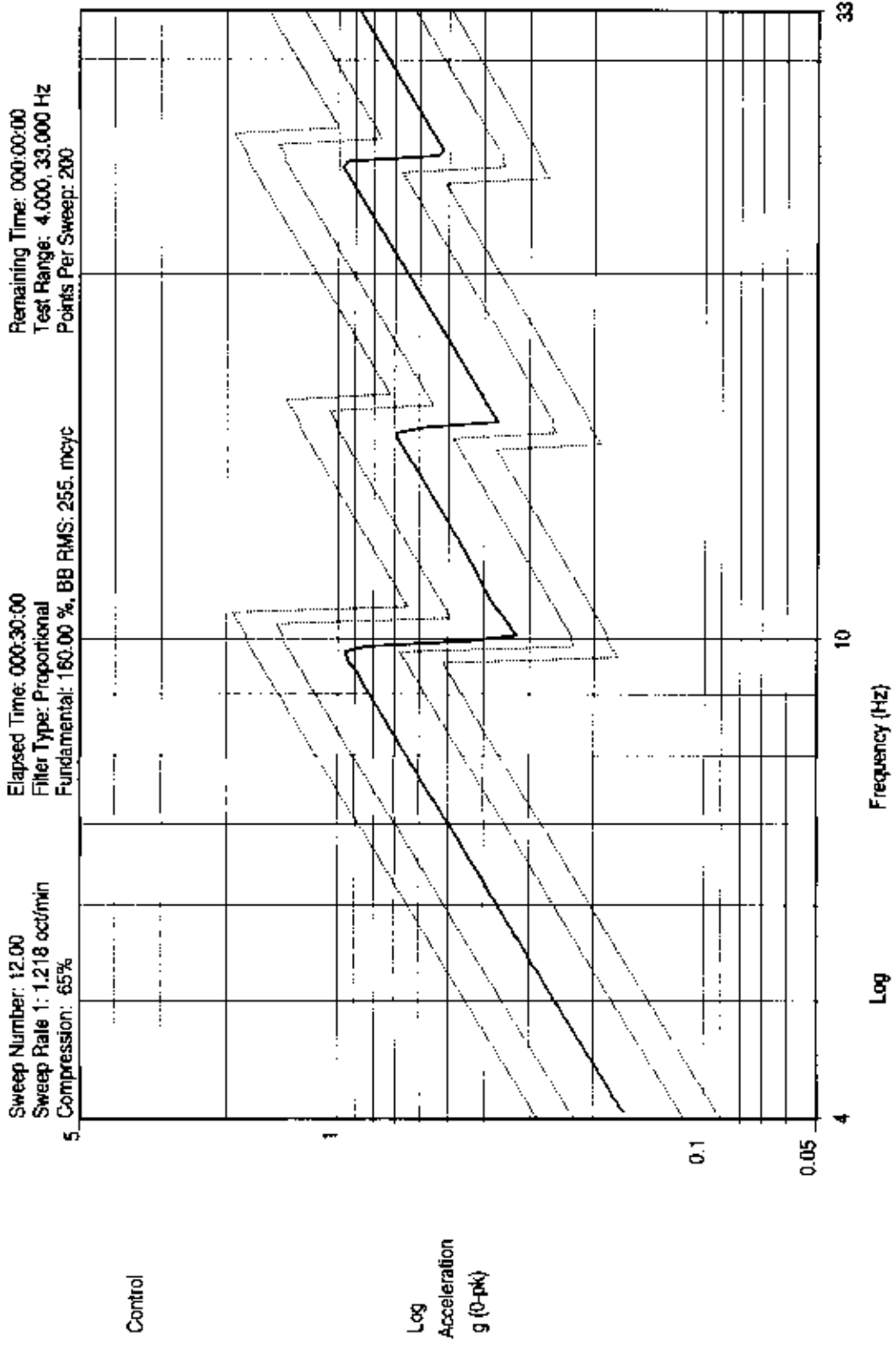
sine message log  
1.00000

```
%Test: RTCM.005
%Log: /user/client/m3223/sine/log/RTCM.005.log
05/30/01
10:51:47 Nulling Internal Offsets.
10:51:53 Nulling Completed.
10:51:53 Loop Check Started...
10:51:53 Measuring Ambient Noise...
10:52:01 Searching for Threshold...
10:52:09 Loop Check Completed.
10:52:11 Increasing to Test Level...
10:53:02 Start Level Reached.
10:53:02 Test Starts at 4.000 Hz
10:55:32 Saved Sweep Number 1.00
10:58:02 Saved Sweep Number 2.00
11:00:32 Saved Sweep Number 3.00
11:03:02 Saved Sweep Number 4.00
11:05:32 Saved Sweep Number 5.00
11:08:02 Saved Sweep Number 6.00
11:10:32 Saved Sweep Number 7.00
11:13:02 Saved Sweep Number 8.00
11:15:32 Saved Sweep Number 9.00
11:18:02 Saved Sweep Number 10.00
11:20:32 Saved Sweep Number 11.00
11:23:02 Shutdown Initiated...
11:23:07 Saved Sweep Number 12.00
```



10:55:32  
Wed May 30 2001

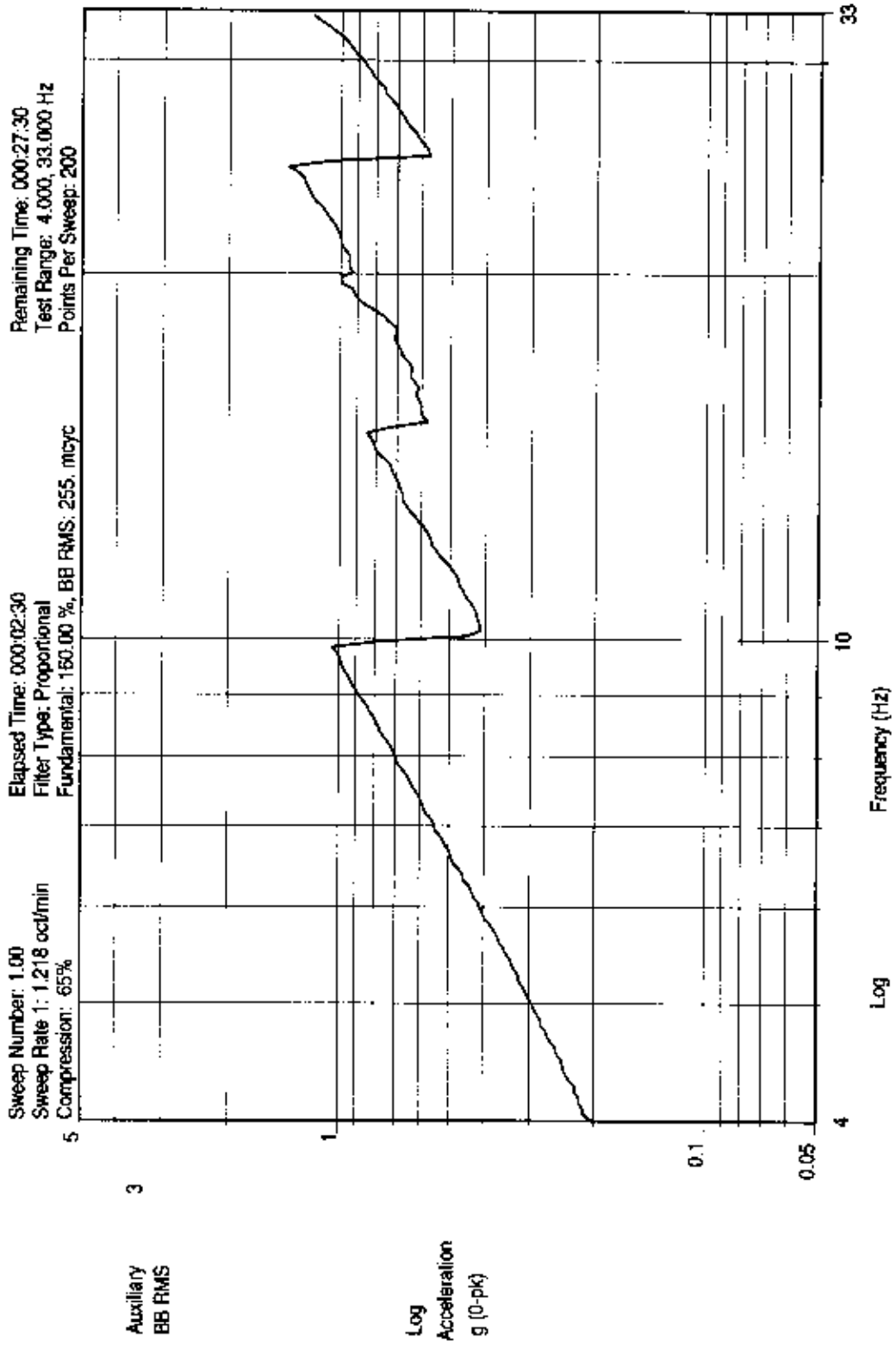
001Y TEST : RTCM MAY,2,1997  
 M3223 - EPIRB ACR RLB35 SN: 07  
 Sine Data Review Name: RTCM.005



001Y TEST : RTCM MAY 2, 1997  
 M3223 - EPIRB ACR RLB35 SAN: 07  
 Sine Test Name: RTCM.006

11-23-16  
 30-May-2001

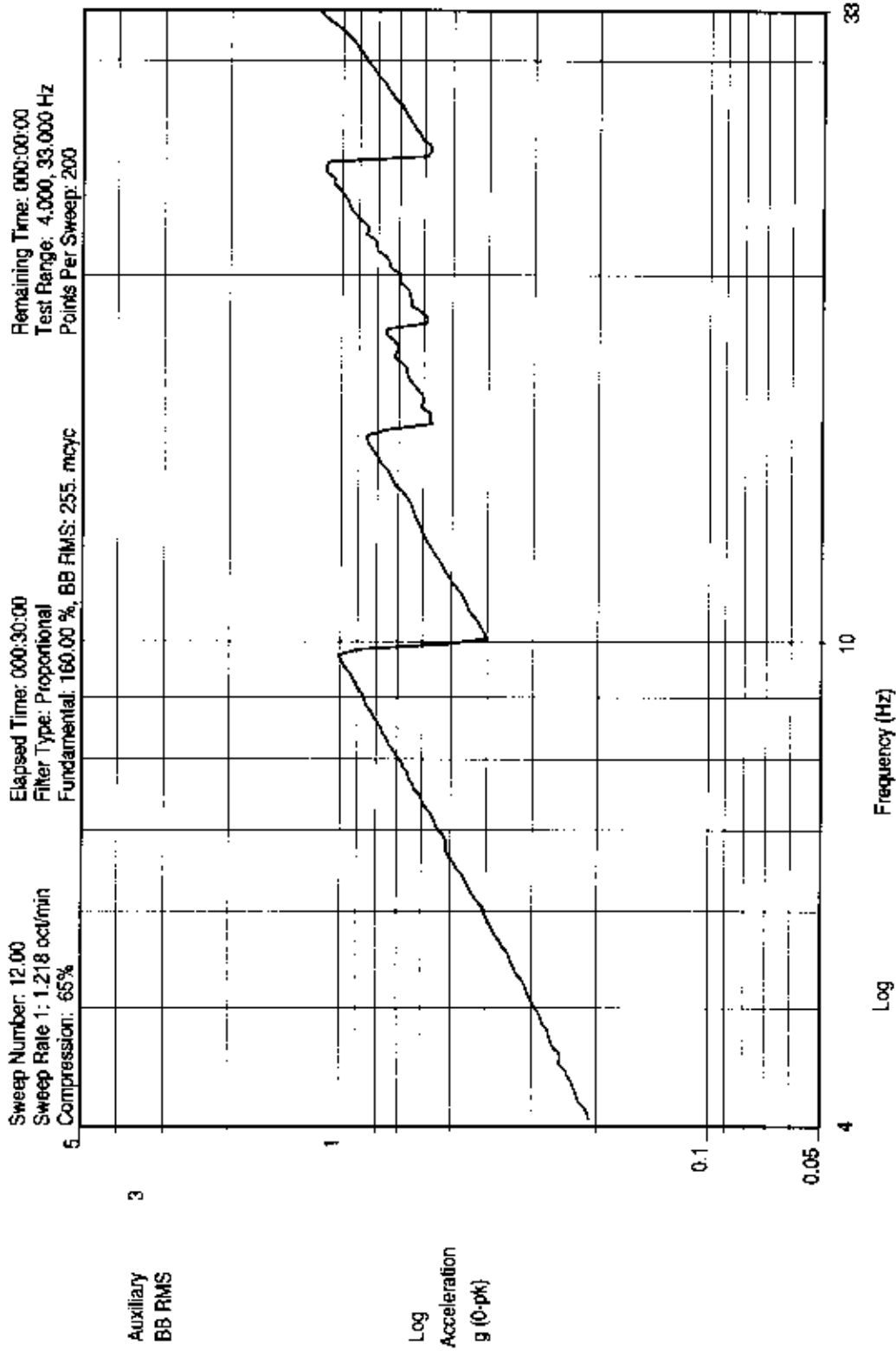




1Y SENSOR

001Y TEST : RTCM MAY,2,1997  
 M3223 - EPIRB ACR RLB35 S/N: 07  
 Sine Data Review Name: RTCM.L005

10:55:32  
 Wed May 30 2001



1Y SENSOR

001Y TEST : RTCM MAY.2.1997  
 M3223 - EPIRB ACR RLB35 SN: 07  
 Sine Test Name: RTCM.005

11:23:17  
 30-May-2001

## **5.9.2. RESULTS OF X VIBRATION AXIS**

## Sine Version 4.8.0 Test Summary Listing

Data Storage File Name: RTCM.008  
 Current Date: Wed May 30 2001 14:48:09

## DOCUMENTATION:

Title 1: 001X TEST : RTCM MAY, 2, 1997  
 Title 2: M3223 - EPIRB ACR RLB35 S/N: 07  
 Title 3:

## TEST RESULTS:

Test Function: Test  
 Date at Shutdown: 30-May-2001  
 Time at Shutdown: 14:45:13  
 Test Completed Normally  
 Elapsed Time 000:30:00  
 Remaining Time 000:00:00  
 Elapsed Sweeps 12.00  
 Remaining Sweeps -0.00  
 Frequency at Shutdown: 4.02 Hz  
 Test Level: 0.00 dB  
 Maximum Control Error: -9.91 dB @ 10.00 Hz  
 Table of Alarms Occurrences Maximum Value  
 Alarm Lines Out: 0  
 Maximum Drive: 0  
 Input Overload: 0

## CONTROL PARAMETERS:

CONTROL STRATEGY -  
 Control Spectrum: Maximum  
 Filter Type: Proportional  
 Filter Specification: Fundamental 160.00 %, RMS 255. mcyc  
 Sweep Mode: Log

## SWEEP/COMPRESSION TABLE -

Segment Number	Ending Frequency (Hz)	Sweep Rate (Oct/min)	Compression (%)
1	33	1.218	65

## REFERENCE TABLE:

REFERENCE PARAMETERS -  
 Minimum Frequency: 4.000 Hz  
 Maximum Frequency: 33.000 Hz  
 Frequency Points: 200.000  
 Box Tolerance: Disable

SPECTRUM DYNAMIC LIMITS -  
 Acceleration Range: 15.918 dB  
 Minimum Acceleration (0-pk): 0.161 g  
 Maximum Acceleration (0-pk): 1.006 g  
 Maximum Velocity (0-pk): 0.157 m/s  
 Maximum Displacement (pk-pk): 5.000 mm

## CHANNEL TABLE:

Channel Number	Channel Type	Loop Check	Sensitivity (mV/Units)	Input Coupling	Transducer Type	Units	Control Weighting	Profile Number	Measurement Process
1	Control	Yes	93.20	AC	Accel	g	0.00		BB RMS
2	Auxiliary	No	88.55	AC	Accel	g			BB RMS
3	Auxiliary	No	71.00	AC	Accel	g			BB RMS
4	Auxiliary	No	64.00	AC	Accel	g			BB RMS

(Continued for Labels...)

Channel Number	Channel Type	Loop Check (mV/Units)	Sensitivity	Channel Label	Documentation
1	Control	Yes	93.20	PILOTE P	Label 1
2	Auxiliary	No	88.55	1X SENSOR	Label 2
3	Auxiliary	No	71.00	1Y SENSOR	
4	Auxiliary	No	64.00	1Z SENSOR	

(12 Inactive Channels)

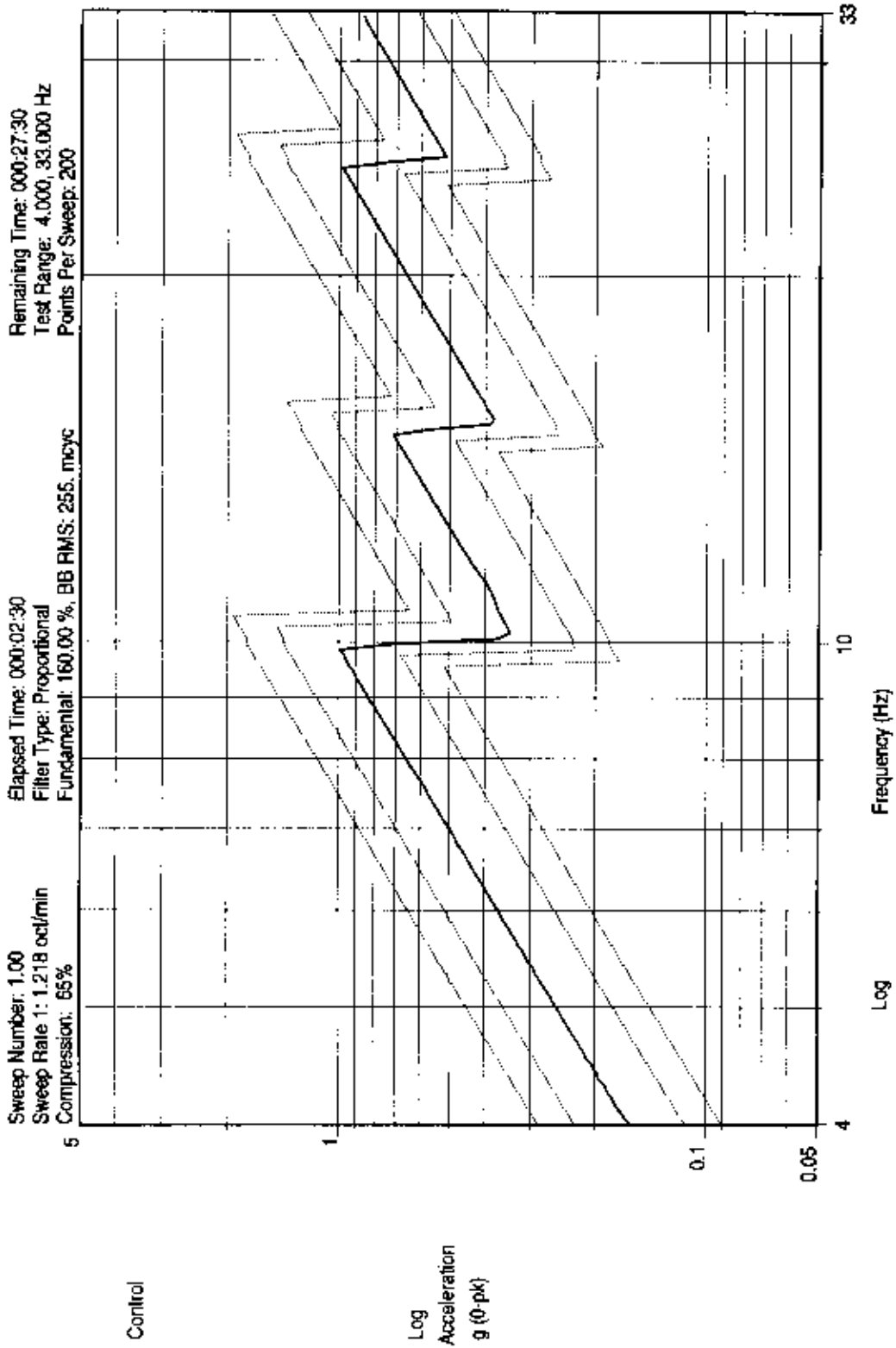
TRANSFER FUNCTION PAIR TABLE:

Enable H(f) Measurement:				No
H(f) Pair	Response Channel	Reference Channel	Label	
1	2	1	H(f) Pair Label 1	

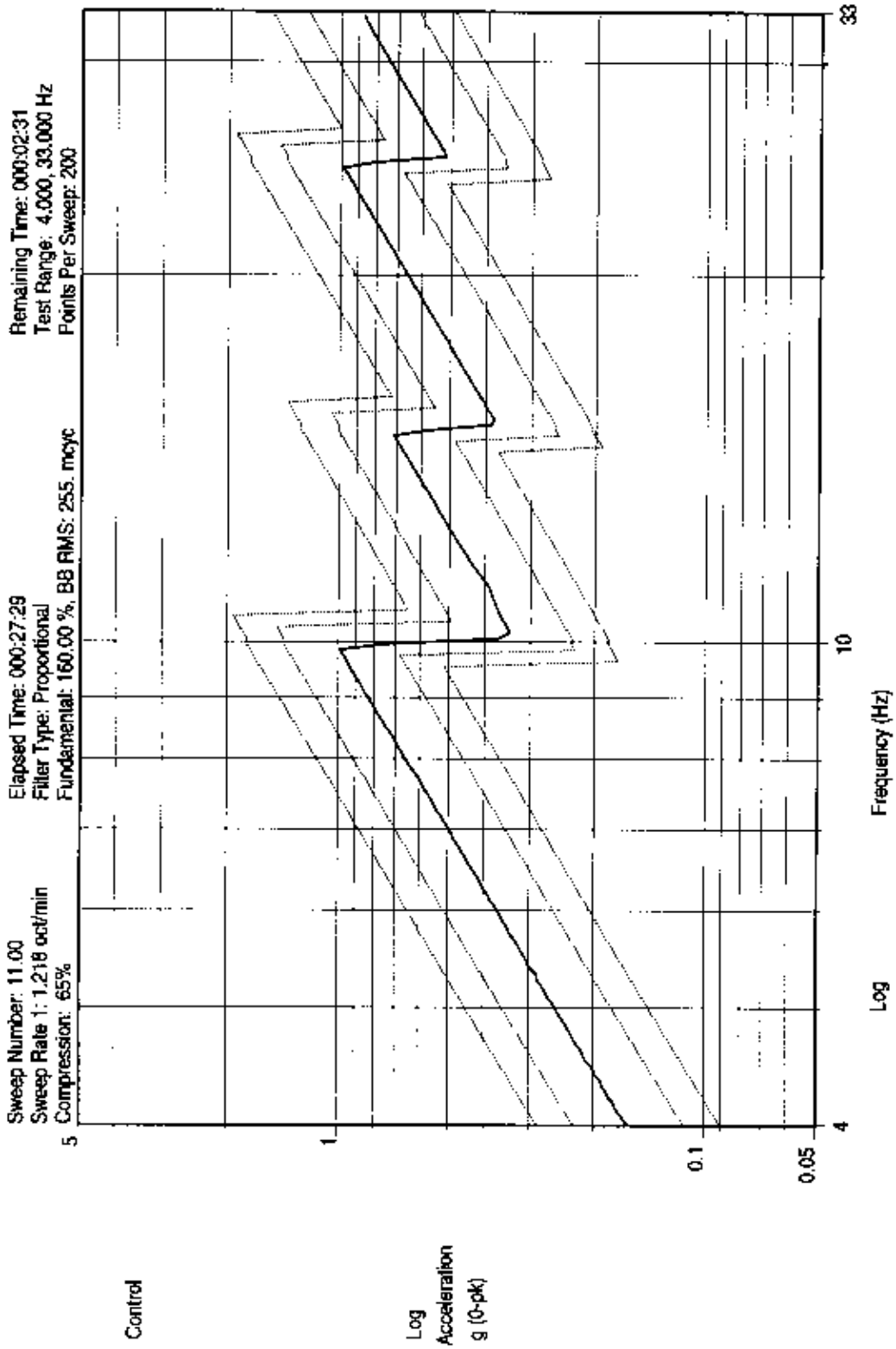
End of Sine Test Summary

sine message log  
1.00000

```
%Test: RTCM.008
%Log: /user/client/m3223/sine/log/RTCM.008.log
05/30/01
14:13:54 Nulling Internal Offsets.
14:14:02 Nulling Completed.
14:14:03 Loop Check Started...
14:14:03 Measuring Ambient Noise...
14:14:10 Searching for Threshold...
14:14:18 Loop Check Completed.
14:14:20 Increasing to Test Level...
14:15:08 Start Level Reached.
14:15:08 Test Starts at 4.000 Hz
14:17:38 Saved Sweep Number 1.00
14:20:08 Saved Sweep Number 2.00
14:22:38 Saved Sweep Number 3.00
14:25:08 Saved Sweep Number 4.00
14:27:38 Saved Sweep Number 5.00
14:30:08 Saved Sweep Number 6.00
14:32:38 Saved Sweep Number 7.00
14:35:08 Saved Sweep Number 8.00
14:37:38 Saved Sweep Number 9.00
14:40:08 Saved Sweep Number 10.00
14:42:38 Saved Sweep Number 11.00
14:45:08 Shutdown Initiated...
14:45:13 Saved Sweep Number 12.00
```



14:17:36  
 Wed May 30 2001  
 001X TEST : RTCM MAY 2, 1997  
 M3223 - EPIRB ACR RLB35 S/N: 07  
 Sine Data Review Name: RTCM.006



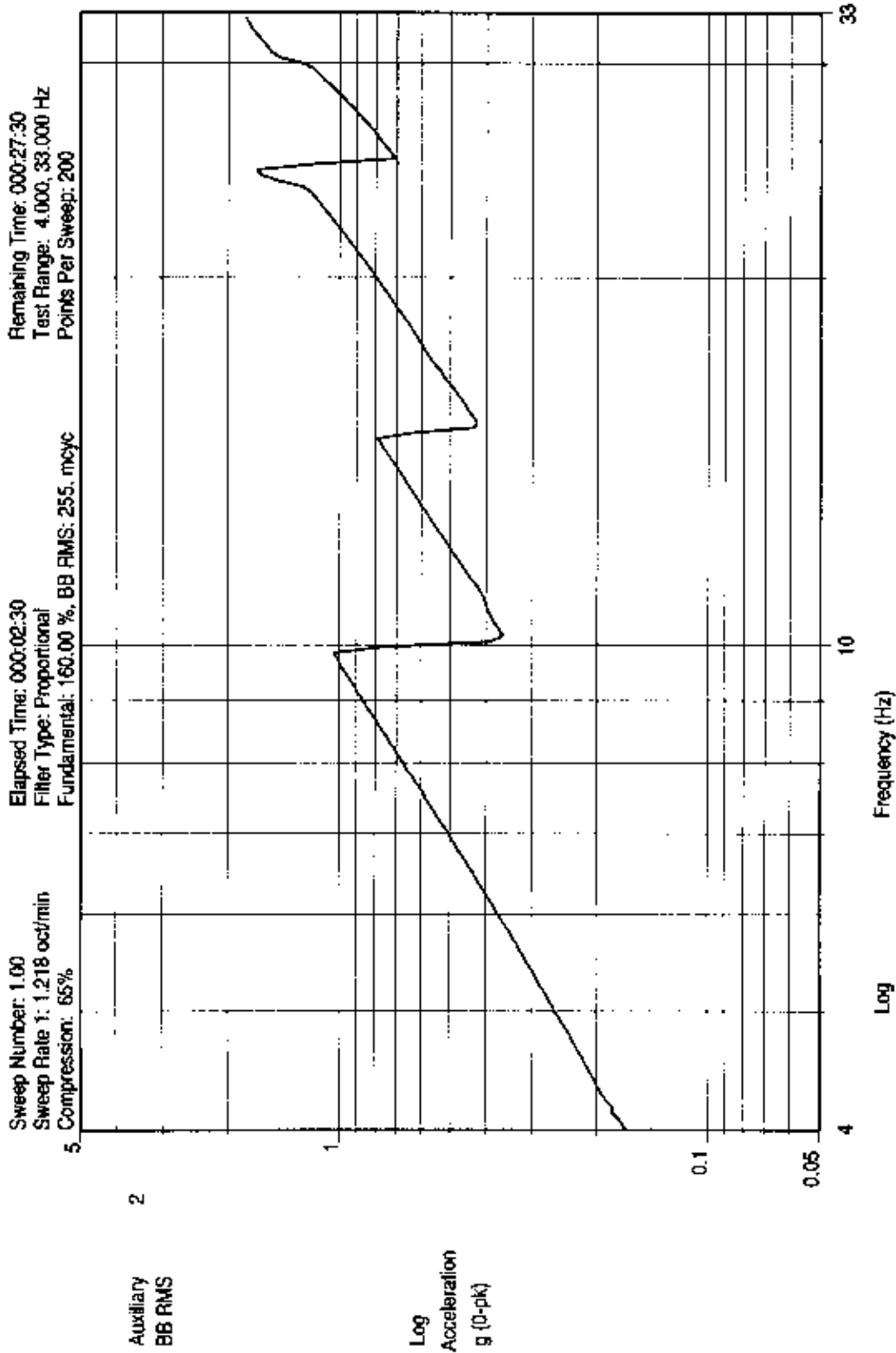
14:42:38

Wed May 30 2001

001X TEST : RTCM MAY,2,1997

M3223 - EPIRB ACR RLB35 S/N: 07

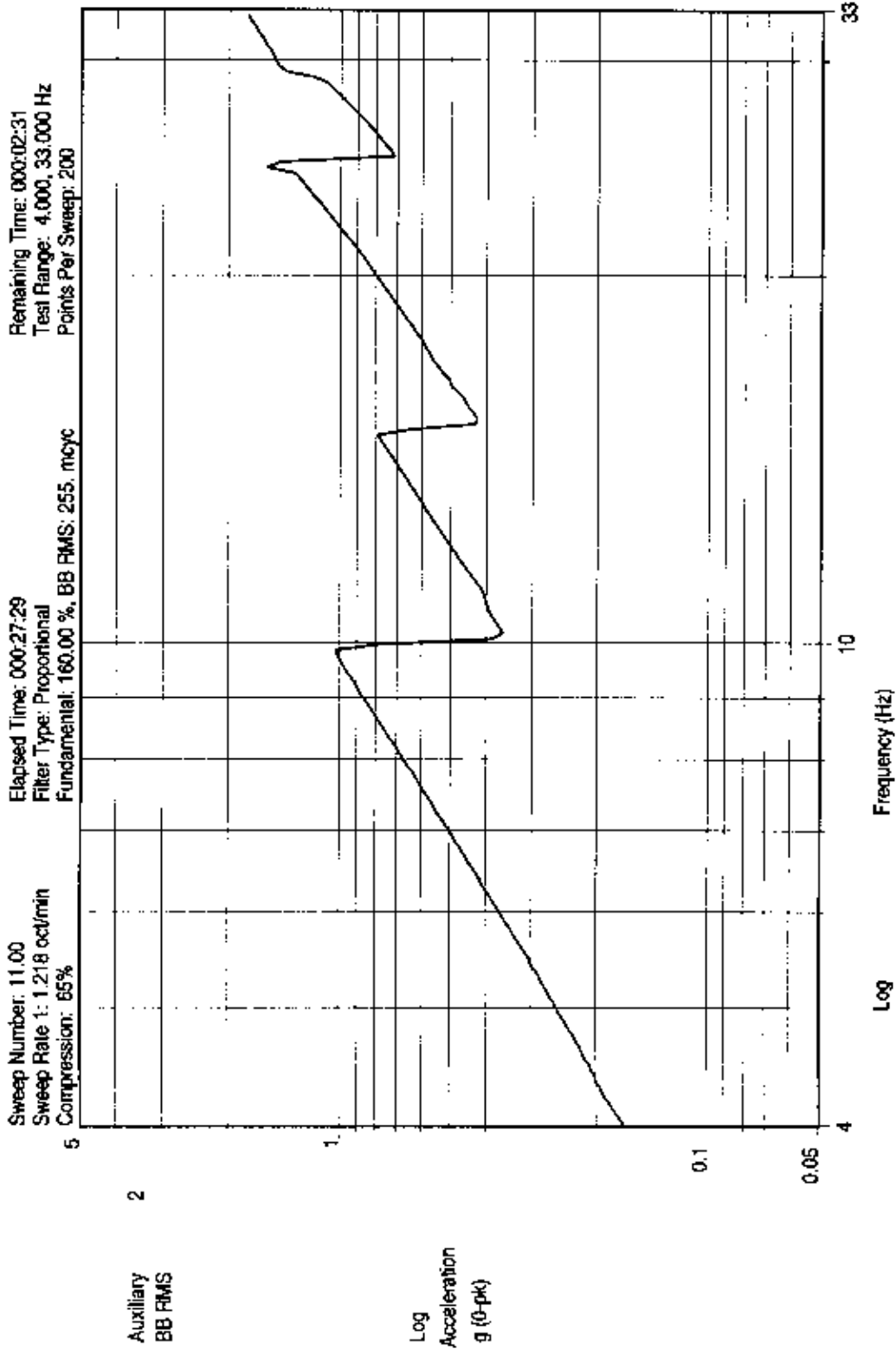
Sine Data Review Name: RTCM,006



001X TEST : RTCM MAY 2, 1997  
 M3223 - EPIRB ACR FLB35 S/N: 07  
 Sine Data Review Name: RTCM.008

14:17:38  
 Wed May 30 2001





IX SENSOR

001X TEST : RTCM MAY 2, 1997  
 M3223 - EPIRB ACR RLB35 S/N: 07  
 Sine Data Review Name: RTCM.008

14:42:36  
 Wed May 30 2001

### **5.9.3. RESULTS OF Z VIBRATION AXIS**

## Sine Version 4.8.0 Test Summary Listing

 Data Storage File Name: RTCM.011  
 Current Date: Thu May 31 2001 11:17:21

## DOCUMENTATION:

 Title 1: 001Z TEST : RTCM MAY.2.1997  
 Title 2: M3223 - EPIRB ACR RLB35 S/N: 07  
 Title 3:

## TEST RESULTS:

Test Function:	Test
Date at Shutdown:	31-May-2001
Time at Shutdown:	11:08:29
Test Completed Normally	
Elapsed Time	000:30:00
Remaining Time	000:00:00
Elapsed Sweeps	12.00
Remaining Sweeps	0.00
Frequency at Shutdown:	4.01 Hz
Test Level:	0.00 dB
Maximum Control Error:	9.97 dB @ 10.02 Hz
Table of Alarms	Occurrences Maximum Value
Alarm Lines Out:	0
Maximum Drive:	0
Input Overload:	0

## CONTROL PARAMETERS:

## CONTROL STRATEGY -

Control Spectrum:	Maximum
Filter Type:	Proportional
Filter Specification:	Fundamental 160.00 %, RMS 255. mcyc
Sweep Mode:	Log

## SWEEP/COMPRESSION TABLE -

Segment Number	Ending Frequency (Hz)	Sweep Rate (Oct/min)	Compression (%)
1	33	1.218	65

## REFERENCE TABLE:

## REFERENCE PARAMETERS -

Minimum Frequency:	4.000 Hz
Maximum Frequency:	33.000 Hz
Frequency Points:	200.000
Box Tolerance:	Disable

## SPECTRUM DYNAMIC LIMITS -

Acceleration Range:	15.910 dB
Minimum Acceleration (0-pk):	0.161 g
Maximum Acceleration (0-pk):	1.006 g
Maximum Velocity (0-pk):	0.157 m/s
Maximum Displacement (pk-pk):	5.000 mm

## CHANNEL TABLE:

Channel Number	Channel Type	Loop Check	Sensitivity (mV/Units)	Input Coupling	Transducer Type	Units	Control Weighting	Profile Number	Measurement Process
1	Control	Yes	93.20	AC	Accel g		0.00		BB RMS
2	Auxiliary	No	88.55	AC	Accel g				BB RMS
3	Auxiliary	No	71.00	AC	Accel g				BB RMS
4	Auxiliary	No	64.00	AC	Accel g				BB RMS

(Continued for Labels...)

Channel Number	Channel Type	Loop Check (mV/Units)	Sensitivity	Input Coupling	Transducer	Channel Label	Documentation
1	Control	Yes	93.20	AC	Accel g	PILOTE P	Label 1
2	Auxiliary	No	88.55	AC	Accel g	1X SENSOR	Label 2
3	Auxiliary	No	71.00	AC	Accel g	1Y SENSOR	
4	Auxiliary	No	64.00	AC	Accel g	1Z SENSOR	

(12 Inactive Channels)

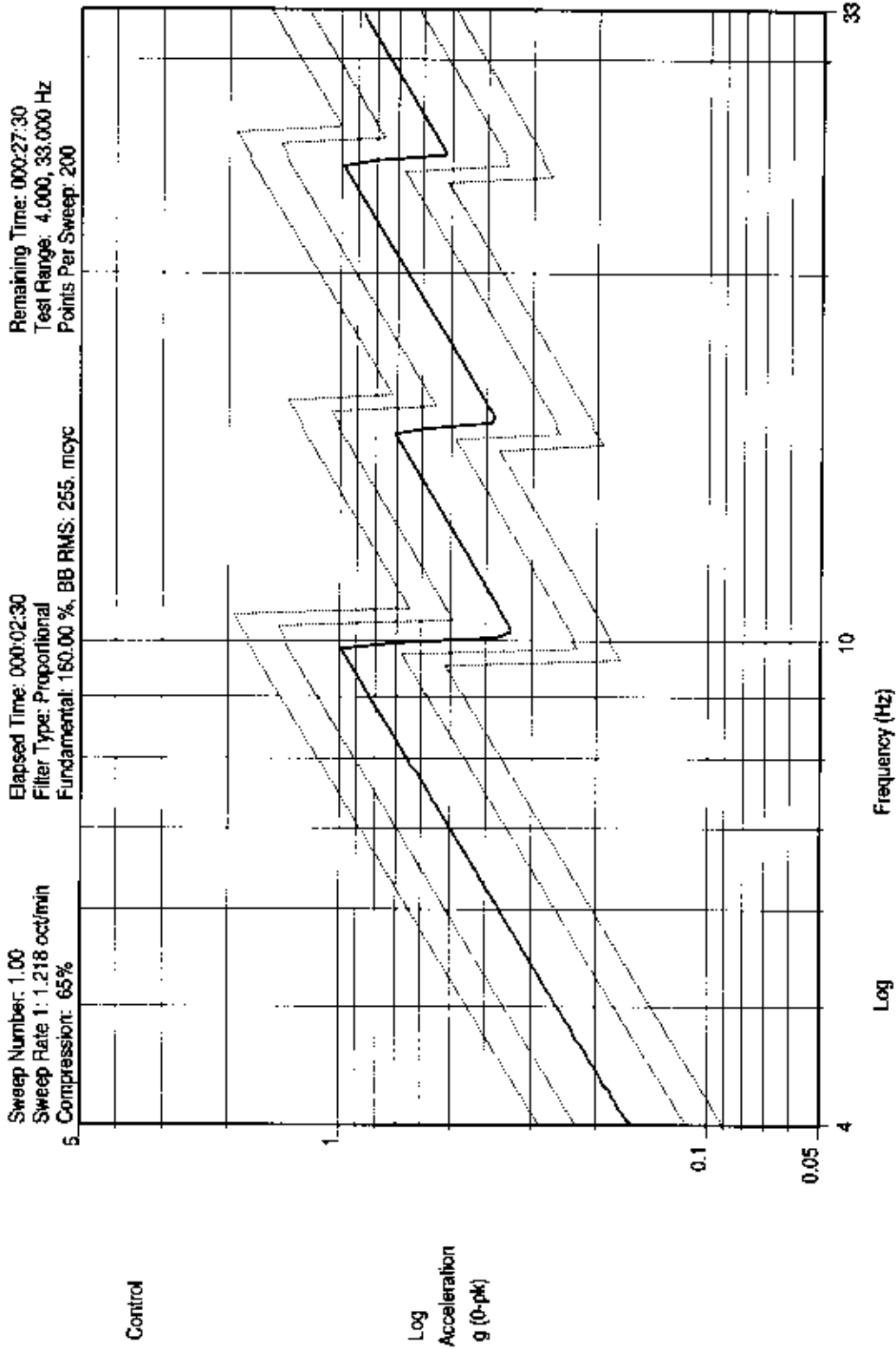
TRANSFER FUNCTION PAIR TABLE:

Enable H(f) Measurement:				No
H(f) Pair	Response Channel	Reference Channel	Label	
1	2	1	H(f) Pair Label 1	

End of Sine Test Summary

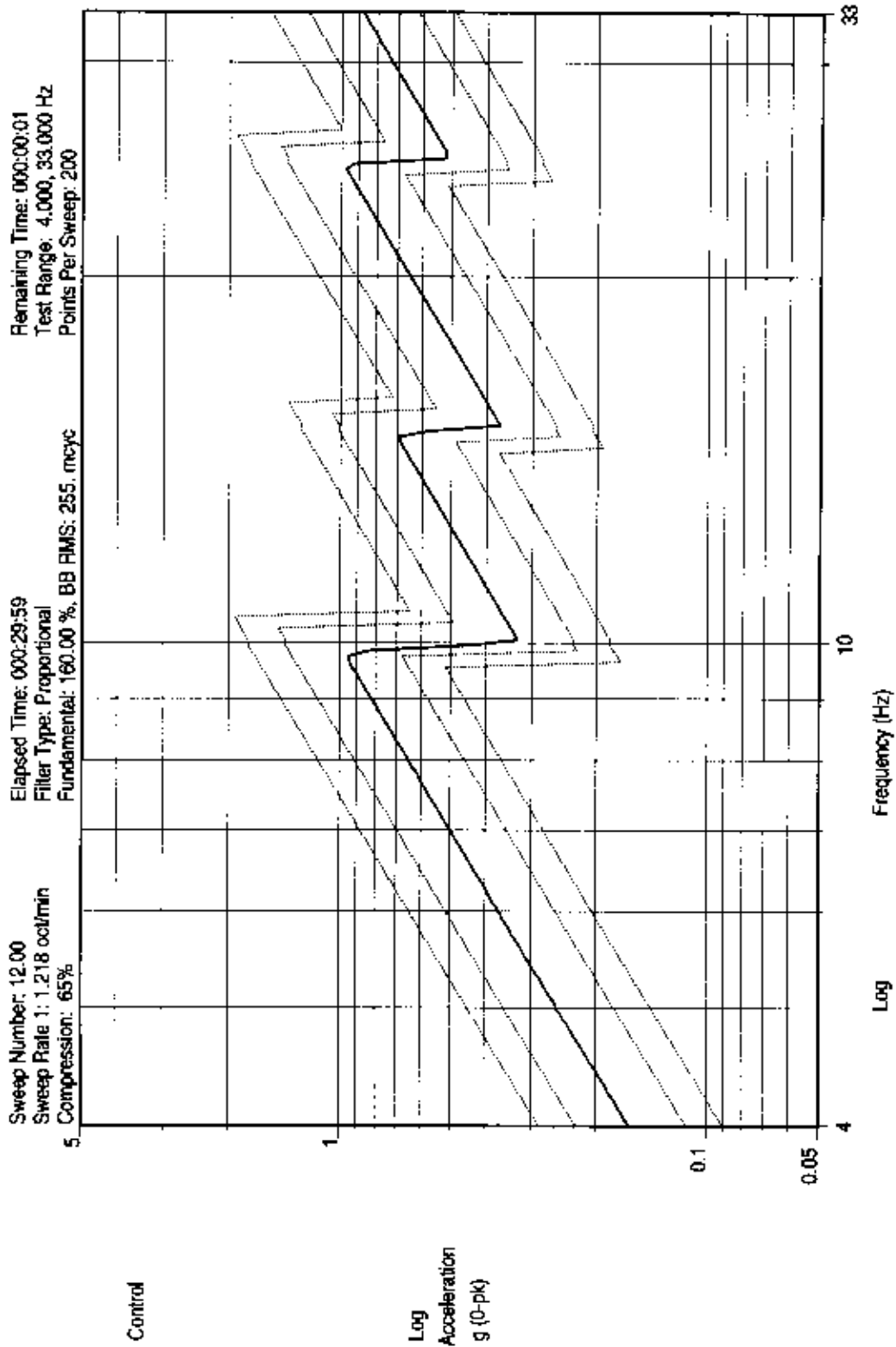
sine message log  
1.00000

%Test: RTCM.011  
%Log: /user/client/m3223/sine/log/RTCM.011.log  
05/31/01  
10:37:13 Loop Check Started...  
10:37:13 Measuring Ambient Noise...  
10:37:22 Searching for Threshold...  
10:37:30 Loop Check Completed.  
10:37:32 Increasing to Test Level...  
10:38:23 Start Level Reached.  
10:38:23 Test Starts at 4.000 Hz  
10:40:54 Saved Sweep Number 1.00  
10:43:24 Saved Sweep Number 2.00  
10:45:54 Saved Sweep Number 3.00  
10:48:24 Saved Sweep Number 4.00  
10:50:53 Saved Sweep Number 5.00  
10:53:23 Saved Sweep Number 6.00  
10:55:53 Saved Sweep Number 7.00  
10:58:23 Saved Sweep Number 8.00  
11:00:53 Saved Sweep Number 9.00  
11:03:23 Saved Sweep Number 10.00  
11:05:53 Saved Sweep Number 11.00  
11:08:23 Saved Sweep Number 12.00  
11:08:23 Shutdown Initiated...  
11:08:29 Saved Sweep Number 12.00



001Z TEST : RTCM MAY.2,1997  
M3223 - EPIRB ACR RLB35 S/N: 07  
Sine Data Review Name: RTCM.011

10:40:54  
Thu May 31 2001



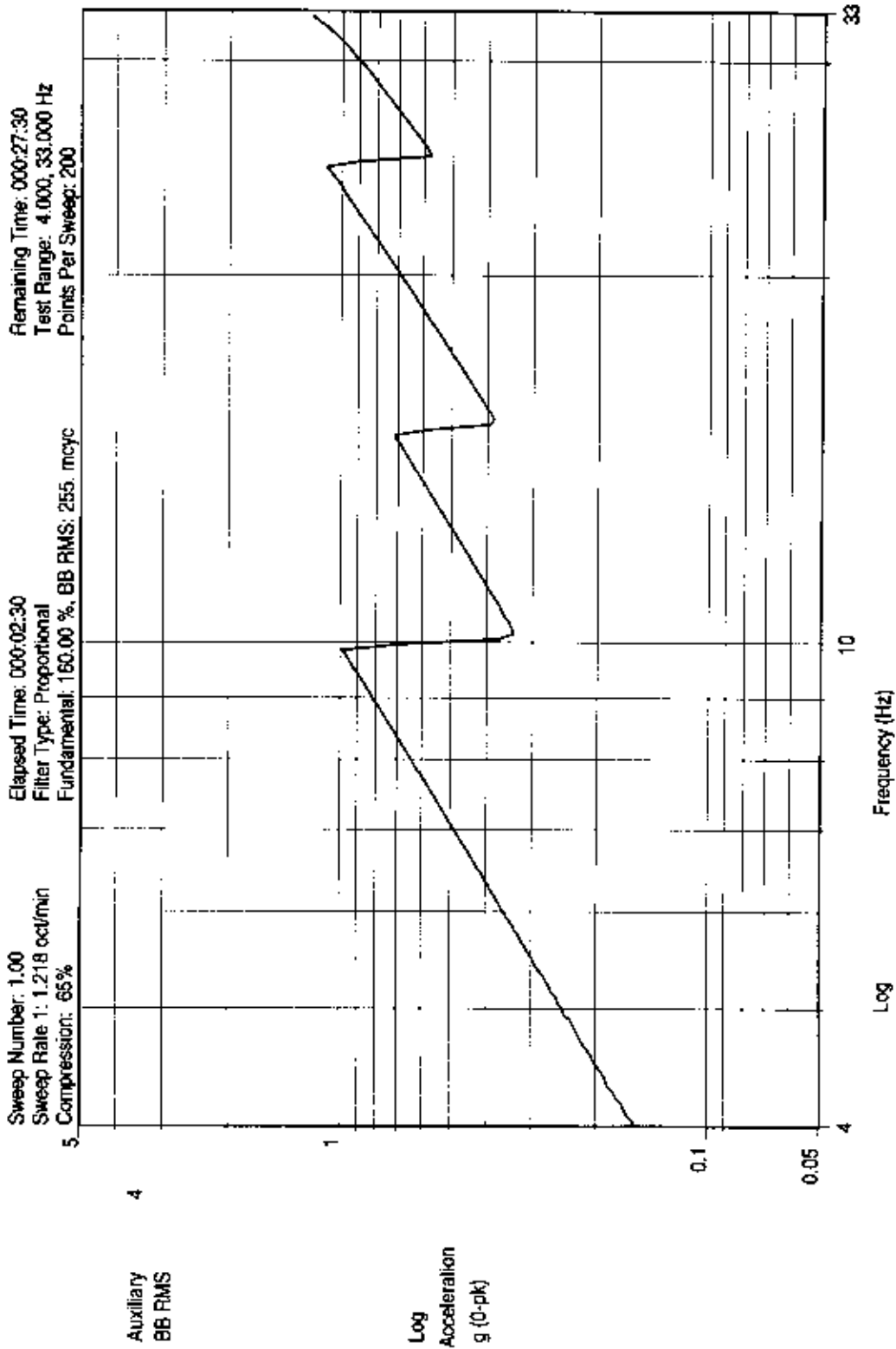
11:08:23

Thu May 31 2001

001Z TEST : RTCM MAY 2, 1997

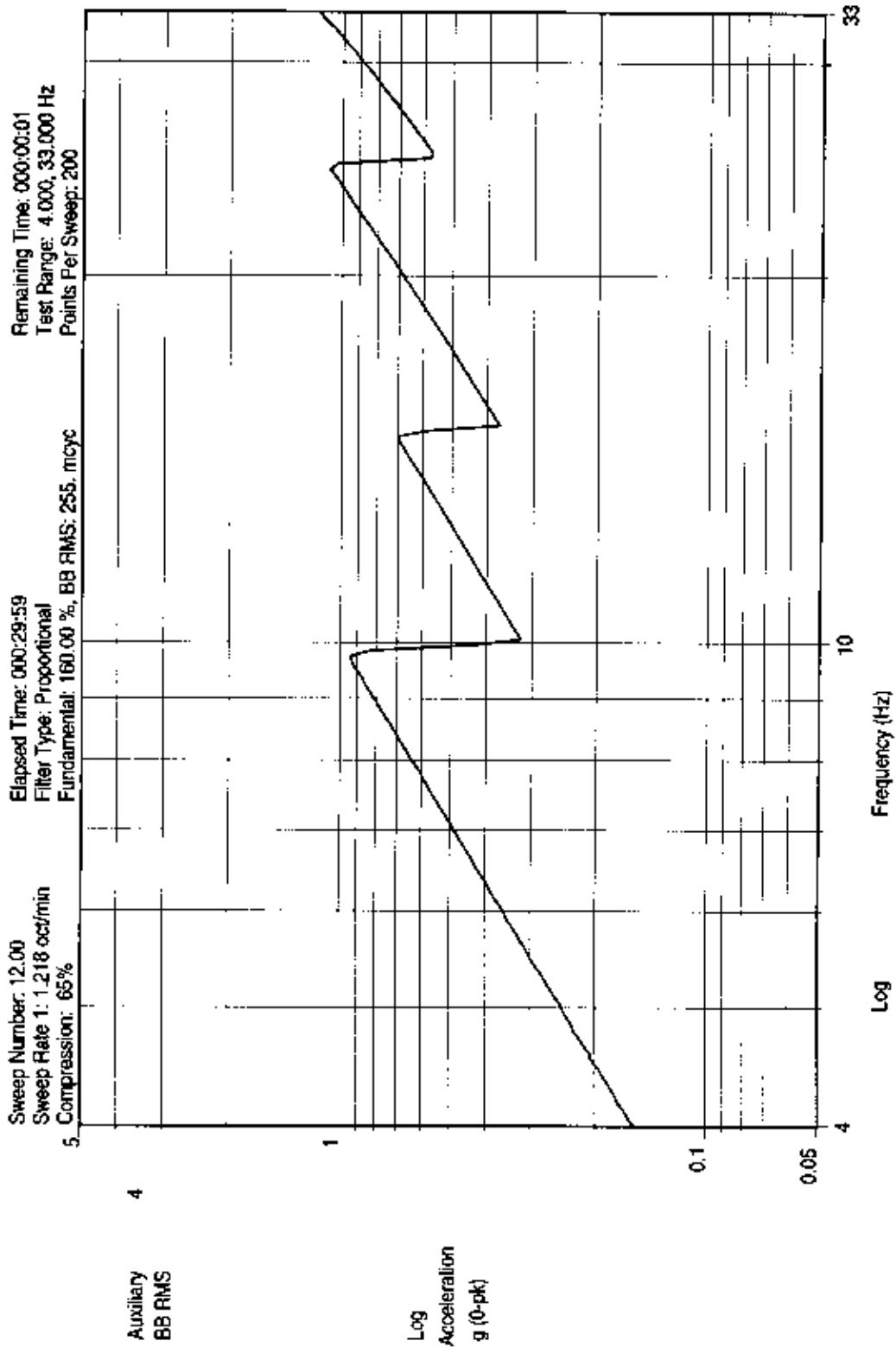
M3223 - EPIRB ACR RLB35 S/N: 07

Sine Data Review Name: RTCM.011



10:40:54  
Thu May 31 2001

001Z TEST : RTCM MAY 2, 1997  
M3223 - EPIRB ACR RLB35 S/N: 07  
Sine Data Review Name: RTCM.011



11:08:23

Thu May 31 2001

001Z TEST : RTCM MAY 2, 1997

M3223 - EPIRB ACR RLB35 S/N: 07

Sine Data Review Name: RTCM:011



#### **5.9.4. BEACON CHECKOUT**

Test using a portable test bench and visual inspection confirmed that the beacon does not activate in an untimely manner during vibration testing.

#### **5.9.5. FINAL CONTROL**

##### **5.9.5.1.External mechanical inspection.**

A visual inspection was done on all external mechanical parts.

Result : nominal.

##### **5.9.5.2.Aliveness test results**

Result : nominal.

Data and graphs are reported next page

**VIBRATION ALIVENESS TEST RESULTS**

Beacon Unit : 1/2  
 Name : ACR  
 Type : RLB35  
 Number : 07  
 Bracket : ACR Universal Sea Shelter Id 18560

Date : June 1<sup>st</sup>, 2001

## 406 MHz Measurements

<b>1 - Environmental Temperature (° C)</b>		+ 22° C
<b>2 - POWER OUTPUT</b>		
- Transmission power	dBm	37 ± 2
- Power risetime	ms	< 5
- Power falltime	ms	< 5
<b>3 - SPURIOUS OUTPUT *</b>		
- In band		OK-
- Carrier harmonics		
<b>4 - DIGITAL MESSAGE GENERATOR *</b>		
- Repetition rate		-
- Bit rate	bits/S	400 ± 4
- Transmission time	ms	440 ± 4.4 / 520 ± 5.2
- CW preamble	ms	160 ± 1.6
<b>5 - DIGITAL MESSAGE *</b>		
- Bit and frame sync	bits	1-24
- Format flag	bit	25
- Protocol flag	bit	26
- Country code	bits	27-36
- Protocol	bits	37-40
- Encoded Position Data Source	bits	111
- Homing	bits	112
- BCH 1 code read / calculated	bits	86-106 / 25-85
- BCH 2 code read / calculated	bits	133-144 / 107-132
<b>6 - FREQUENCY</b>		
- Nominal value	KHz	406 025 ± 2
- Short term stability		< 210 <sup>-9</sup> /100 ms
		- 0.53974 4.5 x 10 <sup>-11</sup>

\* See data and graphs next pages

**Laboratoire de certification**  
**Contrôle balise ARGOS/SARSAT**


---

Constructeur	ACR
Modele	RLB35
Numero de serie	07
Reference	M3223-1
Type	SARSAT

Date de l'essai 1 Jun 2001 15:20:08

**Message balise**


---

Message recu	(1-144):	FFFE2F96EE2EC0017FDFFCOA6D3783E0F66C
Format flag	(25):	1
Protocole flag	(26):	0
Code pays	(27-36):	0366
Pays	:	USA
Code protocole	(37-40):	1110
Protocole utilise	:	Standard - Test
Identification	:	
Numero	:	
BCH 1 lu/calculé	(86-106/25-85):	1029B4/1029B4
BCH 2 lu/calculé	(133-144/107-132):	66C/66C
Pos. Data Source	(111):	Internal
121.5 MHz Homing	(112):	Yes
Position GPS de reference	:	N 43°33'34'' E 1°28'48
Position GPS	:	Yes
Position GPS par défaut	:	Yes

**Contrôle message**


---

Duree de la porteeuse pure	160.36ms +- 0.00
Duree de l'emission	519.35 ms
Frequence de modulation	401.28Hz +- 0.00

**Stabilite de frequence**


---

Frequence moyenne	F2	405024460.26 Hz
SIGMA2	F2-F1	3.413E-10
SIGMA3	F3-F2	4.528E-11

**Mesures d'indice**


---

F	F1	G1
49459.51	233	60
49459.02	233	59

Excursion de phase totale	rd	<= 2.48	2.30
Excursion de phase positive	rd	0.96< <1.24	1.13
Excursion de phase negative	rd	-1.24< <=0.96	-1.17
Symetrie de l'excursion	%	<= 5	1.54



L'Intelligence de l'Environnement

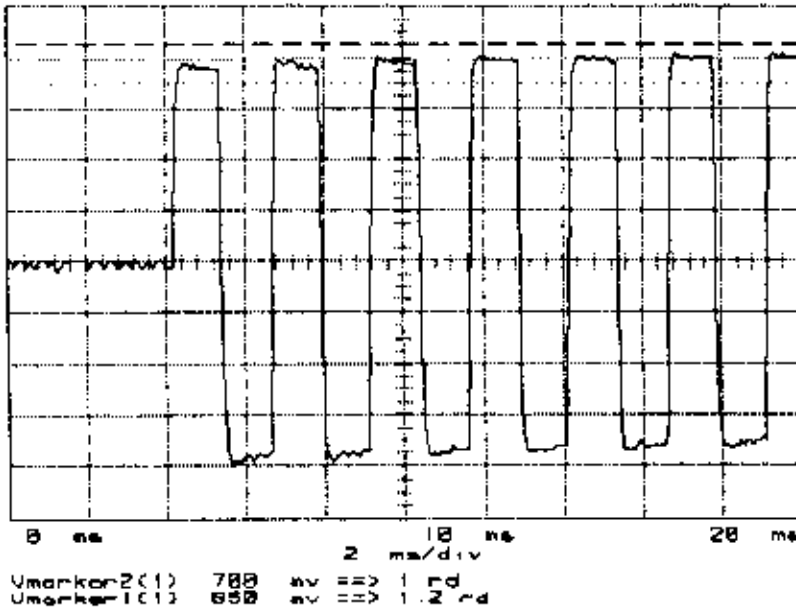
## Mesures de puissance

Puissance

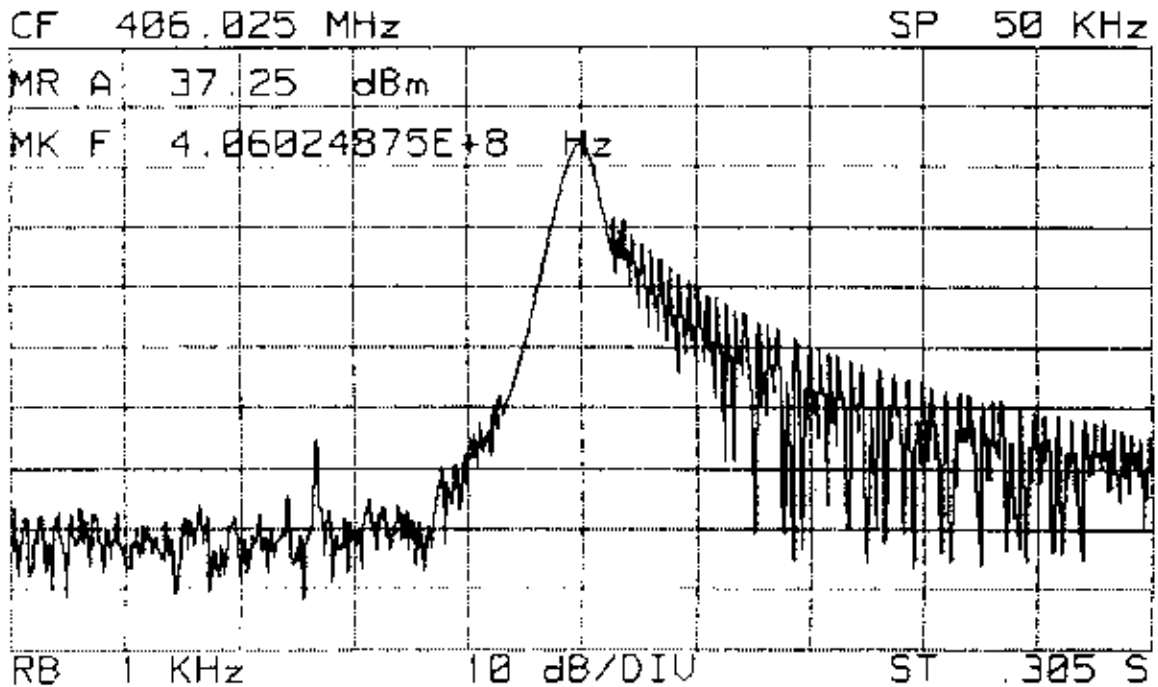
dBm

37.37

Oscillo



## Spectre de fréquence



## **CHAPTER 6**

### **A6.0 – BUMP TEST**

## **6.1. ADMINISTRATIVE INFORMATION**

### **6.1.1. CLIENT**

ACR Electronics Inc

### **6.1.2. REPRESENTATIVES PRESENT**

For the Client : G. PEYROU ITS/AP/ET  
For the Test Laboratory : J. M. BUCHMAN

### **6.1.3. DATES**

Start of test : June 1<sup>st</sup>, 2001  
End of test : June 1<sup>st</sup>, 2001

### **6.1.4. INTESPACE FILE REFERENCE : M2393-ETS/IEC**

## **6.2. UNIT UNDER TEST (UUT)**

Beacon Unit : 1/2  
Name : ACR  
Type : RLB35  
Number : 07

Bracket : ACR Universal Sea Shelter Id 18560

## **7.3. PURPOSE OF THE TEST**

Functional checkout of hardware after vibration testing.

## **6.4. TEST EQUIPMENT**

### **6.4.1. TEST DEVICES**

Electrodynamic vibration table, type 80 kN-2 -GR3  
Spectral Dynamics SD2225 digital control panel

### **6.4.2. METROLOGICAL EQUIPMENT**

Control : accelerometer (analysis and processing)  
Measurements : Spectral Dynamics SD2225  
Electrical Beacon Checking : Argos - Cospas/Sarsat Test Bench

## 6.5. TEST PROCEDURE

### 6.5.1. AXIS (See photograph in § 6.7 page 6.4)

X-axis : parallel to the Beacon Bracket fixing plane and Beacon « widthways »  
 Y-axis : perpendicular to the Beacon Bracket fixing plane and Beacon « widthways »  
 Z-axis : parallel to the Beacon Bracket fixing plane and Beacon « lengthways »

### 6.5.2. MOUNTING

The beacon is secured to a light-alloy supporting square.

The complete assembly is firmly attached to the moving part of the vibration table according to the required axis.

### 6.5.3. TEST SPECIFICATIONS AND SEQUENCE

Bumps following

- Section 6.4 of ETS 300-066 (Second edition –September 1996 )
- Section A1.5 of IEC 1097-2 (First edition –december 1994 ) and

- Profile of bump test :

Peak acceleration	98 m/s <sup>2</sup>
Pulse duration	16 ms
Waveshape	Half-cycle Sinewave
Test axis	Vertical (Z)
Number of Bumps	4000

- Beacon control : Visual inspection and Aliveness test after the Ruggedness Tests

## 6.6. LIST OF SERVO AND CONTROL SENSORS

Sensor	Location	N° acc.	Cable	Sensitivity pC/g
P (servo)	Screwed on test holder sheet	CP91	BU03	9.32
1X (control)	Glued on Beacon Necklace	10922	12/2	2.80
1Y (control)	Glued on Beacon Necklace	5326	13/3	7.10
1Z (control)	Glued on Beacon Necklace	3748	11/4	6.40

## 6.7 PHOTOGRAPH





## **6.8. TEST SCHEDULE**

Date / Test n°	Specifications	Paragraph	Events - Observations	
			Test equipment	Unit under test
June 1 <sup>st</sup> , 2001 PREL	<b>Half-cycle sinewave Bump</b> Peak acceleration 98 m/s <sup>2</sup> Pulse duration 16 ms Test axis Vertical (+Z) Number of Bumps 1		Preliminary testing without the equipment	
June 1 <sup>st</sup> , 2001 004Z+	<b>Half-cycle sinewave Bump</b> Peak acceleration 98 m/s <sup>2</sup> Pulse duration 16 ms Test axis Vertical (+Z) Number of Bumps 2000 Test duration : 50 min.	6.9.1	Nominal	Set up the beacon on test table on Zaxis (80 kN).  Functional testing : nominal.
June 1 <sup>st</sup> , 2001 004Z-	<b>Half-cycle sinewave Bump</b> Peak acceleration 98 m/s <sup>2</sup> Pulse duration 16 ms Test axis Vertical (-Z) Number of Bumps 2000 Test duration : 50 min.	6.9.2	Nominal	Functional testing : nominal.
June 1 <sup>st</sup> , 2001	<b>Visual inspection</b>	6.9.4.1	End of the bump test	Removal of Beacon Nothing abnormal to note
June 1 <sup>st</sup> , 2001	<b>EFPRB Aliveness Test</b>	6.9.4.2	Cospas Sarsat Test Bench	Nominal

## **6.9. TEST RESULTS**

### **6.9.1. RESULTS OF +Z BUMP AXIS (2000 bumps)**



File Name: /user/client/m3223/shock/test/10gpos

Current Date: Fri Jun 01 2001 09:08:43

## CONTROL PARAMETERS:

## DURATION -

Number of Full Level Pulses: 2000  
 Delay between Pulses: 1000.0 ms

## CONTROL STRATEGY -

Drive Update: On  
 Pulse Output Polarity: +  
 Weighting for Averaging: 0.125  
 Feedback Gain: 0.750  
 Waveform Trend Removal: Enable

## OPERATION MODE -

Mode: Semi-Automatic

## EQUALIZATION &amp; SYSTEM IDENTIFICATION-

Start Level: -15.0 dB  
 Initial Excitation: Pulse  
 Prestored Drive: Off

## STARTUP -

Initial Test Level: -11.0 dB  
 Level Increment: 3.0 dB  
 Delay between Pulses: 1000.0 ms

## REFERENCE PARAMETERS:

## REFERENCE PULSE -

Pulse Type: Half Sine  
 Pulse Amplitude: 10.00 g  
 Pulse Duration: 18.00 ms  
 Specify Buffer Duration: No  
 Buffer Duration: 200.00 ms  
 Center Pulse in Buffer: Yes  
 Sample Rate Multiplier: 5.12  
 Units for Accel, Vel, and Displ: g, m/s, mm

## PULSE COMPENSATION -

Type: Pre- and Post-Pulse  
 Optimization: Single Sided Displacement  
 Pre-Pulse Amplitude: 20.0 %  
 Post-Pulse Amplitude: 20.0 %

## PULSE DISPLAY TOLERANCE BANDS -

Type: None

## PULSE DYNAMIC LIMITS -

Input Volts: 0.93 V  
 Acceleration: 9.98 g -2.00 g  
 Velocity: 0.56 m/s -0.56 m/s  
 Displacement: 0.04 mm -15.68 mm  
 Sample Rate: 1280.00 Hz

## SRS ANALYSIS PARAMETERS -

SRS Spacing: 1/3 octave  
 SRS Filter Definition: Absolute Acceleration  
 SRS Damping: 5.00 %  
 SRS Q: 10.00

## SAFETY PARAMETERS:

## ALARM/ABORTS -

Maximum Average Error -  
 Alarm: 10.00 %  
 Abort: 20.00 %  
 Maximum Peak Error -  
 Alarm: 20.00 %  
 Abort: 50.00 %

## LOOP CHECK -

Noise Threshold: 30.00 mV RMS  
 Maximum Drive: 100.00 mV RMS



Loop Check:

Yes

Maximum Drive:

6.00 Vpeak

## CHANNEL TABLE:

Channel Number	Channel Type	Loop Check	Sensitivity (mV/g)	Channel Label 1	Label 2
1	Control	Yes	93.2	PILOTE P	
2	Auxiliary	No	88.55	1X SENSOR	
3	Auxiliary	No	71	1Y SENSOR	
4	Auxiliary	No	64	1Z SENSOR	

## DOCUMENTATION:

Display Text -

Title 1: 004Z+ TEST : RTCM + ETS 300 066 + IEC 1097.2

Title 2: M3223 - EPIRB RLB35 S/N: 07 - POSITIVE BUMP TEST

List Only Text -

Title 3:

Prompt before Test: Yes

Data Storage -

Mode: Manual

Message Log -

Mode: Use Run Number

Printing -

Auto Plot after Test: No

## REMOTE COMMUNICATION TABLE:

Enable Remote Communication: No

## SHAKER LIMITS:

Enable Shaker Limits: Yes

File Name: 80kN

Shaker Description: Shaker 80kN Limits

Symmetric Values: NO

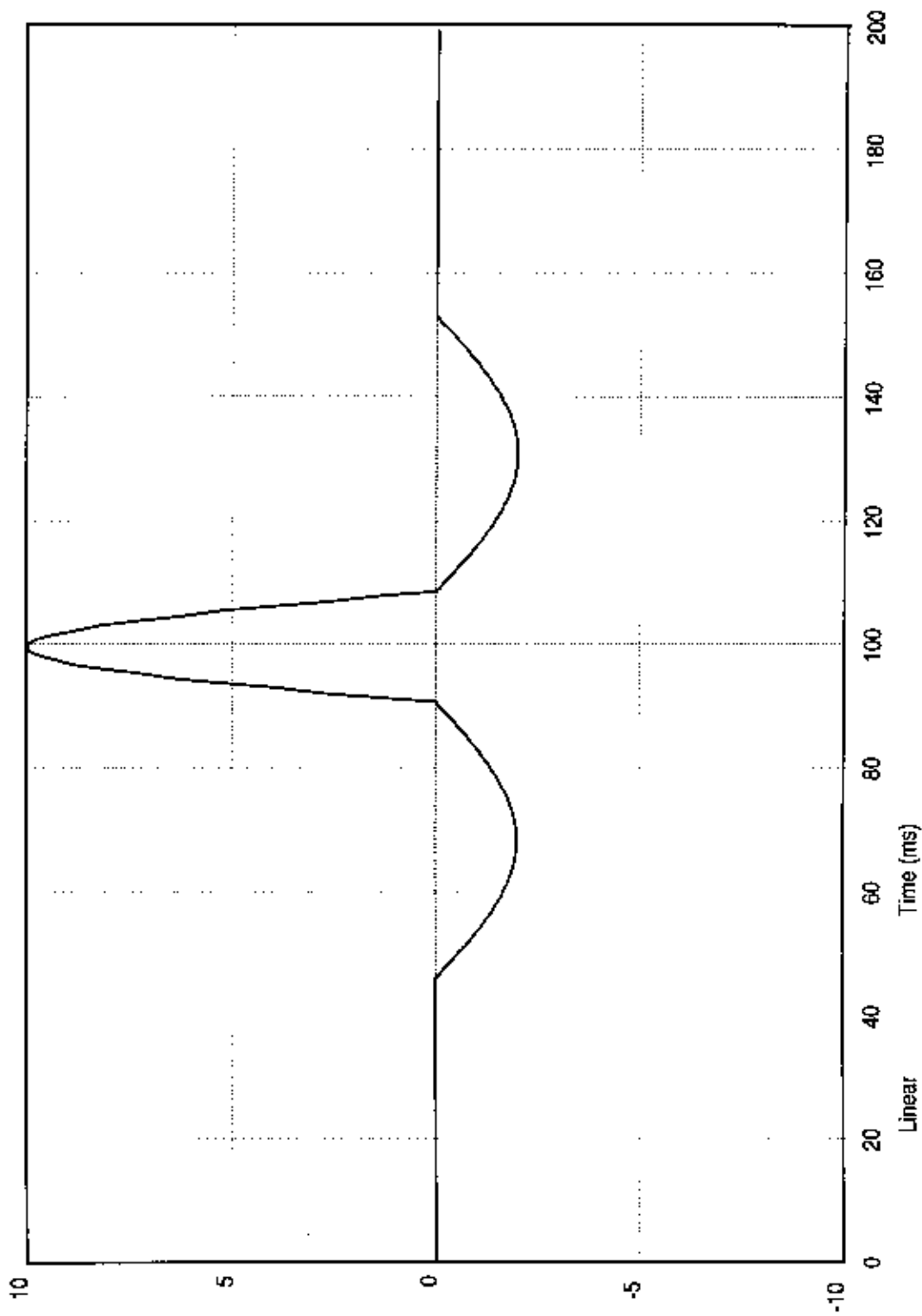
Acceleration (+g): 100.000 (-g): -100.000

Velocity (+m/s): 2.000 (-m/s): -2.000

Displacement (+mm): 25.400 (-mm): -25.400

Voltage (+v): 10.000 (-v): -10.000

End of Classical Shock Test List



Acceleration

Linear  
g

119

09:54:18

01-Jun-2001

004Z+ TEST : RTCM + ETS 300 066 + IEC 1097.2

M3223 - EPIRB RLB35 S/N: 07 - POSITIVE BUMP TEST

Classical Shock Test Name: /user/client/m3223/shock/test/10gpos



## Version 3.8.0 Test Summary Listing

 Centre de l'Environnement  
 Test Name:

10gpos.001

Current Date:

Fri Jun 01 2001 09:47:23

## DOCUMENTATION:

Title 1: 004Z+ TEST : RTCM + ETS 300 066 + IEC 1097.2  
 Title 2: M3223 - EPIRB RLB35 S/N: 07 - POSITIVE BUMP TEST  
 Title 3:

## TEST RESULTS:

Time at Shutdown: 09:47:07  
 Date at Shutdown: 01-Jun-2001  
 Test Completed Normally  
 Last Pulse Output  
 Pulse Amplitude: 9.97 g  
 Test Level: 0.00 dB  
 Polarity: +  
 Average Error (Time Domain): 0.24 %  
 Peak Error (Time Domain): 0.32 %  
 Pulses Requested: 2000  
 Pulses Remaining: 0  
 Table of Alarms Occurrences Maximum Value  
 Average Error: 0  
 Peak Error: 0  
 Maximum Drive: 0  
 Input Overload: 0

## TABLE OF OUTPUTS:

Level	Number of Outputs	
	Positive	Negative
0.00	2000	
-2.00	1	
-5.00	1	
-8.00	1	
-11.00	1	
-15.00	11	

## REFERENCE PARAMETERS:

## REFERENCE PULSE -

Pulse Type: Half Sine  
 Pulse Amplitude: 10.00 g  
 Pulse Duration: 18.00 ms

## PULSE DYNAMIC LIMITS -

Acceleration: 9.98 g -2.00 g  
 Velocity: 0.56 m/s -0.56 m/s  
 Displacement: 0.04 mm -15.68 mm  
 Sample Rate: 1280.00 Hz

## SRS ANALYSIS PARAMETERS -

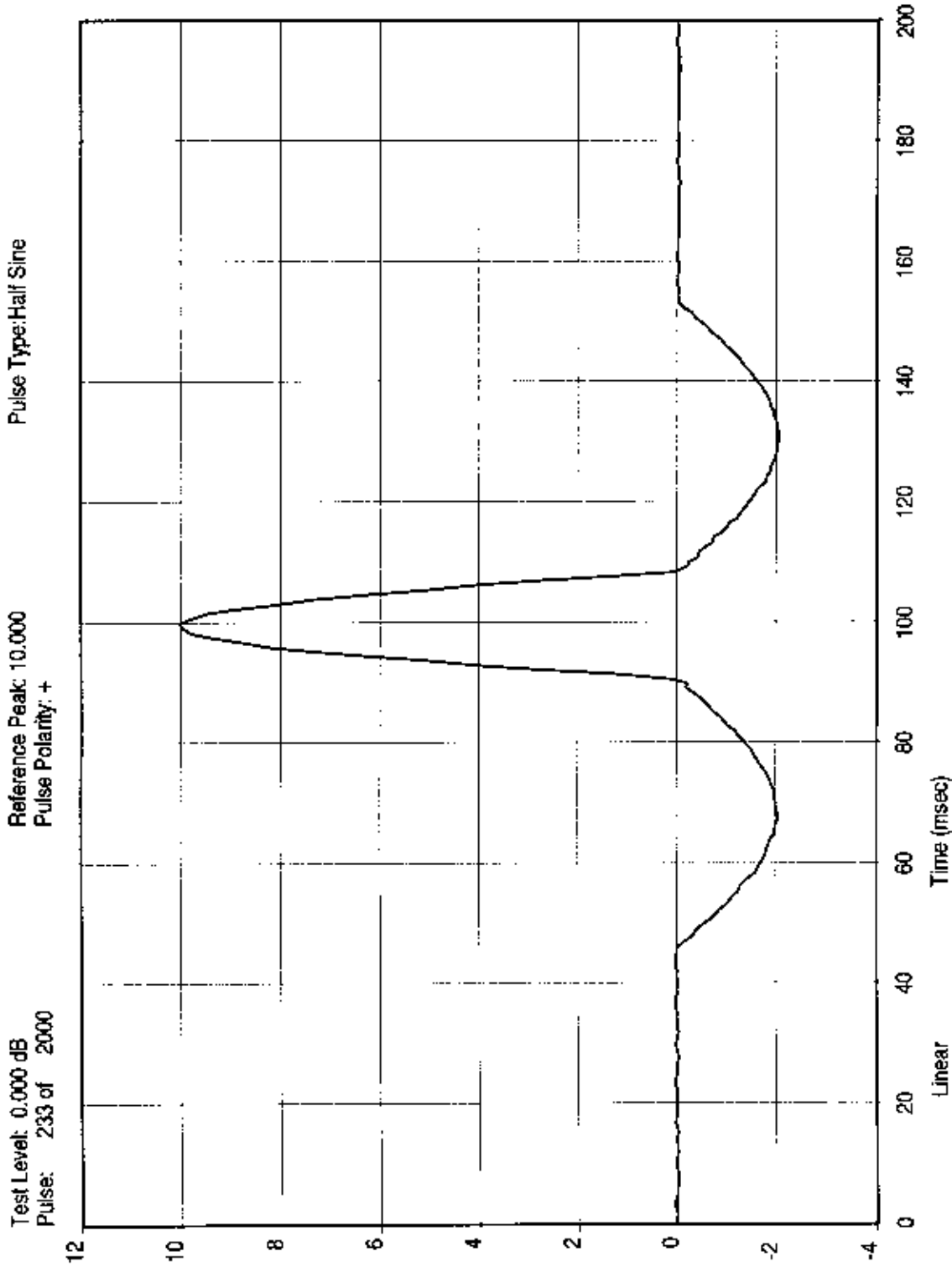
SRS Spacing: 1/3 octave  
 SRS Filter Definition: Absolute Acceleration  
 SRS Damping: 5.00 %  
 SRS Q: 10.00

## CHANNEL TABLE:

Channel Number	Channel Type	Loop Check	Sensitivity (mV/g)	Channel Label 1	Label 2
1	Control	Yes	93.2	PILOTE P	
2	Auxiliary	No	88.55	1X SENSOR	
3	Auxiliary	No	71	1Y SENSOR	
4	Auxiliary	No	64	1Z SENSOR	

End of Classical Shock Test Summary List

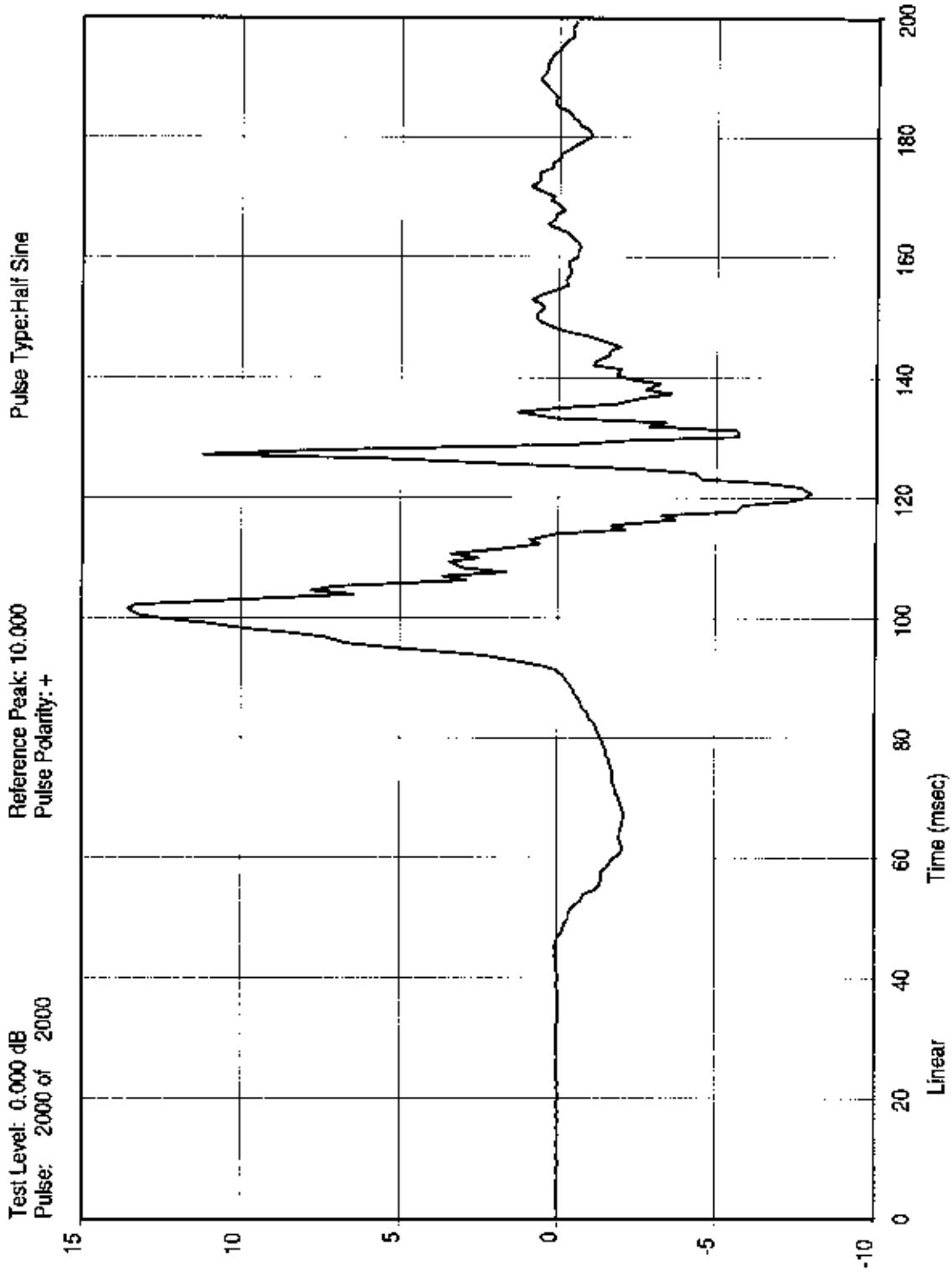




PILOTE P

004Z+ TEST : RTCM + ETS 300 066 + IEC 1097.2  
M2393 - EPIRB RLB35 S/N: 07 - POSITIVE BUMP TEST

Classical Shock Data Review Name: /user/client/m3223/shock/data/10gpos.001



Auxiliary  
Acceleration

Linear  
g

Peak:  
13.519  
-7.994


6.14

08:46:53.1

Fri Jun 01 2001

004Z+ TEST : RTCM + ETS 300 066 + IEC 1097.2  
M.3223- EPIRB RLB35 S/N: 07 - POSITIVE BUMP TEST  
Classical Shock Test Name: 10gpos.001

### **6.9.1. RESULTS OF -Z BUMP AXIS (2000 bumps)**


**Intespace** version 3.8.0 Test File Listing

Intelligence de l'Environnement

File Name:

/user/client/m3223/shock/test/10gneg

Current Date:

Fri Jun 01 2001 09:50:02

**CONTROL PARAMETERS:****DURATION -**

Number of Full Level Pulses: 2000  
 Delay between Pulses: 1000.0 ms

**CONTROL STRATEGY -**

Drive Update: On  
 Pulse Output Polarity: -  
 Weighting for Averaging: 0.125  
 Feedback Gain: 0.750  
 Waveform Trend Removal: Enable

**OPERATION MODE -**

Mode: Semi-Automatic

**EQUALIZATION & SYSTEM IDENTIFICATION-**

Start Level: -15.0 dB  
 Initial Excitation: Pulse  
 Prestored Drive: Off

**STARTUP -**

Initial Test Level: -11.0 dB  
 Level Increment: 3.0 dB  
 Delay between Pulses: 1000.0 ms

**REFERENCE PARAMETERS:****REFERENCE PULSE -**

Pulse Type: Half Sine  
 Pulse Amplitude: 10.00 g  
 Pulse Duration: 18.00 ms

Specify Buffer Duration: No

Buffer Duration: 200.00 ms

Center Pulse in Buffer: Yes

Sample Rate Multiplier: 5.12

Units for Accel, Vel, and Displ: g, m/s, mm

**PULSE COMPENSATION -**

Type: Pre- and Post-Pulse  
 Optimization: Single Sided Displacement  
 Pre-Pulse Amplitude: 20.0 %  
 Post-Pulse Amplitude: 20.0 %

**PULSE DISPLAY TOLERANCE BANDS -**

Type: None

**PULSE DYNAMIC LIMITS -**

Input Volts: 0.93 V  
 Acceleration: 9.98 g -2.00 g  
 Velocity: 0.56 m/s -0.56 m/s  
 Displacement: 0.04 mm -15.68 mm  
 Sample Rate: 1280.00 Hz

**SRS ANALYSIS PARAMETERS -**

SRS Spacing: 1/3 octave  
 SRS Filter Definition: Absolute Acceleration  
 SRS Damping: 5.00 %  
 SRS Q: 10.00

**SAFETY PARAMETERS:****ALARM/ABORTS -**

Maximum Average Error -

Alarm: 10.00 %  
 Abort: 20.00 %

Maximum Peak Error -

Alarm: 20.00 %  
 Abort: 50.00 %

**LOOP CHECK -**

Noise Threshold: 30.00 mV RMS  
 Maximum Drive: 100.00 mV RMS



Loop Check: Yes  
 DRIVE SIGNAL -  
 Maximum Drive: 6.00 Vpeak

## CHANNEL TABLE:

Channel Number	Channel Type	Loop Check	Sensitivity (mV/g)	Channel Label 1	Label 2
1	Control	Yes	93.2	PILOTE P	
2	Auxiliary	No	88.55	1X SENSOR	
3	Auxiliary	No	71	1Y SENSOR	
4	Auxiliary	No	64	1Z SENSOR	

## DOCUMENTATION:

Display Text -

Title 1: 004Z- TEST : RTCM + ETS 300 066 + IEC 1097.2

Title 2: M3223 - EPIRB RLB35 S/N: 07 - NEGATIVE BUMP TEST

List Only Text -

Title 3:

Prompt before Test: Yes

Data Storage -

Mode: Manual

Message Log -

Mode: Use Run Number

Printing -

Auto Plot after Test: No

## REMOTE COMMUNICATION TABLE:

Enable Remote Communication: No

## SHAKER LIMITS:

Enable Shaker Limits: Yes

File Name: 80kN

Shaker Description: Shaker 80kN Limits

Symmetric Values: NO

Acceleration (+g): 100.000 (-g): -100.000

Velocity (+m/s): 2.000 (-m/s): -2.000

Displacement (+mm): 25.400 (-mm): -25.400

Voltage (+v): 10.000 (-v): -10.000

End of Classical Shock Test List



Test Name: 10gneg.002  
Current Date: Fri Jun 01 2001 10:59:30

DOCUMENTATION:

Title 1: 004Z- TEST : RTCM + ETS 300 066 + IEC 1097.2  
Title 2: M3223 - EPIRB RLB35 S/N: 07 - NEGATIVE BUMP TEST  
Title 3:

TEST RESULTS:

Time at Shutdown: 10:59:10  
Date at Shutdown: 01-Jun-2001  
Test Completed Normally  
Last Pulse Output  
Pulse Amplitude: -10.00 g  
Test Level: 0.00 dB  
Polarity: -  
Average Error (Time Domain): 0.22 %  
Peak Error (Time Domain): 0.02 %  
Pulses Requested: 2000  
Pulses Remaining: 0  
Table of Alarms Occurrences Maximum Value  
Average Error: 0  
Peak Error: 0  
Maximum Drive: 0  
Input Overload: 2

TABLE OF OUTPUTS:

Level	Number of Outputs	
	Positive	Negative
0.00		2000
-2.00		1
-5.00		1
-8.00		1
-11.00		1
-15.00		11

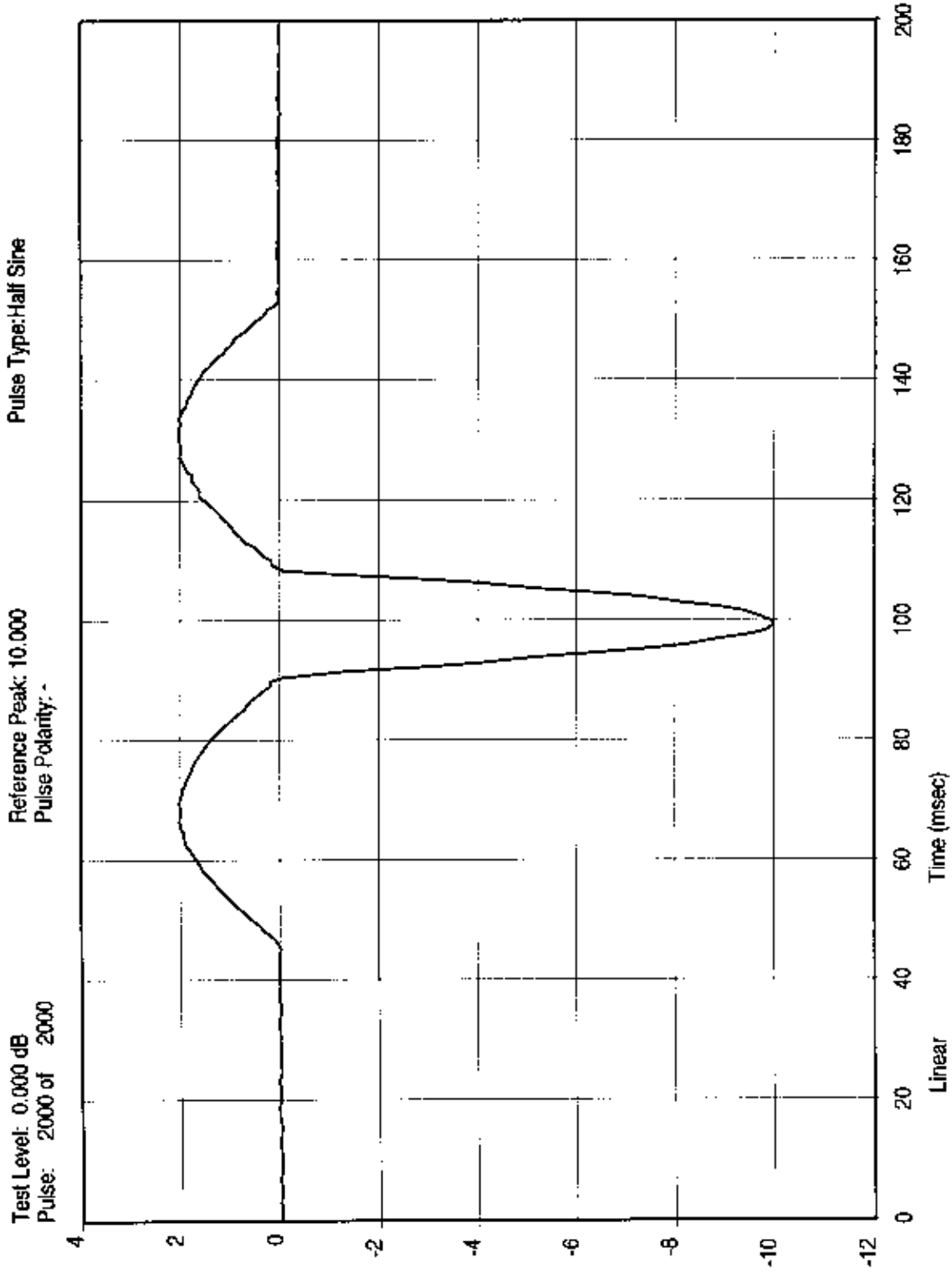
REFERENCE PARAMETERS:

REFERENCE PULSE -  
Pulse Type: Half Sine  
Pulse Amplitude: 10.00 g  
Pulse Duration: 18.00 ms  
PULSE DYNAMIC LIMITS -  
Acceleration: 9.98 g -2.00 g  
Velocity: 0.56 m/s -0.56 m/s  
Displacement: 0.04 mm -15.68 mm  
Sample Rate: 1280.00 Hz  
SRS ANALYSIS PARAMETERS -  
SRS Spacing: 1/3 octave  
SRS Filter Definition: Absolute Acceleration  
SRS Damping: 5.00 %  
SRS Q: 10.00

CHANNEL TABLE:

Channel Number	Channel Type	Loop Check	Sensitivity (mV/g)	Channel Label 1	Label 2
1	Control	Yes	93.2	PILOTE P	
2	Auxiliary	No	88.55	1X SENSOR	
3	Auxiliary	No	71	1Y SENSOR	
4	Auxiliary	No	64	1Z SENSOR	

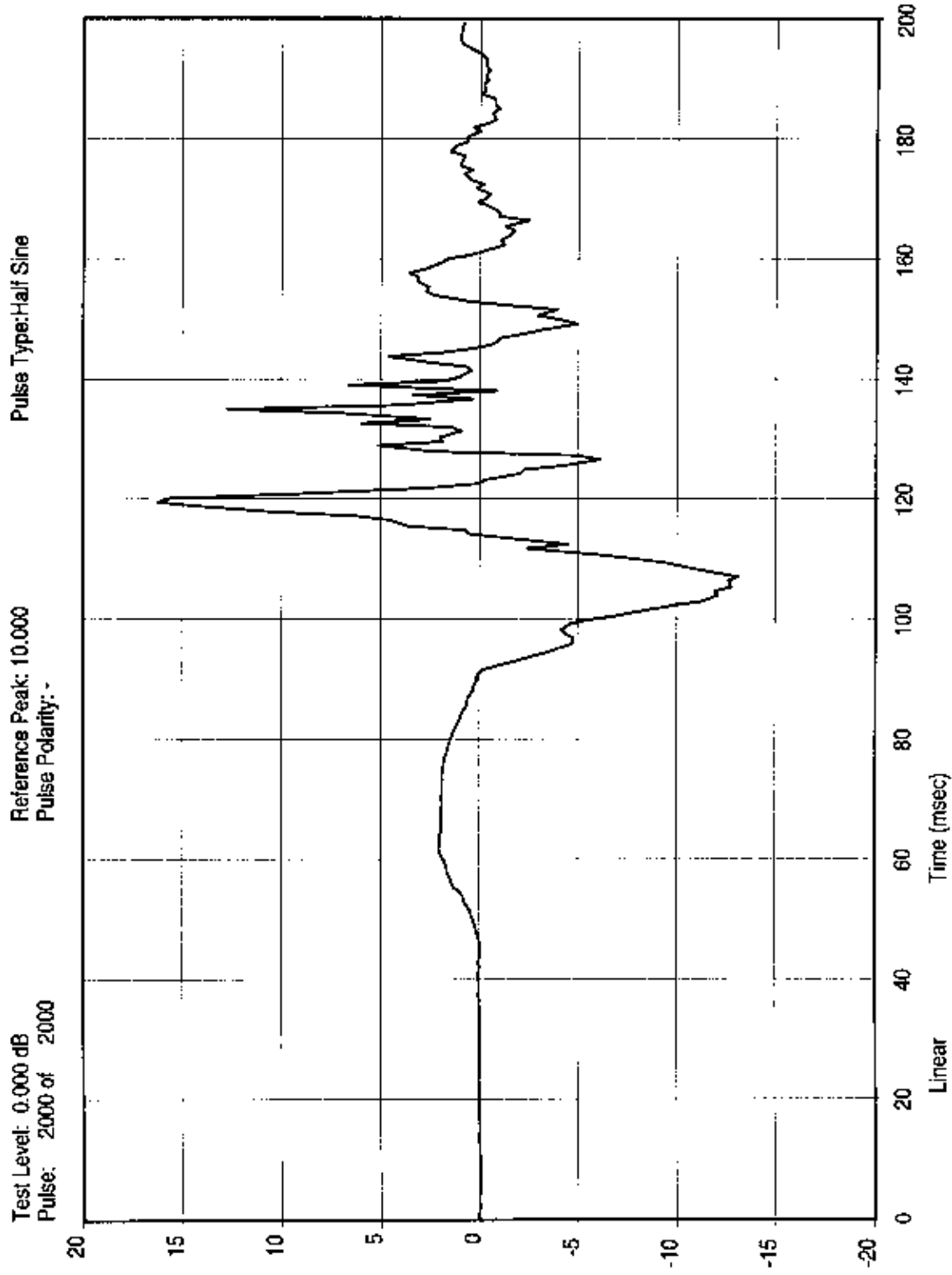
End of Classical Shock Test Summary List



619  
10:37:02.2  
Fri Jun 01 2001

004Z: TEST : RTCM + ETS 300 066 + IEC 1097.2  
M3223 - EPIRB RLB35 S/N: 07 - NEGATIVE BUMP TEST  
Classical Shock Test Name: 10gneg.002

PILOTE P



4  
Auxiliary  
Acceleration

9  
Linear

Peak:  
16.250  
-13.113

6.20

10:37:02.2

Fri Jun 01 2001

1Z SENSOR

004Z- TEST : RTCM + ETS 300 066 + IEC 1097.2  
M3223 - EPIRB RLB95 S/N: 07 - NEGATIVE BUMP TEST  
Classical Shock Test Name: 10gneg.002



### **6.9.3. BEACON CHECKOUT**

Test using a portable test bench and visual inspection confirmed that the beacon does not activate in an untimely manner during vibration testing.

### **6.9.4. FINAL CONTROL**

#### **6.9.4.1.External mechanical inspection.**

A visual inspection was done on all external mechanical parts.

Result : nominal.

#### **6.9.4.2.Aliveness test results**

Result : nominal.

Data and graphs are reported next pages

**BUMP ALIVENESS TEST RESULTS**

Beacon Unit : 1/2  
 Name : ACR  
 Type : RLB35  
 Number : 07  
 Bracket : ACR Universal Sea Shelter Id 18560

Date : June 1<sup>st</sup>, 2001

**406 MHz Measurements**

<b>1 - Environmental Temperature (° C)</b>		+ 22° C
<b>2 - POWER OUTPUT</b>		
- Transmission power	dBm	37 ± 2
- Power risetime	ms	< 5
- Power falltime	ms	< 5
<b>3 - SPURIOUS OUTPUT *</b>		
- In band		OK-
- Carrier harmonics		
<b>4 - DIGITAL MESSAGE GENERATOR *</b>		
- Repetition rate		-
- Bit rate	bits/S	400 ± 4
- Transmission time	ms	440 ± 4.4 / 520 ± 5.2
- CW preamble	ms	160 ± 1.6
<b>5 - DIGITAL MESSAGE *</b>		
- Bit and frame sync	bits	1-24
- Format flag	bit	25
- Protocol flag	bit	26
- Country code	bits	27-36
- Protocol	bits	37-40
- Encoded Position Data Source	bits	111
- Homing	bits	112
- BCH 1 code read / calculated	bits	86-106 / 25-85
- BCH 2 code read / calculated	bits	133-144 / 107-132
<b>6 - FREQUENCY</b>		
- Nominal value	KHz	406 025 ± 2
- Short term stability		< 210 <sup>-9</sup> /100 ms

\* See data and graphs next pages

Laboratoire de certification  
 Controle balise ARGOS/SARSAT

 Constructeur ACR  
 Modele RLB35  
 Numero de serie 07  
 Reference M3223-1  
 Type SARSAT

Date de l'essai 1 Jun 2001 15:20:08

## Message balise

 Message reçu (1-144): FFFE2F96EE2EC0017FDFFCOA6D3783E0F56C  
 Format flag (25): 1  
 Protocole flag (26): 0  
 Code pays (27-36): 0366  
 Pays : USA  
 Code protocole (37-40): 1110  
 Protocole utilise : Standard - Test  
 Identification :  
 Numero :  
 BCH 1 lu/calculé (86-106/25-85): 1029B4/1029B4  
 BCH 2 lu/calculé (133-144/107-132): 66C/66C  
 Pos. Data Source (111): Internal  
 121.5 MHz Homing (112): Yes  
 Position GPS de reference : N 43°33'34'' E 1°28'48  
 Position GPS : Yes  
 Position GPS par default : Yes

## Controle message

 Duree de la porteuse pure 160.36ms +/- 0.00  
 Duree de l'emission 519.35 ms  
 Frequence de modulation 401.28Hz +/- 0.00

## Stabilité de fréquence

 Frequence moyenne F2 406024460.26 Hz  
 SIGMA2 F2-F1 3.413E-10  
 SIGMA3 F3-F2 4.528E-11

## Mesures d'indice

F	F1	G1
49459.51	233	60
49459.02	233	59

Excursion de phase totale	rd	<= 2.46	2.30
Excursion de phase positive	rd	0.96<	<1.24 1.13
Excursion de phase negative	rd	-1.24<	<-0.96 -1.17
Symetrie de l'excursion	%	<= 5	1.54

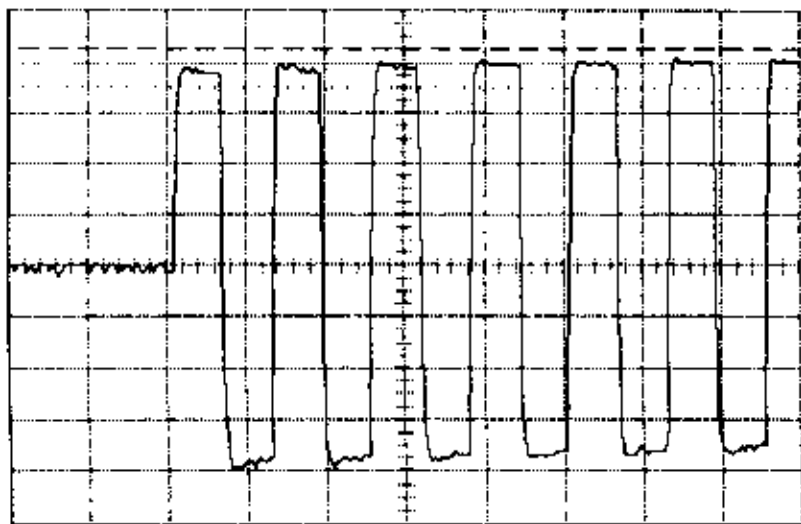


L'Intelligence de l'Environnement

Mesures de puissance

Puissance dBm 37.37

Oscillo



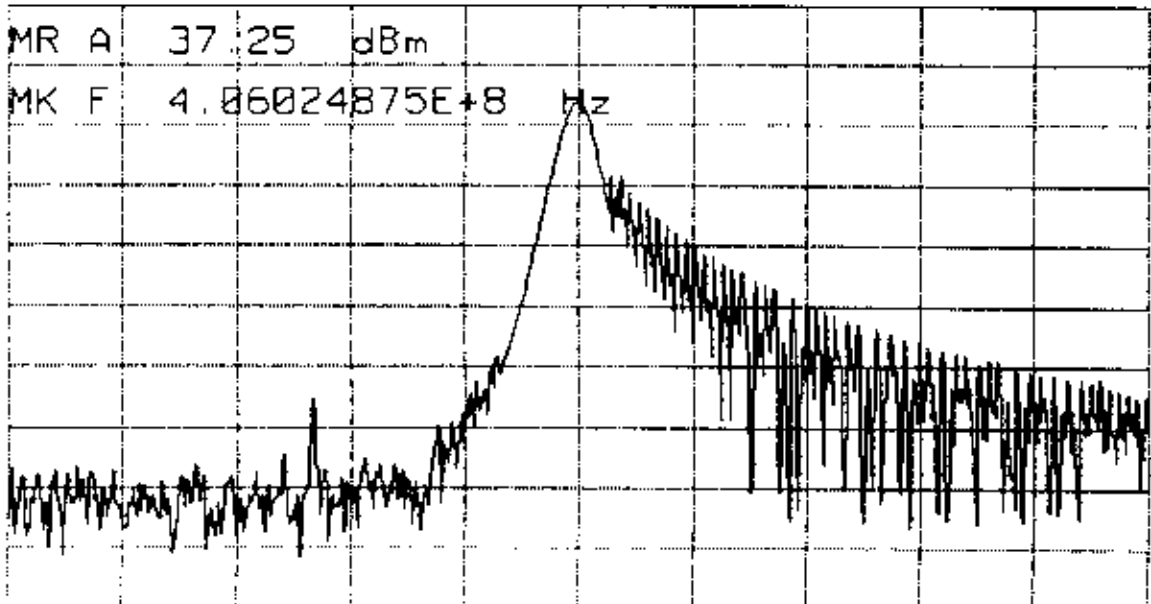
0 ns 10 ns 20 ns  
 2 mV/div  
 Umarker2(1) 780 mV ==> 1.0 d  
 Umarker1(1) 650 mV ==> 1.2 d

Spectre de frequence

CF 406.025 MHz SP 50 KHz

MR A 37.25 dBm

MK F 4.06024875E+8 Hz



RB 1 KHz 10 dB/DIV ST .305 S

PRINT ON THIS SIDE ONLY HEWLETT PACKARD JF-1PATE II RECORDING NO. 9226-1 K AUG 06 90

## CHAPTER 7

### **A7.0 – SALT FOG TEST**

## 7.1. TEST SPECIFICATIONS AND SEQUENCE

Following :

- Section A7.0 of RTCM Recommended Standards for 406 MHz Satellite EPIRBs (Version 2.0 Feb 5,1997) ;

Note : The EPIRB hereby considered has been also tested following :

- Section 6.5 of ETS 300-066 (Second edition –September 1996 ) ;
- Section A1.6 of IEC 1097-2 (First edition –december 1994 ) and
- Section 8.12 of EN 60945 ( May 1997)

## 7.2. EQUIPMENT UNDER TEST

Beacon Unit : 1/2  
Name : ACR  
Type : RLB35  
Number : 07

Bracket : ACR Universal Sea Shelter Id 18560

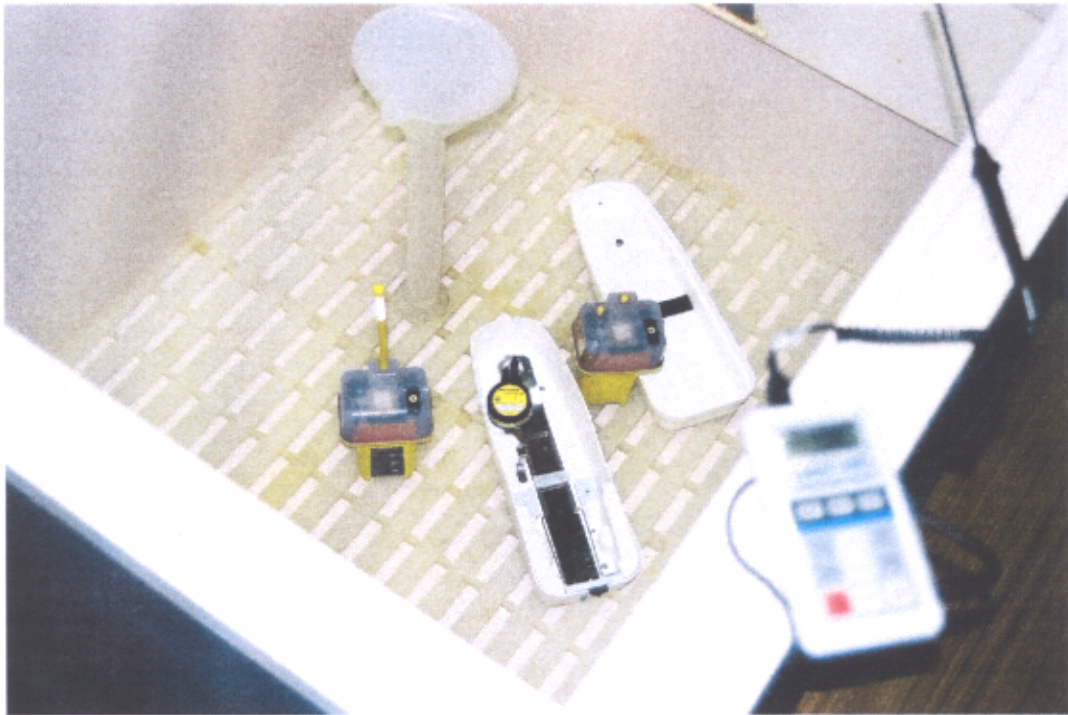
## 7.3. TEST SITE

Toulouse Space Center (C.S.T.) - INTESPACE Laboratory.

## 7.4. TEST EQUIPMENT

- Salt fog chamber SAPRATIN S /N : 229 (see photo page 7.3),
- Salt solution : Mil-Std-810 D (July 19th, 1983), method 509.2.
- Climatic chamber : CLIMATS F.C.H. – Type: Austral 137H60/1,5E - S/N: S4880.
- COLE PARMER thermo-hygrometer, Type : TriSense S/N : 37000-00,
- KEITHLEY thermometer/multimeter ,Type : 2000, S/N 0678112 with CU-CT thermocoupler.
- Argos - Cospas/Sarsat Test Bench.

**SALT FOG TEST**



## 7.5. TEST RESULTS

Note : The salt fog test has been conducted in two times :

- 1) First : following RTCM Recommended Standard
- 2) Second : following ETS / IEC Standards ( The RTCM period has been considered as first time period of ETS/IEC specifications )

### 7.5.1 Test implementation

Place : INTESPACE Laboratory

Date	Hour	Events - Observations
April 27 <sup>th</sup> ,2001	15h	Salt bath preparation ; warming up of the chamber with beacon in it bracket
	17h	Salt fog injection (5% of NaCl) at 40 °C ± 2 °C ≥ 48 h
May 2 <sup>nd</sup> ,2001	8h	Salt fog injection stopped. Beacon dried during 24 h at 40 °C ± 2 °C
May 3 <sup>rd</sup> ,2001	10h	Salt fog injection at 40 °C ± 2 °C ≥ 12 h
May 4 <sup>th</sup> ,2001	10h	Salt fog injection stopped.
	11h30	Visual inspection at ≈ 22 °C: <b>OK</b> . Nothing abnormal to note .
	14h	Electrical checks : See results of aliveness after RTCM salt fog test next page § 7.5.2
	15h	Beacon in FB4 bracket placed in the salt fog chamber at 40 °C ± 2 °C
	16h	Salt fog injection (5% of NaCl) at 40 °C ± 2 °C for 1 hour
	17h	Salt fog injection stoped and begining of first storage period at 40 °C ± 2 °C and 93 % ± 3 % of HR
May 11 <sup>th</sup> ,2001	16h	Salt fog injection (5% of NaCl) at 40 °C ± 2 °C for 1 hour
	17h	Salt fog injection stopped and begining of second storage period at 40 °C ± 2 °C and 93 % ± 3 % of HR
May 18 <sup>th</sup> ,2001	16h	Salt fog injection (5% of NaCl) at 40 °C ± 2 °C for 1 hour
	17h	Salt fog injection stopped and begining of second storage period at 40 °C ± 2 °C and 93 % ± 3 % of HR
May 28 <sup>th</sup> ,2001	10h	End of salt fog test
	16h	Visual Inspection at 22 °C : <b>OK</b> . Nothing abnormal to note Electrical checks : See results of aliveness after ETS/IEC salt fog test next page § 7.5.3



**7.5.2 ALIVENESS TEST RESULTS AFTER RTCM SALT FOG TEST**

Beacon Unit : 1/2  
 Name : ACR  
 Type : RLB35  
 Number : 07

Bracket : ACR Universal Sea Shelter Id 18560

**406 MHZ MEASUREMENTS**

May 4<sup>th</sup>,2001

<b>1 - Environmental Temperature ( ° C)</b>			+ 22° C
<b>2 - POWER OUTPUT</b>			
- Transmission power	dBm	37 ± 2	37.4
- Power risetime	ms	< 5	0.85 ms
- Power falltime	ms	< 5	-
<b>3 - SPURIOUS OUTPUT</b>			
- In band	*		OK
- Carrier harmonics			
<b>4 -DIGITAL MESSAGE GENERATOR</b>			
- Repetition rate			OK
- Bit rate	bits/S	400 ± 4	401.31
- Transmission time	ms	440 ± 4.4 / 520 ± 5.2	519.36
- CW preamble	ms	160 ± 1.6	160.38
<b>5 - DIGITAL MESSAGE</b>			
- Bit and frame sync	bits	1-24	FFFE2F
- Format flag	bit	25	1
- Protocol flag	bit	26	0
- Country code	bits	27-36	0366
- Protocol	bits	37-40	1110
- Encoded Position Data Source	bits	111	1
- Homing	bits	112	1
- BCH 1 code read / calculated	bits	86-106 / 25-85	1029B4 / 1029B4
- BCH 2 code read / calculated	bits	133-144 / 107-132	66C / 66C
<b>6 - FREQUENCY</b>			
- Nominal value	KHz	406 025 ± 2	-0.52587
- Short term stability		< 2x10 <sup>-9</sup> /100 ms	2.3 x 10 <sup>-10</sup>

- See data and graphs next pages

**Laboratoire de certification  
 Contrôle balise ARGOS/SARSAT**

Constructeur     ACR  
 Modèle            RLB35  
 Numéro de série   07  
 Référence         M3223-1  
 Type               SARSAT

Date de l'essai    4 May 2001 14:04:58

**Message balise**

Message reçu                   (1-144): FFPE2F96EE2EC0017FDFFCOA6D3783EOP66C  
 Format flag                    (25): 1  
 Protocole flag                 (26): 0  
 Code pays                    (27-36): 0366  
 Pays                         : USA  
 Code protocole               (37-40): 1110  
 Protocole utilisée            : Standard - Test  
 Identification               :  
 Numéro                       :  
 BCH 1 lu/calculé           (85-106/25-85): 1029B4/1029B4  
 BCH 2 lu/calculé           (133-144/107-132): 66C/66C  
 Pos. Data Source           (111): Internal  
 121.5 MHz Homing           (112): Yes  
 Position GPS de référence   : N 43°33'34'' E 1°28'48  
 Position GPS                 : Yes  
 Position GPS par défaut     : Yes

**Contrôle message**

Durée de la porteuse pure                   160.38ms +- 0.00  
 Durée de l'émission                         519.36 ms  
 Fréquence de modulation                    401.31Hz +- 0.00  
 Stabilité de fréquence

Fréquence moyenne     F2                   406024474.13 Hz  
 SIGMA2                 F2-F1               6.095E-10  
 SIGMA3                 F3-F2               2.299E-10

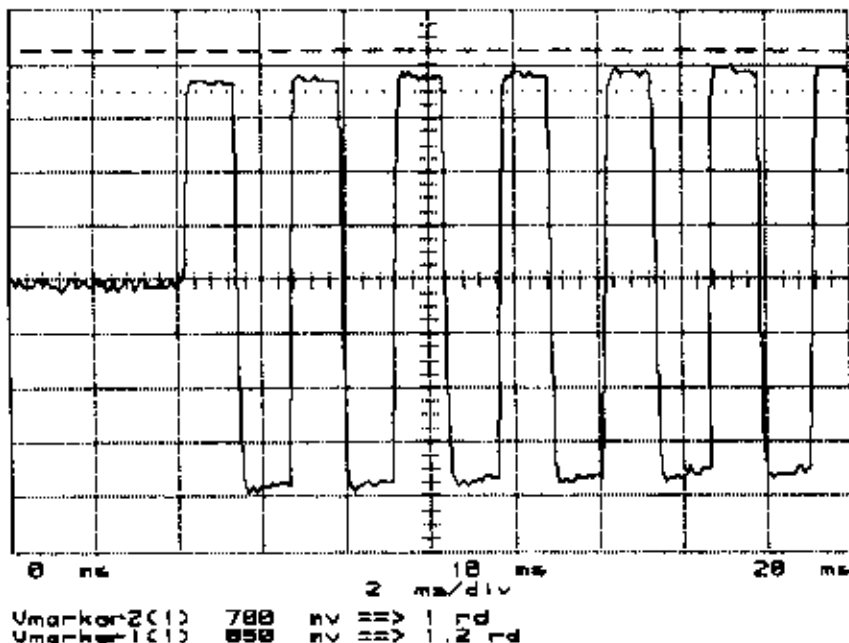
**Mesures d'indice**

F	F1	G1
49473.67	233	60
49473.5	233	59

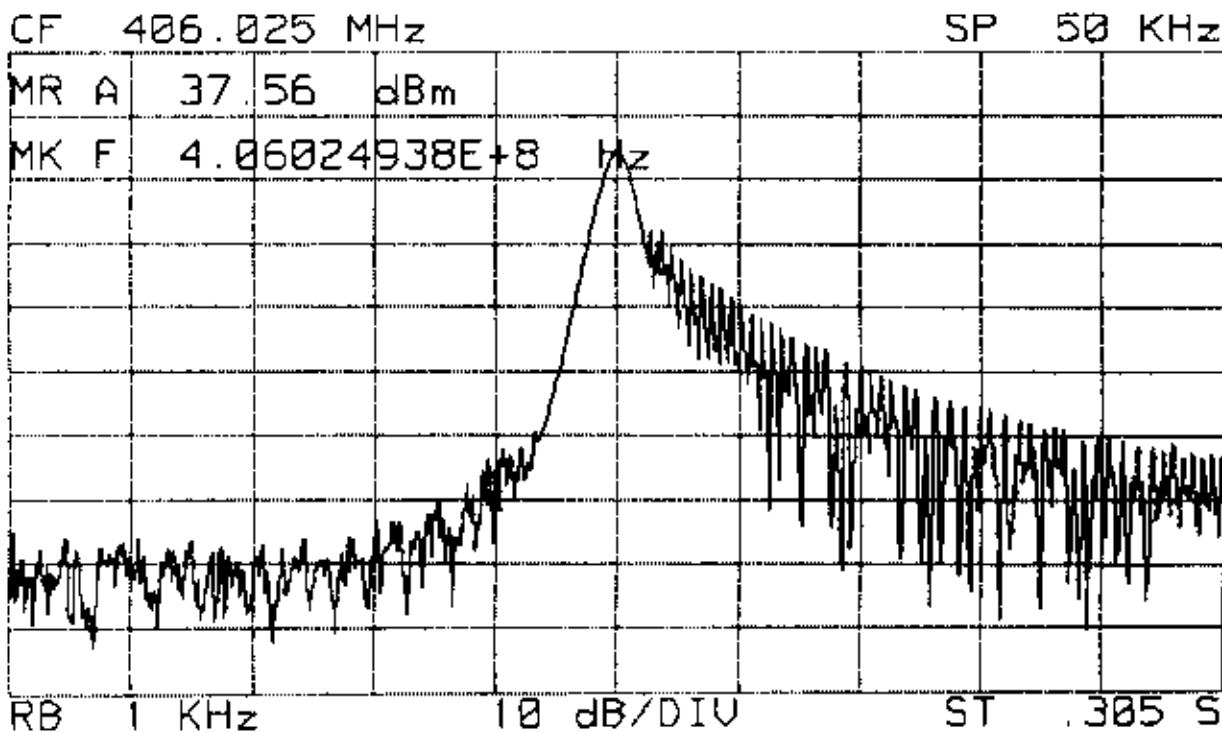
Excursion de phase totale	rd	<= 2.48	2.23
Excursion de phase positive	rd	0.96< <1.24	1.14
Excursion de phase négative	rd	-1.24< <-0.96	-1.09
Symétrie de l'excursion	%	<= 5	-2.14

Puissance dBm 37.41

Oscillo



Spéctre de fréquence



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**7.5.3 ALIVENESS TEST RESULTS AFTER ETS/IEC SALT FOG TEST**

Beacon Unit : 1/2  
 Name : ACR  
 Type : RLB35  
 Number : 07

Bracket : ACR Universal Sea Shelter Id 18560

**406 MHZ MEASUREMENTS**

May 28<sup>th</sup>,2001

<b>1 - Environmental Temperature ( ° C)</b>			+ 22° C
<b>2 - POWER OUTPUT</b>			
- Transmission power	dBm	37 ± 2	37.1
- Power risetime	ms	< 5	0.85 ms
- Power falltime	ms	< 5	-
<b>3 - SPURIOUS OUTPUT</b>			
- In band	*		OK
- Carrier harmonics			
<b>4 -DIGITAL MESSAGE GENERATOR</b>			
- Repetition rate			OK
- Bit rate	bits/S	400 ± 4	401.30
- Transmission time	ms	440 ± 4.4 / 520 ± 5.2	519.34
- CW preamble	ms	160 ± 1.6	160.35
<b>5 - DIGITAL MESSAGE</b>			
- Bit and frame sync	bits	1-24	FFFE2F
- Format flag	bit	25	1
- Protocol flag	bit	26	0
- Country code	bits	27-36	0366
- Protocol	bits	37-40	1110
- Encoded Position Data Source	bits	111	1
- Homing	bits	112	1
- BCH 1 code read / calculated	bits	86-106 / 25-85	1029B4 / 1029B4
- BCH 2 code read / calculated	bits	133-144 / 107-132	66C / 66C
<b>6 - FREQUENCY</b>			
- Nominal value	KHz	406 025 ± 2	-0.54053
- Short term stability		< 2x10 <sup>-9</sup> /100 ms	3.4 x 10 <sup>-10</sup>

\* See data and graphs next pages

IMPRIMERIE ON 144

**Laboratoire de certification**  
**Contrôle balise ARGOS/SARSAT**


---

Constructeur	ACR
Modele	RLB35
Numero de serie	07
Reference	M3223-1
Type	SARSAT

Date de l'essai 28 May 1991 16:53:01

**Message balise**


---

Message reçu	(1-144):	FFFE2F96EE2EC0017FDFFCOA6D3783E0F66C
Format flag	(25):	1
Protocole flag	(26):	0
Code pays	(27-36):	0366
Pays	:	USA
Code protocole	(37-40):	1110
Protocole utilise	:	Standard - Test
Identification	:	
Numero	:	
BCH 1 lu/calculé	(86-106/25-85):	1029B4/1029B4
BCH 2 lu/calculé	(133-144/107-132):	66C/66C
Pos. Data Source	(111):	Internal
121.5 MHz Homing	(112):	Yes
Position GPS de reference	:	N 43°33'34'' E 1°28'48
Position GPS	:	Yes
Position GPS par défaut	:	Yes

**Contrôle message**


---

Duree de la porteuse pure	160.35ms +- 0.00
Duree de l'emission	519.34 ms
Frequence de modulation	401.30Hz +- 0.00
Stabilite de frequence	

---

Frequence moyenne	F2	406024459.47 Hz
SIGMA2	F2-F1	2.961E-10
SIGMA3	F3-F2	3.413E-10

**Mesures d'indice**


---

F	F1	G1
49458.78	232	60
49458.16	232	59

Excursion de phase totale	rd	<= 2.48	2.25
Excursion de phase positive	rd	0.96< <1.24	1.14
Excursion de phase negative	rd	-1.24< <-0.96	-1.12
Symetrie de l'excursion	%	<= 5	-.91

**Mesures de puissance**


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Puissance	dBm	34.10 +3.00 = 39.10
-----------	-----	---------------------

AUKO 06 96

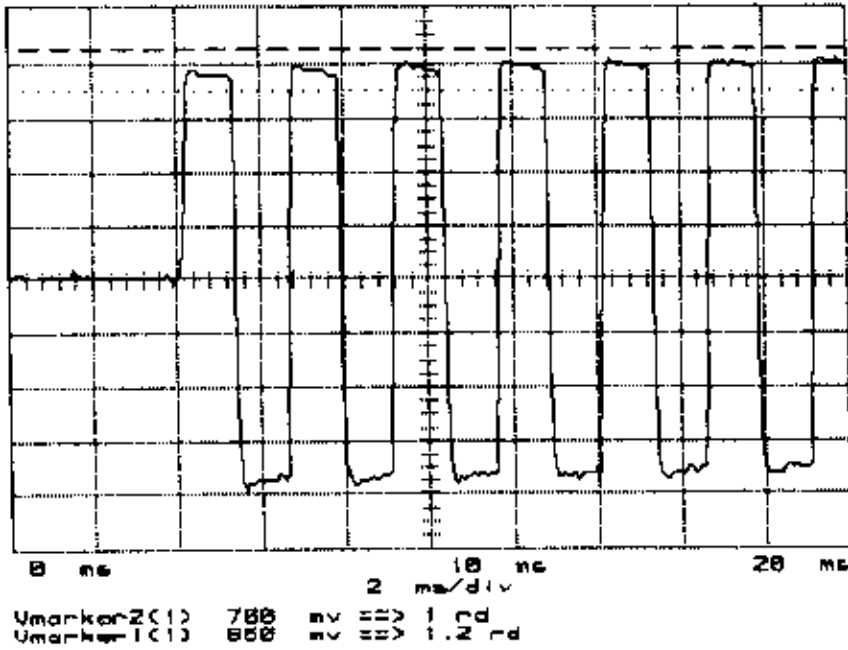
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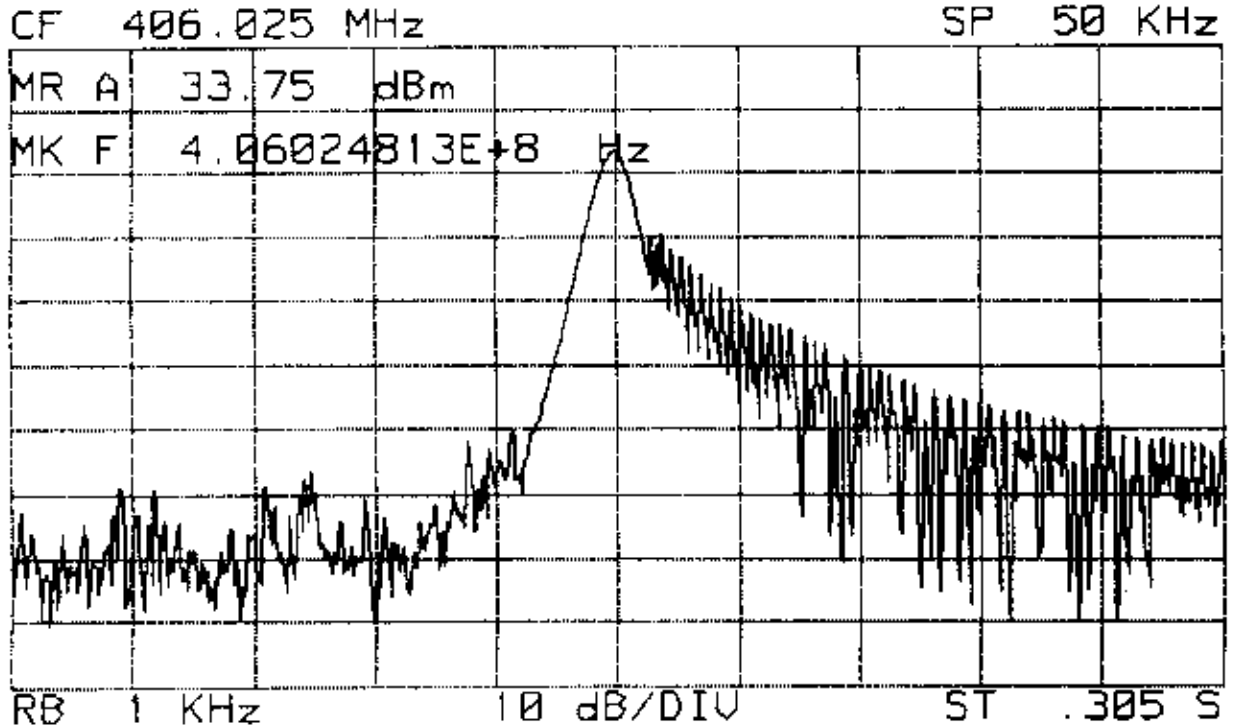
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Oscillo



Spectre de fréquence



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