CHAPTER 8

A8.0 - DROP TESTS

8-1 DROP TEST ON HARD SURFACE

8.1.1. DEFINITION OF TEST

Following Section A8.1 of RTCM Recommended Standards for 406 MHz Satellite EPIRBs (Version 2.0 Feb 5,1997) :

:

The EUT is soaked at minimum stowage temperature (-40°C) for 2 hours .

• Before five minutes after removal from a temperature the EUT is dropped above the test surface :

- height : 1 meter (± 10 mm)
- orientation : normal floating position
- hard surface : piece of oak (600 x 500 x 200 mm / weight : 50 Kg).

Note : After the first Drop Test the EUT is dropped, 5 times following 5 other orientations above the test surface following Section 8.6.1 of EN 60945 (May 1997) :

• At the conclusion of the drops, the EUT is controlled by an aliveness test

8.1.2. EQUIPMENT UNDER TEST

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

8.1.3. TEST SITE

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

8.1.4. TEST EQUIPMENT

• Oven,

• Drop bench (see photo § 8.1.5),

• Argos-Cospas/Sarsat Certification test bench

8.1.5. PHOTOGRAPHS

8.1.6. TEST RESULTS

8.1.6.1 Test Implementation

Place : INTESPACE Laboratory

Date	Hour	Events - Observations
June 5th, 2011	8:00	Cooling the beacon to - 40° C in temperature controlled oven
	12:30	Beacon removed of oven.
	12:43	Beacon dropped on hard surface following 6 beacon orientations
	15:05	Visual inspection : OK.
	15:10	Electrical checks : OK See result of aliveness test next page

8.1.6.2 ALIVENESS TEST RESULTS AFTER DROP TEST ON HARD SURFACE

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

Date : June 5th, 2001

406 MHZ MEASUREMENTS

1 - Environmental Temperature (° C)			+ 22° C
2 – POWER OUTPUT			
- Transmission power	dBm	37 ± 2	37.55
- Power risetime	ms	< 5	0.85
- Power falltime	ms	< 5	-
3 – SPURIOUS OUTPUT			
- In band	*		OK
- Carrier harmonics			
4 –DIGITAL MESSAGE GENERATOR			
- Repetition rate			OK
- Bit rate	bits/S	400 ± 4	401.30
- Transmission time	ms	440 ± 4.4 / 520 ± 5.2	519.35
- CW preamble	ms	160 ± 1.6	160.37
5 – DIGITAL MESSAGE	*		
- 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	087645 / 087645
- BCH 2 code read / calculated	bits	133-144 / 107-132	E36 / E36
6 – FREQUENCY			
- Nominal value	KHz	406 025 ± 2	- 0.54003
- Short term stability		< $2x10^{-9}$/100 ms	4.4×10^{-11}

* See data and graphs next pages .

Laboratoire de certification
Controle balise ARGOS/SARSAT — After Drop test on hard surface

Constructeur	ACR
Modele	RLB35
Numero de serie	07
Reference	M2332-1
Type	SARSAT

Date de l'essai 5 Jun 2001 15:09:34

Message balise

Message recu	(1-144):	FFFE2F96EE2EC0012C00221D91776A7CCE36
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/calcule	(86-106/25-85):	087645/087645
BCH 2 lu/calcule	(133-144/107-132):	E36/E36
Pos. Data Source	(111):	Internal
121.5 MHz Homing	(112):	Yes
Position GPS de reference	:	N 43°33'26'' E 1°28'57
Position GPS	:	Yes
Position GPS par defaut	:	No
Latitude position	:	43°33'24'' Nord
Longitude position	:	1°28'48'' Est
Delta position	:	.285081370243 km

Controle message

Duree de la porteuse pure	160.37ms +- 0.00
Duree de l'emission	519.35 ms
Frequence de modulation	401.30Hz +- 0.00

Stabilite de frequence

Frequence moyenne F2		406024459.97 Hz
SIGMA2	F2-F1	7.663E-11
SIGMA3	F3-F2	4.354E-11

Mesures d'indice

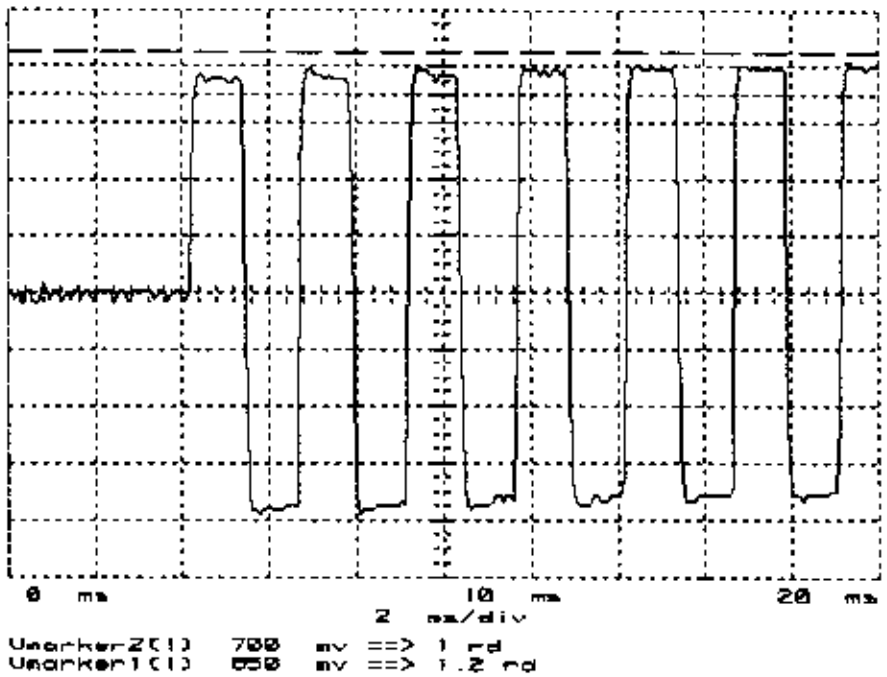
F	F1	G1
49459.92	233	60
49459.94	233	59

Excursion de phase totale	rd		<= 2.48	2.23
Excursion de phase positive	rd	0.96<	<1.24	1.15
Excursion de phase negative	rd	-1.24<	<-0.96	-1.09
Symetrie de l'excursion	%		<= 5	-2.84

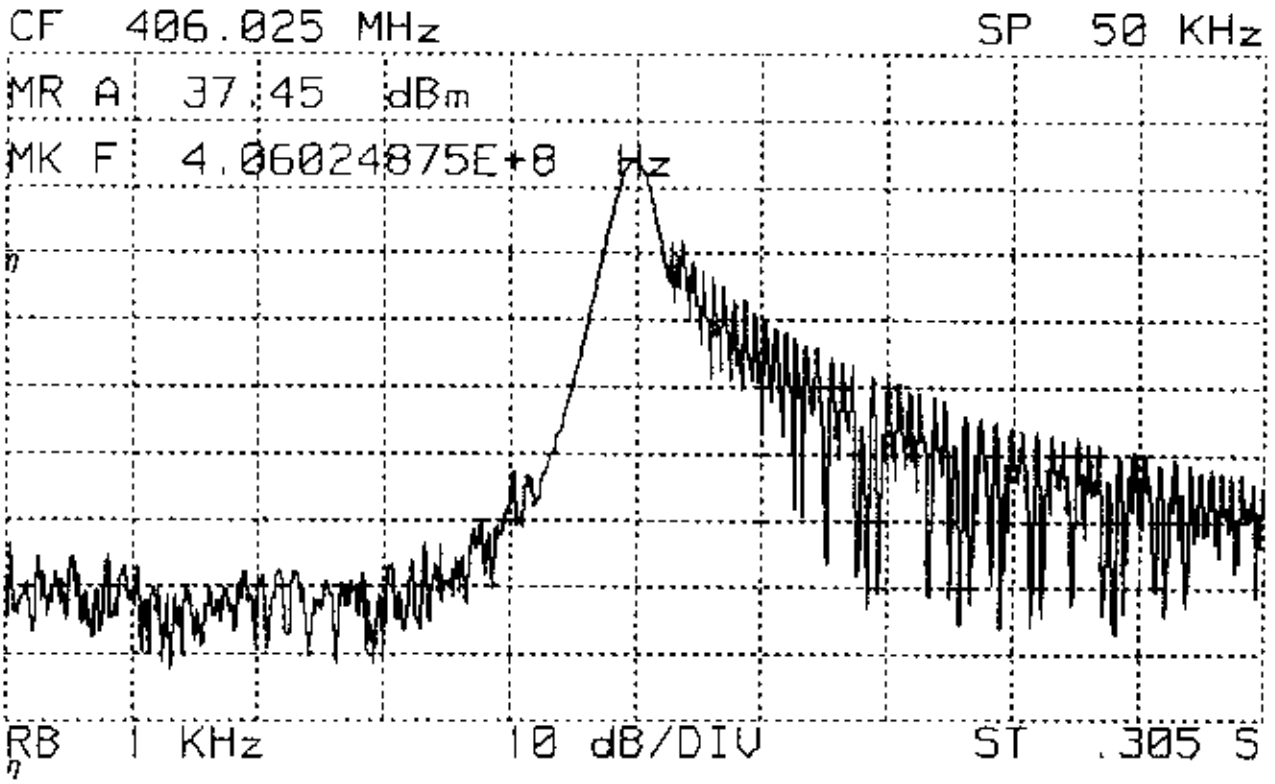
Mesures de puissance

Puissance	dBm	37.55

Oscillo



Spectre de frequence



8.2 – DROP TEST INTO WATER

8.2.1 DEFINITION OF TEST

- It respect the definition drescribed in Section A8.2 of RTCM Recommended Standards for 406 MHz Satellite EPIRBs (Version 2.0 Feb 5,1997) .

• At the conclusion of the drops, the EUT is controlled by an aliveness test

8.2.2. GENERAL DEFINITION OF TESTS

8.2.2.1. PURPOSE

a) Ensure that beacons are switched off, and drop them into the water from a height of 20 m in three configurations :

- Antenna vertical up
- Antenna vertical down
- Antenna horizontal

b) Physically inspect beacons

c) Do electrical tests of beacons

8.2.2.2. TEST SITE

The tests are conducted in a river lock-gate.

8.2.2.3. TEST EQUIPMENT

Beacon without stowage bracket.

The test is carried out using a hydrolic horst skiff able to reach 20 m height. The height is controlled by a calibrated halyard.

The beacon is held by the operator in the right position and released above the water area. An operator takes photographs of the test sequence in real time .

8.2.2.4. TEST SEQUENCE

The test sequence is as follows :

1 - Drop Test - Antenna vertical (up)

2 - Drop Test - Antenna vertical (down)

3 - Drop Test - Antenna horizontal

8.2.2.5. ORGANIZATION

• Conducting of the test :	ITS
• Crane operation :	ITS
• Operation and control of beacon :	ITS / CNES + manufacturer
• Recovery of beacons :	ITS
• Operation of camera :	ITS
• Height and depth checks :	ITS
• Signal for start of test :	ITS (subject to agreement of CNES + manufacturer)

8.2.3. IMPLEMENTATION OF TEST

8.2.3.1. TIMING

- Preparation phase
  - Obtain agreement of lock-gate staff,
  - Record beacon identification,
  - Lift up the operator and beacon in the hoisting skiff control the height (20 m),
  - Set up camera,
  - Make sure diver is ready.
- Test phase
  - Obtain the ITS / CNES agreement for start of the test,
  - Drop the beacon
  - Tacke pictures before, during and at the end of the drop
- Control phase
  - Diver recovers beacon,
  - Mechanical and electrical checkout.

8.2.3.2. ENVIRONMENT

The tests conducted outside may therefore be subject to inclement weather such as wind, fog, icing and so on...

Decisions to postpone testing shall be taken jointly by ITS and CNES, in accordance with the manufacturer (if he is present).

8.2.3.3. SAFETY - QUALITY

All tests are to be conducted in the presence of ITS coordinator .

• Ensure that all personnel around the lock-gate is suitably dressed in view of the risk of slipping.

8.2.3.4. LOGISTICS

All tests are photographied in real time.

8.2.4. TEST RESULTS

8.2.4.1 Test implementation

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

Place : Port Sud – Ramonville Saint Agne

	DATE/HOURS	MECHANICAL CONTROLS	ELECTRICAL CONTROLS
CONFIGURATION 1 Antenna vertical up	June 6th, 2001 14 :50	OK	OK
CONFIGURATION 2 Antenna vertical down	June 6th, 2001 15:00	OK	OK
CONFIGURATION 3 Antenna horizontal	June 6th, 2001 15:15	OK	OK

Observations :

Nothing abnormal to note

Electrical checks after a drop test : OK

See result of alivness test next page

G. PEYROU

ITS Representative

8.2.4.2 Aliveness Test Results after Drop Test into the water

Beacon Unit : 1/2
Name : ACR
Type : RLB35
Number : 07
Date : June 6th, 2001 16:58

406 MHZ MEASUREMENTS

1 - Environmental Temperature (° C)			+ 22° C
2 – POWER OUTPUT			
- Transmission power	dBm	37 ± 2	37.75
- Power risetime	ms	< 5	0.85
- Power falltime	ms	< 5	-
3 – SPURIOUS OUTPUT			
- In band	*		OK
- Carrier harmonics			
4 –DIGITAL MESSAGE GENERATOR			
- Repetition rate			OK
- Bit rate	bits/S	400 ± 4	401.29
- Transmission time	ms	440 ± 4.4 / 520 ± 5.2	519.34
- CW preamble	ms	160 ± 1.6	160.36
5 – DIGITAL MESSAGE	*		
- 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	087645 / 087645
- BCH 2 code read / calculated	bits	133-144 / 107-132	6D1 / 6D1
6 – FREQUENCY			
- Nominal value	KHz	406 025 ± 2	- 0.53901
- Short term stability		$< 2 \times 10^{-9}$/100 ms	7.8×10^{-11}

* See graphs next pages

Laboratoire de certification
Controle balise ARGOS/SARSAT

After 80 mm height drop tests

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

Date de l'essai 6 Jan 2001 16:57:50

Message balise

Message recu	(1-144):	FFFE2F96EE2EC0012C00221D917769FCB6D1
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/calcule	(86-106/25-85):	087645/087645
BCH 2 lu/calcule	(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 message

Duree de la porteuse pure	160.36ms +- 0.00
Duree de l'emission	519.34 ms
Frequence de modulation	401.29Hz +- 0.00

Stabilite de frequence

Frequence moyenne	F2	406024460.99 Hz
SIGMA2	F2-F1	1.080E-10
SIGMA3	F3-F2	7.837E-11

Mesures d'indice

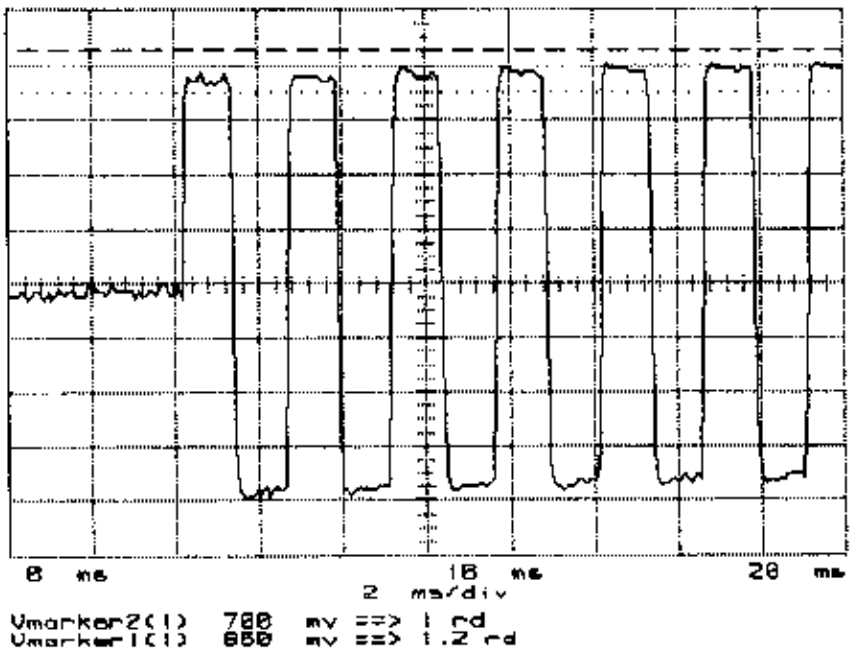
F	F1	G1
49460.93	233	60
49460.95	233	60

Excursion de phase totale	rd		<= 2.48	2.24
Excursion de phase positive	rd	0.96<	<1.24	1.09
Excursion de phase negative	rd	-1.24<	<-0.96	-1.15
Symetrie de l'excursion	%		<= 5	2.38

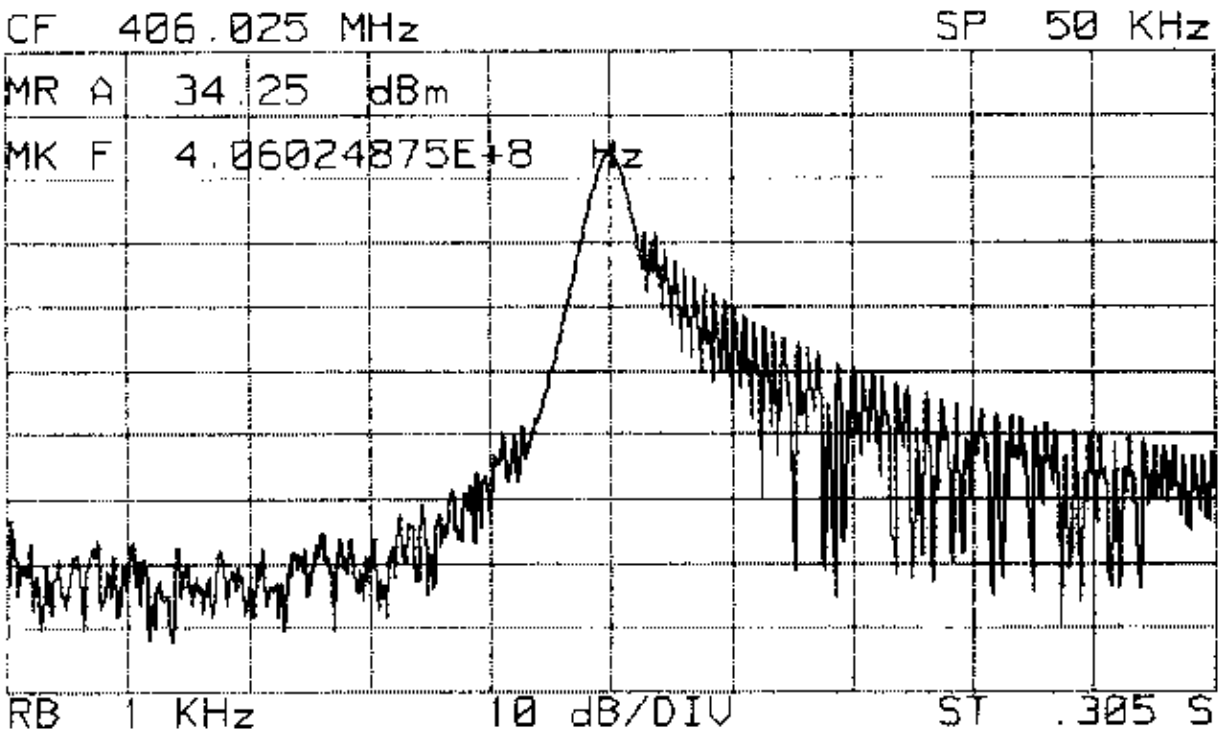
Mesures de puissance

Puissance dBm 34.30 + 3.45 = 37.75

Oscillo



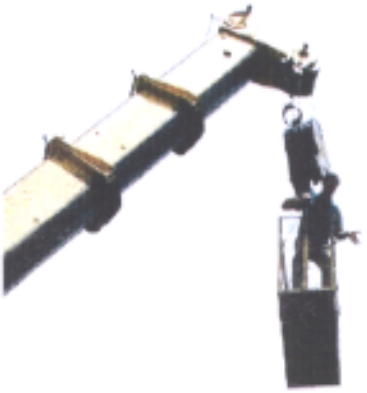
Spectre de frequence



8.2.5. PHOTOGRAPHS

FIRST DROP INTO WATER
Antenna vertical up

SECOND DROP INTO WATER
Antenna vertical down



THIRD DROP INTO WATER
Antenna vertical horizontal

CHAPTER 9

A9.0-LEAKAGE AND IMMERSION TESTS

9.1. TEST SPECIFICATIONS AND SEQUENCE

9.1.1 Test specifications
Following Section A9.0 of RTCM Recommended Standards for 406 MHz Satellite EPIRBs (Version 2.0 Feb 5,1997)

9.1.2 Test sequence

• Leave beacon in off position throughout test .

• Place the beacon in an atmosphere of + 65 ± 3°C for one hour.

• Fully immerse beacon in water at + 20 ± 3°C to a depth of 100 ± 5 mm msasured from it highest point to the surface of water for a period of 48 hours (Test equipment : Pressure Chamber).

• Set chamber to 1 kg/cm^2 to simulate a 10 meter head of water .

• Leave pressure on for five minutes.

• Remove beacon from chamber, wipe it dry and perform an alivness test then check that there is no free water inside the case.

9.2. EQUIPMENT UNDER TEST

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

9.3 TEST SITE

Toulouse Space Center (CST) - INTESPACE Metrology.

9.4. TEST EQUIPMENT

• Pressure chamber : Intespace 100 liters Pressure Chamber (see photo next page),

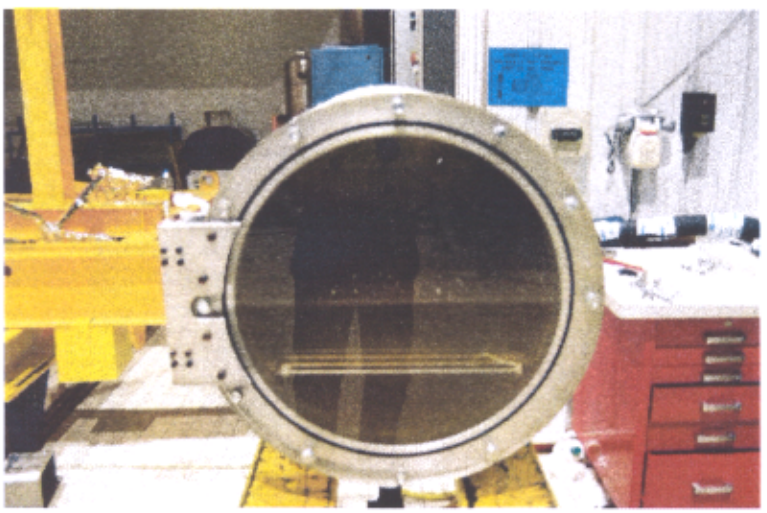
• Pressure sensor : BARFLEX BOURDON Electronique Type 0-2000 hPa

• Pressure reducer.

• Nitrogen cylinder.

• Argos - Cospas/Sarsat Test Bench.

LEAKAGE AND IMMERSION TEST



9.5. TEST RESULTS

9.5.1 Test implementation

Place : INTESPACE Laboratory

Date	Hour	Events - Observations
June 8th, 2001	15:15	Beacon (battery disconnected) leaved in thermal chamber at + 65 °C for one hour minimum
	17:15	Beacon submerged under 100 mm of water for 48 hours minimum in pressure chamber
June 12th, 2001	10:00	Beacon submerged and chamber pressurized to 10^5 Pascal for five minutes
	10:05	Chamber depressurized and then beacon removed, wiped and dried .
	14:30	Electrical checks : See results of aliveness test next pages
	14:45	Beacon opened for visual inspection at ≈ 22 °C: **OK**. Nothing abnormal to note

9.5.2 ALIVENESS TEST RESULTS AFTER IMMERSION TEST

Beacon Unit : 1/2
Name : ACR
Type : RLB35
Number : 07
Date : June 12th, 2001 14:34

406 MHZ MEASUREMENTS

1 - Environmental Temperature (° C)			+ 22° C
2 – POWER OUTPUT			
- Transmission power	dBm	37 ± 2	37.35
- Power risetime	ms	< 5	0.85 ms
- Power falltime	ms	< 5	-
3 – SPURIOUS OUTPUT			
- In band	*		OK
- Carrier harmonics			
4 –DIGITAL MESSAGE GENERATOR			
- Repetition rate			OK
- Bit rate	bits/S	400 ± 4	401.29
- Transmission time	ms	440 ± 4.4 / 520 ± 5.2	519.34
- CW preamble	ms	160 ± 1.6	160.36
5 – DIGITAL MESSAGE			
- 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
6 – FREQUENCY			
- Nominal value	KHz	406 025 ± 2	-0.54177
- Short term stability		$< 2x10^{-9}$/100 ms	2.3×10^{-11}

* See data and graphs next pages

Laboratoire de certification
Controle balise ARGOS/SARSAT

After immersion test

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

Date de l'essai 12 Jun 2001 14:34:08

Message balise

Message recu	(1-144):	FFFE2F96EE2EC0017FDFFC0A6D3783E0F66C
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/calcule	(86-106/25-85):	1029B4/1029B4
BCH 2 lu/calcule	(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 defaut	:	Yes

Controle message

Duree de la porteuse pure	160.36ms +- 0.00
Duree de l'emission	519.34 ms
Frequence de modulation	401.29Hz +- 0.00

Stabilite de frequence

Frequence moyenne F2		406024458.23 Hz
SIGMA2	F2-F1	9.404E-11
SIGMA3	F3-F2	2.264E-11

Mesures d'indice

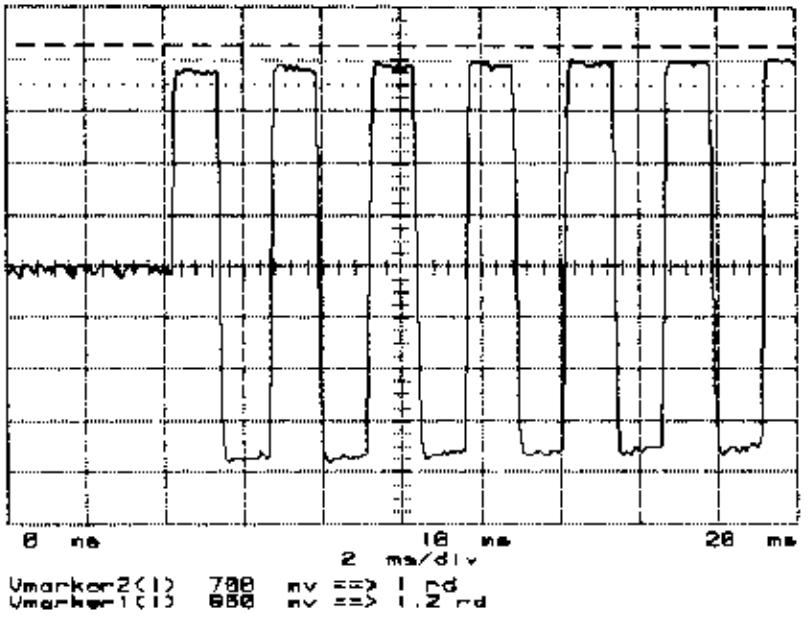
F	F1	G1
49458.2	233	60
49458.19	233	60

Excursion de phase totale	rd	<= 2.48		2.17
Excursion de phase positive	rd	0.96<	<1.24	1.20
Excursion de phase negative	rd	-1.24<	<-0.96	-.97
Symetrie de l'excursion	%	<= 5		-10.57

Mesures de puissance

Puissance	dBm	37.35

Oscillo



Spectre de frequence