

CHAPTER 1

ADMINISTRATION, GENERAL COMMENTS AND SUMMARY OF TESTS

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).

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 : 10 June 2004
 End of test : 30 July 2004

1.2.4 WORK REFERENCE : **E5503-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	Commercial designation	GPS fixture	Comments
1	PLB200	07	TeraFixTM 406GPS I/O PLB	Internal Or External	- Antenna disconnected - 50 Ω RF Output Connector (C/S, RTCM & ETSI Tests)
2	PLB201	12	TeraFixTM 406GPS I PLB	External	- Antenna disconnected - 50 Ω RF Output Connector (C/S Tests)
3	PLB200	11	TeraFixTM 406GPS I/O PLB	Internal Or External	- Beacon normally fitted (C/S Antenna & Satellite Tests)

1.3 TEST FACILITIES

- ARGOS – COSPAS/SARSAT Certification Test Bench
- INTESPACE Enviromental Test Equipements
- Toulouse CNES-FMCC

1.4 STANDARDS AND TEST PROCEDURES APPLICABLES

- COSPAS-SARSAT standards :
 - "C/S T. 001- Issue 3 - Revision 5 - October 2003 "
 - "C/S T. 007- Issue 3 - Revision 10 - October 2003"
- RTCM Recommended Standards for 406 MHz Satellite Personal Locator Beacons (PLBs) - Version 1.1 - June 19, 2002
- INTESPACE Radiobeacon Test Procedures

1.5 TEST SEQUENCE

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

- | | |
|--|----------|
| 1 - Initial Alivness Test | |
| 2 - Vibration Test | (A 3.0) |
| 3 - Bump Test | (A 4.0) |
| 4 - Salt Fog Test | (A 5.0) |
| 5 - Drop Test | (A 6.0) |
| 6 - Leakage and Immersion Test | (A 7.0) |
| 7 - Spurious Emission Test (406 MHz) (C/S Tests 8) | (A 8.0) |
| 8 - Cospas-Sarsat C/S T.007 Tests | (A 9.0) |
| 9 - Operational Life, Strobe Light and Self Tests (C/S Tests 8) | (A 10.0) |
| 10 - Auxiliary Radio-Locating Device Transmitter Tests | (A 12.0) |

The three electronics beacon are very similar . The model PLB200 and PLB201 differ by the GPS mode . With PLB200 is possible to use Internal or External GPS function whereas with PLB201 is possible to use only an external GPS to transmit location data in the 406 MHz message .

- EUT 1 (PLB200 S/N 07) was used for environmental and electrical tests RTCM items A 1.0 to A 12.0 except for the C/S Qualitative Test with the Satellite and for C/S antenna test in which it was used EUT 3 (PLB200 S/N 11)

- EUT 2 (PLB201 S/N 12) was used for full C/S Tests

1.6 RESULTS

See following pages Summary of Test results and following chapters Test Result Reports

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. (±3 °C) (__ °C)	T amb. (±3 °C) (22 °C)	T max. (±3 °C) (__ °C)	
1. INITIAL FUNCTIONAL TEST * Carrier Frequency * Power Output	406.025 ± 0.002 Or 406.028 ± 0.001 35 - 39	MHz MHz dBm		406.02789 37.1		Chapter 2 10 June 2004 (C/S Elec. & Funct. Test at amb Temp. Chapter 9)
2. VIBRATION TEST (A3.0) • Exterior Mechanical Inspection • Aliveness Test • Activation	No damage Successful self-test No activation during test	✓ ✓ ✓		✓ ✓ ✓		Chapter 3 25 to 29 June, 2004
3. BUMP TEST (A4.0) • Exterior Mechanical Inspection • Aliveness Test • Activation	No damage Successful self-test No activation during test	✓ ✓ ✓		✓ ✓ ✓		Chapter 4 25 to 29 June, 2004

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) (___ °C)	
4. SALT FOG TEST (A5.0) • Exterior Mechanical Inspection • Aliveness Test	No damage	✓		✓		Chapter 5 29 june to 3 july, 2004
	Successful self-test	✓		✓		
5. DROP TEST (A6.0) • Exterior Mechanical Inspection • Interior Mechanical Inspection • Aliveness Test • Activation	No damage	✓	✓			Chapter 6 7 july, 2004
	No damage	✓	✓			
	Successful self-test	✓	✓			
	No activation during test	✓	✓			
6. LEAKAGE AND IMMERSION TEST (A7.0) • Interior Inspection • Aliveness Test	No water	✓		✓		Chapter 7 7 to 10 july, 2004
	Successful self-test	✓		✓		

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. (± 3 °C) (-20 °C)	T amb. (± 3 °C) (+22 °C)	T max. (± 3 °C) (+55 °C)	
7. SPURIOUS EMISSIONS TEST (A8.0) • 406 MHz • 121.5 MHz	Figure 2-1	√ (attach graphs)	√	√	√	Chapter 8 and Chapter 9 (C/S T.A. Tests Results) June 10 th , to July 15 th , 2004
	Figure 2-5	√ (attach graphs)	√	√	√	
8. COSPAS-SARSAT TYPE APPROVAL TESTS (A9.0)	C-S Certificate (attach test report)	√	√	√	√	Chapter 9

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. (± 3 °C) (- 20 °C)	T amb. (± 3 °C) (_____ °C)	T max. (± 3 °C) (_____ °C)	
9. OPERATIONAL LIFE TESTS (A10.1)						Chapter 10 13-15 july 2004 Results after 24 hours (C/S Oper. Life Test at min Temp. Chapter 9)
Operational Life						
• Frequency						
* Nominal Carrier	406.025 ± 0.002 or 406.028 ± 0.001	MHz MHz	406.02787			
* Short-term stability	≤ 0.002	parts/ million in 100 ms	< 0.0004			
• Medium term stability : * Mean slope	≤ 0.001	parts/ million /min	< 0.0003			
* Residual variation	≤ 0.003	parts/ million	< 0.001			
• RF output power	35-39	dBm	38.0			
• Auxiliary PERP (50 Ω)	14-20	dBm	19.2			

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. (± 3 °C) (- 20 °C)	T amb. (± 3 °C) (22 °C)	T max. (± 3 °C) (55 °C)	
10. SELF TEST (A10.2) • RF pulse duration • Frame synchronization pattern • Number of RF bursts - Beacon 15 Hex ID - 121.5 MHz transmission	0.444 sec Or 0.520 sec 0 1101 0000 1-burst Must be provided by self-test burst 1 sc /3 sweeps	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ N/A	✓ ✓ ✓ ✓ N/A	✓ ✓ ✓ ✓ N/A	Chapter 10 and Chapter 12 (C/S Elec. & Funct. Test at min, amb, and max Temp.) No 121.5 MHz
11. BUOYANCY TEST (Category 1 only) (A11.0) • Buoyancy	Floats	✓		N/A		Just floats

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T min. ($\pm 3^{\circ}\text{C}$) (-20°C)	T amb. ($\pm 3^{\circ}\text{C}$) (22°C)	T max. ($\pm 3^{\circ}\text{C}$) (55°C)	
12. AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST (A12.0)						Chapter 11 and Chapter 9 (C/S T.A. Tests Results) June 10 th , to July 25 th , 2004
• Carrier frequency	121.5 $\pm$ 0.006	MHz	121.4963	121.5016	121.5006	
• Duty Cycle	100	%	100	100	100	
• Modulation						
* Frequency	≤ 700 Hz within range of 300-1600 Hz	Hz	360 $\rightarrow$ 1460	360 $\rightarrow$ 1460	360 $\rightarrow$ 1460	
* Direction	Upward	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	
* Duty cycle	33-55	%	38	42	39	
* Factor	0.85-1.0	$\checkmark$	> 0.85	> 0.85	> 0.85	
* Sweep repetition rate	2 - 4	Hz	2.6	2.6	2.6	
• PEIRP (Radiated)	14-20	dBm		17.7		June 24 th , 2004
• Antenna (Radiated)						
- Pattern	Omnidirectional	$\checkmark$		$\checkmark$		
- Polarization	Vertical	$\checkmark$		$\checkmark$		
- VSWR	$\leq 1.5:1$	$\checkmark$		N/A		Non checked (Antenna integrated)