Toulouse, 03/07/2002

INTESPACE reference : M4156

ALTERNATIVE BATTERY TEST REPORT OF 406 MHz DISTRESS BEACON

MANUFACTURER :	ELTA SA
BEACON MODEL :	ADT406 AF/AP

Written : 31/07/2002
By : Gérard PEYROU
Visa :

Approved : 10/07/2002
By : Didier NAWS
Visa :

Quality Control : 11/07/2002
By : Michel BRUNEL
Visa :

Distribution :

- Mr	Claude CRESP	ELTA SA	(1 copy)
- Mr	S. MIKAILOV	COSPAS/SARSAT Sec	(1 copy)
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Accréditation N° 1-0743 Scope given on request

18, avenue Edouard Belin - BP 4356 - 31029 Toulouse cedex 4 - FRANCE
Tél. +33 (0) 5 61 28 11 11 - Fax +33 (0) 5 61 28 11 12
www.intespace.fr - marketing@intespace.fr

AFAQ ISO 9001 N° 99/12221

S.A. au capital de 3 904 560 Euros - RCS : TOULOUSE B 326 100 971 - SIRET : 326 100 971 00018 - APE : 743 B - TVA : FR16326100971

1 - ADMINISRATION

1.1. WORK ORDER

Manufacturer : ELTA SA
Address : 14 Place Marcel Dassault - 31702 BLAGNAC France

Represented by : Mr Claude CRESP

1.2. INTESPACE TEST CENTER

The test operations have been conducted by : Mr G. PEYROU

1.3. SCHEDULE

Start of test:	18 june 2002
End of test :	24 june 2002

1.4. WORK REFERENCE : **M4156**

1.5. EQUIPMENT UNDER TEST

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

- Commercial designation :
- Model : ADT406 AF/AP
- Sérial number: PROTO 011
- Battery :
  - * Chemistry : LiMnO2
  - * Manufacturer & model n° : Ultralife U2260H-2-99
  - * Size & number of cells : (Dx2)x2

2 - TEST FACILITIES

- ARGOS - COSPAS/SARSAT Certification Test Bench.

3 - STANDARDS AND TEST PROCEDURES APPLICABLE

COSPAS-SARSAT standards :

- "C/S T. 001- Issue 3 - Revision 3 - October 1999 "
- "C/S T. 007- Issue 3 - Revision 8 - October 2001"

INTESPACE Radio Beacon Test Procédures :

- " COSPAS-SARSAT Certification Test" Réf. ITS : 572 AP/QA
- " Radio Beacon Test Report " Réf. ITS : 579 AP/QA-f

4 - RESULTS

See the following pages :

- application form for a COSPAS-SARSAT 406 MHz beacon Battery Change adapted for an Alternative Battery ,
- summary of 406 MHz beacon test results
- test results : data and graphs
- and manufacturer technical data Annex A :
  - * C/S Change Notice Form
  - * Manufacturer Consumption analysis of the ELT with the ULTRALIFE batteries
  - * ULTRALIFE batteries documentation

Intespace Reference : M4156

APPLICATION FOR A COSPAS - SARSAT 406 MHz BEACON BATTERY CHANGE

Beacon Manufacturer : ELTA SA

Beacon model : ADT406 AF/AP

Beacon Number : PROTO 011

Name and Location of Beacon Test Facility : INTESPACE / CNES Toulouse

Beacon Type : Aviation : ☑ Land : ☐ Maritime : ☐

Antenna Model : 2624-82 CHELTON formely RAYAN

Specified Operating Temperature Range -20 °C to 55 °C

Specified Operating Lifetime : 24 hr ☑ 48 hr ☐ Other ☑ Specify : Homing 60 h

Beacon Battery Type(s)

Chemistry : LiMnO2
Manufacturer & model n° : Ultralife U2260H-2-99
Size & number of cells : (Dx2)x2

Extra Features in Beacon	**No**	**Yes**	**Details**
a) Auxiliary Radio-Locating Device :	☐	☑	Frequency : 121.5/243 MHz Power : 20 or 23 dBm (selectable) Tx. Duty Cycle : Cont
b) Transmits Encoded Position Data	☐	☑	Nav. Device : *external* Type : *GPS* Manufacturer : *From an A/C data Bus* Model :
c) Transmits Long Message (144 bits)	☑	☑	Selectable
c) Automatic Activation :	☐	☑	
d) Built-in Strobe light :	☑	☐	Intensity : Flash rate :
e) Selft-test mode	☐	☑	
f) Other	☑	☐	Specify :

I hereby confirm that the 406 MHz beacon described above has been successfully tested in accordance with the COSPAS-SARSAT Type Approval Standard (C/S T.007 § 6.2) and complies with the COSPAS-SARSAT Specification (C/ST T.001) as demonstrated in the attached report.

Dated : 3/07/2002

Signed : 
(for test facility)

TableC2 : SUMMARY OF 406 MHz BEACON TEST RESULTS

PARAMÈTRES TO BE MEASURED DURING TESTS		RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
				$T_{min.}$ -20°C (±3)	$T_{amb.}$ 22°C (±3)	$T_{max.}$ 55°C (±3)	
1 - POWER OUTPUT							
o transmitter power output		35 - 39	dBm	36,8	36,7	36,6	
o Power output rise time		< 5	ms	0,05	0,05	0,05	Graphs p, 17, 20 and 23
o power output 1 ms before burst		must be < -10 dBm	√ *	√	√	√	Graphs pages 10 to 13
2 - DIGITAL MESSAGE							Data and graphs pages 14 to 23
	Bits number						
o bit sync	1-15	15 bits "1"	√	√	√	√	
o frame sync	16-24	9 bits (000101111)	√	√	√	√	
o format flag	25	1 bit	√	1	1	1	
o protocol flag	26	1 bit	√	1	1	1	
o identification/position code	27-85	59 bits	√	√	√	√	
o BCH code	86-106	21 bits	√	√	√	√	
o emerg. code/nat. use/supplem. data	107-112	6 bits	data bits	001111	001111	001111	
o additional data/BCH (if applicable)	113-144	32 bits	√	√	√	√	
o position error (if applicable)		< 5	km	Default	Default	Default	

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ -20°C (±3)	$T_{amb.}$ 22°C (±3)	$T_{max.}$ 55°C (±3)	
3 - DIGITAL MESSAGE GENERATOR						Data and graphs pages 14 to 23
o repetition rate *** :						
minimum T_R =	47,5	seconds	50,0	50,0	50,0	
maximum T_R =	52,5	seconds	51,5	51,5	51,5	
o bit rate						
minimum f_b =	396	bits/sec.	400,75	400,74	400,75	
maximum f_b =	404	bits/sec.	400,78	400,78	400,79	
o total transmission time :						
short message =	435.6 - 444.4	ms				
long message (optional) =	514.8 - 525.2	ms	519,63	519,56	519,53	
o CW preamble						
minimum T_1 =	158,4	ms	160,03	159,98	159,95	
maximum T_1 =	161,6	ms	160,04	160,00	159,96	
o first burst delay	> 47,5	seconds				

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PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			$T_{min.}$ -20°C (±3)	$T_{amb.}$ 22°C (±3)	$T_{max.}$ 55°C (±3)	
4 - MODULATION						Data and graphs
o biphase-L		√	√	√	√	pages 14 to 23
o rise time	50 - 250	microsec.	100	120	110	
o fall time	50 - 250	microsec.	110	110	120	
o phase deviation : positive	+ (1.0 to 1.2)	radians	+ 1,10	+ 1,10	+ 1,12	
o phase deviation : negative	- (1.0 to 1.2)	radians	- 1,07	- 1,06	- 1,06	
o symmetry measurement	≤ 0.05		+ 0,004	+ 0,004	+ 0,008	
5 - 406 MHz TRANSMITTED FREQUENCY						Data pages 18, 21 and 24
o nominal value	406.023 - 406.027 or 406.027 - 406.029***	MHz MHz	406,0276390	406,0276103	406,0275808	
o short term stability	≤ 2 x 10^{-9}	/100 ms	9,3E-11	1,13E-10	1,57E-10	
o medium term stability . slope	(-1 to +1) x 10^{-9}	/minute	-3,6E-11	4,0E-11	-5,0E-11	
. residual frequency variation	≤ 3 x 10^{-9}		3,79E-10	1,69E-10	1,26E-10	
6 - SPURIOUS EMISSION **** (into 50 ohms)						See graphs pages 24 to 27
o in-band (406.0 - 406.1 MHz)	see spurious emission mask in C/S T.001	√	√	√	√	

TableC2 : SUMMARY OF 406 MHz BEACON TEST RESULTS

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS
9 - THERMAL SHOCK (30° C change)				Data and graphs pages 28 to 35
o Soak temperature :		°C	Tsoak = 22	
o Measurement temperature :		°C	TMeas = -10	
the following parameters are to be met within 15 minutes of beacon and maintained for 2 hours				
o Transmitted frequency :				
- nominal value	406.023 - 406.027 or 406.027 - 406.029***	MHz MHz	406,02762 / 406,027641	
- short term stability	$\leq 2 \times 10^{-9}$	/100 ms	1,1E-10	
- medium term stability :				
. slope	$(-1 \text{ to } +1) \times 10^{-9}$	/minute	7,7E-10	
. residual frequency variation	$\leq 3 \times 10^{-9}$		4,3E-10	
o Transmitted power output	35 - 39	dBm	36,8	
o Digital message	must be corect	√	√	

TableC2 : SUMMARY OF 406 MHz BEACON TEST RESULTS

PARAMÈTRES TO BE MEASURED DURING TESTS	RANGE OF SPECIFICATION	UNITS	TEST RESULTS	COMMENTS
10 - OPERATING LIFETIME AT MINIMUM TEMPERATURE ****				Data and graphs pages 36 to 49
o Duration	> 24	hours	24 hours at Tmin = -20 °C	
o Transmitted frequency :				
- nominal value	406.023 - 406.027 or 406.027 - 406.029***	MHz MHz	406,027632 / 406,02765	
- short term stability		/100 ms	< 4E-10	
- medium term stability . slope . residual frequency variation	(-1 to +1) x 10^{-9} ≤ 3 x 10^{-9}	/minute	-1,5E-10 / 1,5E-10 < 4E-10	
o Transmitted power output	35 - 39	dBm	37,0 / 37,1	
o Digital message	must be corect	√	√	

* The ticks mark √ can be used where indicated to record that the requirement is met (no value needs to be shown).

** If ($T_{R\,max}$ - $T_{R\,min}$) ≤ 1 second, the manufacturer must provide a technical explanation, as describes in section A3.1.1.

*** From 1 January 2000 new 406MHz beacon models submitted for type approval can be set to transmit at 406.028 Mhz ± 1 kHz . The transmitted frequency sall not vary more than + 2 kHz / - 5 kHz from 406.028 MHz in 5 years . It sall not vary more than 2 parts in 10^9 in 100 ms . After 1 January 2002, all new beacon models submitted for the type approval must be set at the frequency 406.028 MHz ± 1 kHz and satisfy the above stability requirements .

**** attach graphs of test results for test number 6, 9, 10 and 11 and a summary table of results for test number 14, and, if applicable , test number 17.