
REPORT ON

Testing of the McMurdo Limited E5 Smartfind EPIRB
in accordance with
Cospas Sarsat 406 MHz Distress Beacon Type Approval Standard
T.007 Issue 4 November 2005 as a supplement to report no RM614667/01 Issue 1

Report No RM614667/03 Issue 1

June 2006



Product Service



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with Cospas Sarsat 406 MHz Distress Beacon Type Approval
Standard T.007 Issue 4 November 2005 as a supplement to report no
RM614667/01 Issue 1

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PREPARED FOR

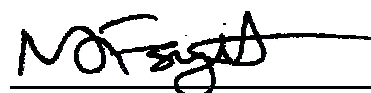
McMurdo Limited
Silverpoint
Airport Service Road
Portsmouth
Hilsea
PO3 5PB

PREPARED BY



J Plummer
Technical Author

APPROVED BY



N Forsyth
Authorised Signatory

DATED

16th June 2006

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SECTION 1

REPORT SUMMARY

Testing of the McMurdo Limited E5 Smartfind EPIRB
in accordance with
Cospas Sarsat 406 MHz Distress Beacon Type Approval Standard
T.007 Issue 4 November 2005 as a supplement to report no RM614667/01 Issue 1

1.1 STATUS

Manufacturer	McMurdo Limited
Type Designation	E5 Smartfind EPIRB
TUV Reference	_10 Serial No: 9D1D05000C00001
Number of Samples Tested	One
Test Specification	Cospas-Sarsat T.007 Issue 4 November 2005
Date of Receipt of Test Sample	1 st February 2006
Start of Test	10 th May 2006
Finish of Test	6 th June 2006
Test Engineer(s)	R Henley R Hampton

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out is shown below.

Section	Spec Clause	Test Description	Result	Levels/Comments
	-	Table of Test Results	N/A	
	A3.2.2	Transmitted Power Output		
	A3.1.4	Digital Message Coding		
	A3.1	Digital Message Generator		
	A3.2.3	Data Encoding and Modulation		
	A3.2.1	406MHz Transmitted Frequency		
2.1	A3.2.2.4	Spurious Emissions	Pass	
	A3.3	406MHz VSWR Check – Decoded Message		
	A3.6	Self Test Mode – Decoded Message		
	A2.2	Thermal Shock		
	A2.3	Operating Lifetime at Minimum Temperature		
	A2.4	Frequency Stability with Temperature Gradient		
	A3.5	Long Term Frequency Stability		
	A3.4	Protection Against Continuous Transmission		
2.2	A2.5	Satellite Qualitative Test	Pass	
	A2.6	Antenna Characteristics		
2.3	C2/16	Beacon Coding Software	Pass	
	A3.8	Navigation System – National Location Protocol 1		
	A3.8	Navigation System – Standard Location Protocol 1		
	A3.8	Navigation System – User Location Protocol 1		
	A2.8	Additional Types of Protocols		

1.3 APPLICATION FORM

1.3.1 Applicant Details

Company Name McMurdo Limited

Address Silver Point
Airport Service Road
Portsmouth
Hilsea
PO3 5PB
United Kingdom

Category of Applicant ☒ Manufacturer ☐ Importer
 ☐ Distributor ☐ Agent

Contact Name Neil Jordan Telephone 02392 623934
Email neiljordan@mcmurdo.co.uk Fax 02392 623997

1.3.2 Manufacturer Details

Company Name Same as above

Address

Contact Name Telephone
Email Fax

1.3 APPLICATION FORM

1.3.3 Beacon Details

Beacon Model:

Name & Location of Test Facility: BABT, Hampshire, United Kingdom

Beacon Type: ☐ Aviation ☐ Land ☒ Maritime

Operating Temperature Range: ☐ Class 1: -40°C to +55°C ☒ Class 2: -20°C to +55°C

Specified Operating Lifetime: ☐ 24 hrs ☒ 48 hrs ☐ Other [hrs]

Beacon Battery Type:

Chemistry: Lithium Manganese Dioxide
 Manufacturer & Model No: Varta CR2/3 AH
 Size & number of cells: 3 x 3 2/3AH
 Voltage: 9V nominal 6.4V end-point

Beacon Oscillator:

Type: TCXO
 Manufacturer & Model No: CMAC E3279

Ancillary Devices & Features:

	No	Yes	Details
Self Test Mode:	☐	☒	See in Self Test Characteristics below
Auxiliary Radio-Locating Device:	☐	☒	Frequency: 121.5 MHz Power: 17 dBm for 48 hours Tx. Duty Cycle: Continuous
Encoded Position Data:	☒	☐	Nav. Device: Type: Manufacturer: Model:
Long Message (144 bits):	☒	☐	
Short Message (112 bits):	☐	☒	
Automatic Activation:	☐	☒	
Strobe Light:	☐	☒	Intensity: >0.75cd Flash Rate 21 flashes per minute
Voice Communications (PTT):	☒	☐	
Other:	☒	☐	Specify:

Protocols Supported:

User Location Protocol	☒	☐
Standard Location Protocol	☒	☐
Standard Short Location Protocol	☒	☐
National Location Protocol	☒	☐
National Short Location Protocol	☒	☐

1.3 APPLICATION FORM

1.3.3 Beacon Details

Self Test Characteristics

	Yes	No
Does self-test have a separate switch positions?	☒	☐
Does self-test switch automatically return to normal position when released?	☒	☐
If not, how long until the first 'distress' message is emitted?		
Does self-test transmit a 406MHz signal?	☒	☐
Unmodulated signal only?	☐	☒
Normal data, but with inverted frame synchronisation pattern?	☒	☐
1 burst only?	☒	☐
Does self-test transmit a 121.5MHz signal?	☒	☐
For less than 1 second?	☐	☒
Continually while self-test is activated?	☐	☒
☒ Other period (specify): 15		
Does self-test transmit on any other frequency (e.g. 243MHz)	☐	☒
Result of self test is indicated by:		
Pass fail indicator light	☒	☐
Strobe light flash	☒	☐
☐ Other (specify):		
Can the self-test be performed without removing the beacon from mounting bracket?	☒	☐
What parameters are internally tested by the self-test?		
Battery voltage	☒	☐
RF power at 406MHz	☒	☐
RF power at 121.5MHz	☒	☐
Approximate RF frequency	☐	☒
Phase locked loop	☒	☐
☐ Other (specify):		
Number of self tests per year	[12	]
Duration of self test	[9 seconds	]
Do the above characteristics apply for all countries where beacon sold?	☒	☐
If No, please specify:		
Do the above characteristics apply for all production serial numbers?	☒	☐
If No, please specify:		

Battery Data

Battery replacement interval	[6 years	]
Battery capacity	[3.06 Ah	]
Battery self drain (i.e. when the battery is stored out of the beacon)	[1% per yr	]

1.3 APPLICATION FORM

1.3.4 Declaration of Build Status

Hardware Version: Issue C
Software Version: 1.2.186

1.3.5 Declarations

	Yes	No
Are the equipments submitted representative production models?	[✓]	[]
If No re the equipments pre-production models?	[]	[]
If pre-production, will final equipments be identical in ALL respects?	[✓]	[]
If No supply full details:		
Is the Test report to be used as part of a Cospas-Sarsat Type Approval Application?	[✓]	[]
If Yes, has the product, any direct engineering predecessor, or variant ever been granted Type Approval in any EEC member country?	[]	[✓]
If Yes, supply full details:		
Will the labeling of the equipment comply with the requirements of C/S T.007 Issue 4?	[✓]	[]
ITU Class of Emission:	121.5MHz = 3K20A3X	
	406.028MHz = 16K0G1D	

Applicant's Declaration

I hereby declare that I am entitled to sign on the behalf of the applicant and that the information supplied is correct and complete.

Signed: (when not emailing)
Name:



Neil Jordan

Position Held:

Electronics Engineer

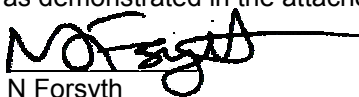
Date:

Test Facility Declaration

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

I hereby confirm that the 406MHz beacon described above has performed limited testing in accordance with the Cospas Sarsat Type Approval Standard (C/S T.007) and complies with the Cospas Sarsat Specification (C/S T.001) as demonstrated in the attached report.

Signed:
Name:



N Forsyth

Position Held:

Senior Engineer

Date:

16th June 2006

1.4 MODIFICATIONS

No modifications were made to the test sample during testing.

1.5 REPORT MODIFICATION RECORD

Issue 1 – First Issue.

SECTION 2

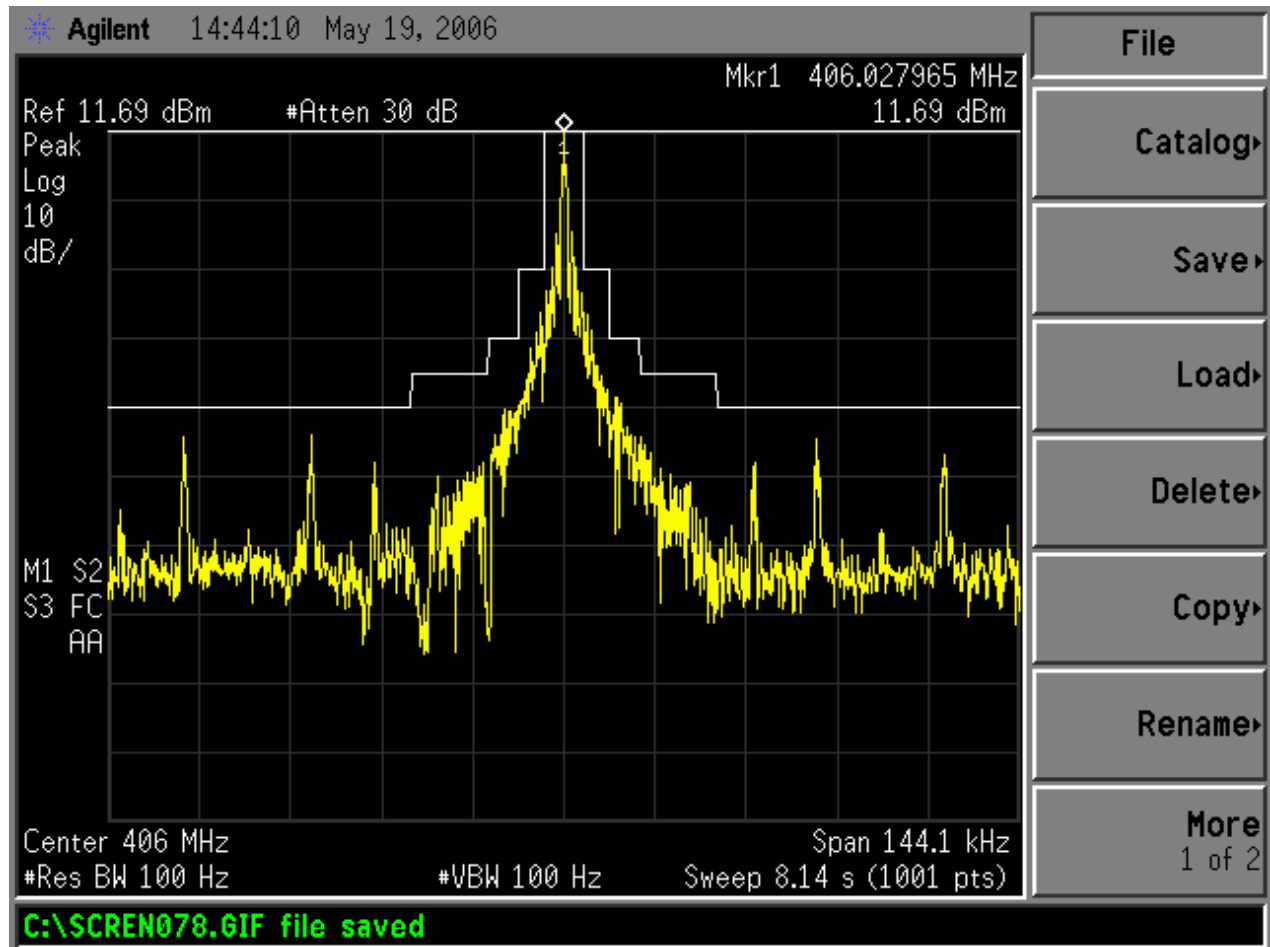
TEST DETAILS

Testing of the McMurdo Limited E5 Smartfind EPIRB
in accordance with
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T.007 Issue 4 November 2005 as a supplement to report no RM614667/01 Issue 1

TABLE OF TEST RESULTS

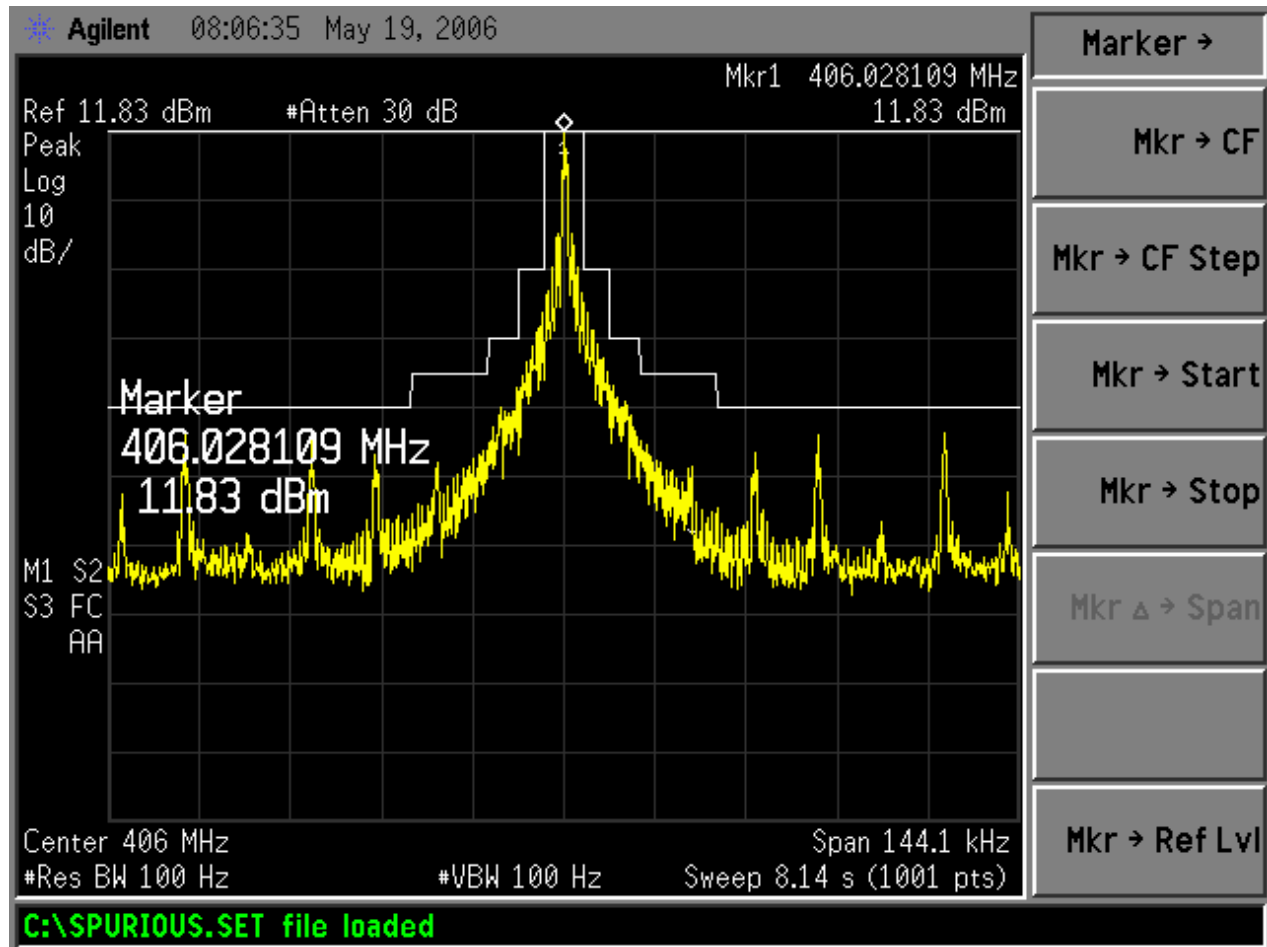
Parameter	Limits	Units	Test Results			Comments
			T _{min} (°C)	T _{amb}	T _{max} (°C)	
6. Spurious Emissions Test C2.6 Clause A3.2.2.4						Test sample: _10 Build state: 0 Result: Pass
In band (406.0 – 406.1 MHz)	IAW mask	P / F	P	P	P	Spectrum plots: Page 13
14. Satellite Qualitative Tests Test C2.14 Clause A2.5			Configuration			Test sample: _10 Build state: 0 Result: Pass
Results provided Successfully located by satellites / LUT Position error	Y / N Must be correct >=80% of results <=5 km	P / F km	T.007 Fig B.4 Y P 100%	Fig B.5 Y P 100%	In Salt Water Y P 92.0%	Test data: Page 16
16. Beacon Coding Software Test C2.16						Test sample: _10 Build state: 0 Result: Pass
Sample message for each coding option Sample self-test message for each coding option	Must be correct Must be correct	P / F P / F	P P			Decoded Messages: Page 20

2.1 SPURIOUS EMISSIONS



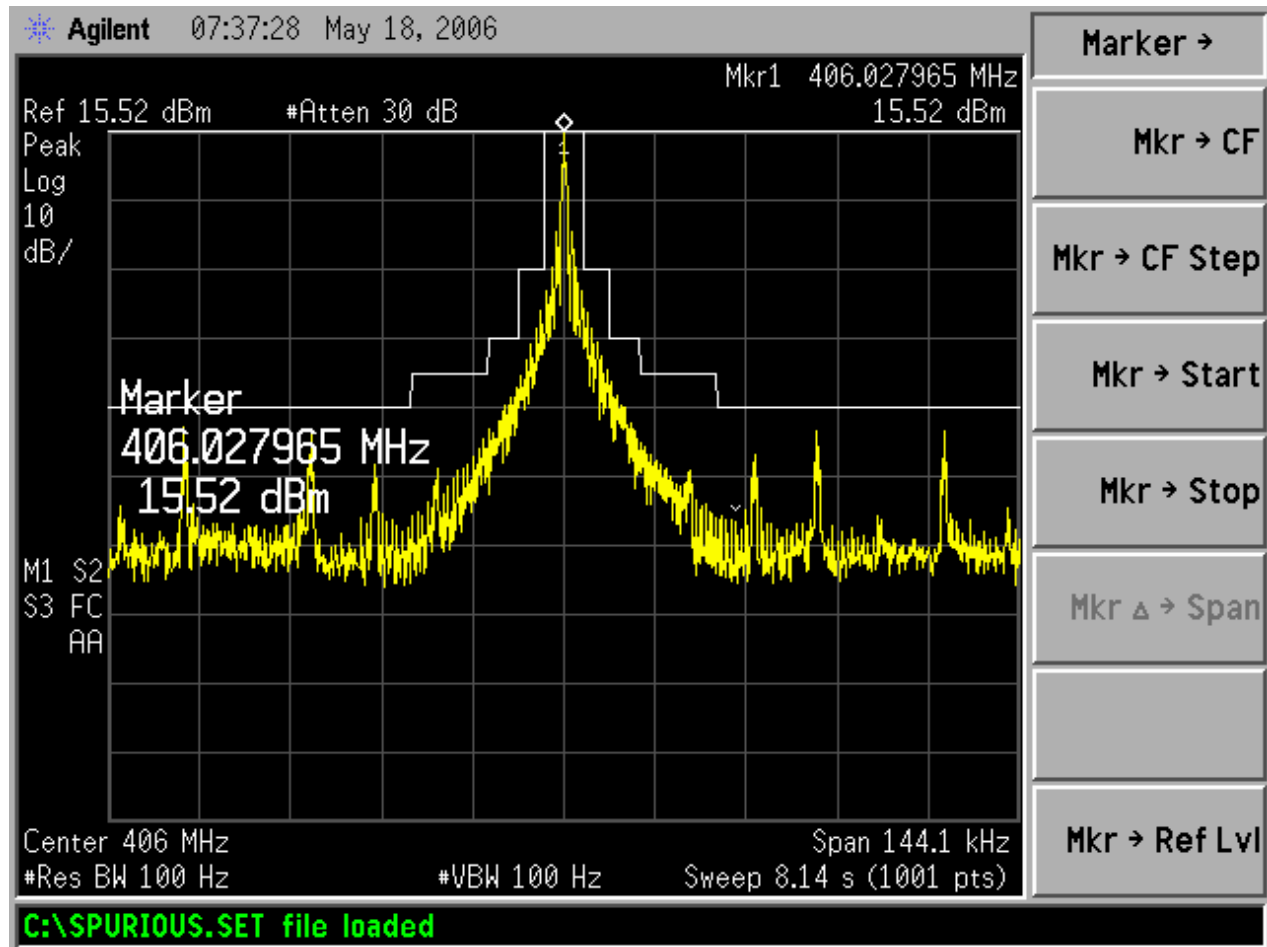
Spurious Emissions at Ambient Temperature

2.1 SPURIOUS EMISSIONS



Spurious Emissions at Minimum Temperature

2.1 SPURIOUS EMISSIONS



Spurious Emissions at Maximum Temperature

2.2 SATELLITE QUALITATIVE TESTS – T.007 Configuration B.4

Date of the Test: 11th and 12th May
 Time of the Test: 17:15 to 08:55
 Beacon Model: E5 Smartfind EPIRB 406 (Non-GPS)
 Beacon 15 Hex ID: 993D4 0018C 00F9D
 Actual location of the test beacon: Latitude: 050° 49.091' N
 Longitude: 001° 11.870' W
 Beacon test configuration (e.g. on dry ground floating in water etc): C/S T.007 Figure B.4

Satellite ID	Satellite Pass Number	15 Hex ID Provided by LUT	Doppler Latitude	Doppler Longitude	Mean Rx Power (dBm)	TCA	CTA (deg)	Location Error (km)
S7	41561	993D4 0018C 00F9D	50.81662	-1.19238	-122.14	07:09:29	5.987	0.420
S8	29049	993D4 0018C 00F9D	50.81584	-1.19532	-114.55	04:22:11	2.773	0.315
S8	29050	993D4 0018C 00F9D	50.81293	-1.20127	-125.62	06:01:56	16.657	0.632
S7	41560	993D4 0018C 00F9D	50.81346	-1.19683	-124.42	05:29:25	-9.492	0.530
S10	5030	993D4 0018C 00F9D	50.81293	-1.19830	-125.38	04:57:05	19.735	0.585
S8	29048	993D4 0018C 00F9D	50.81558	-1.19620	-119.38	02:41:01	-13.032	0.311
S10	5029	993D4 0018C 00F9D	50.82146	-1.19496	-123.15	03:17:34	6.562	0.416
S10	5028	993D4 0018C 00F9D	50.81772	-1.19820	-124.58	01:36:38	-8.981	0.058
S9	20162	993D4 0018C 00F9D	50.82319	-1.18935	-125.36	23:44:22	-19.054	0.815
S6	58594	993D4 0018C 00F9D	50.83777	-1.19087	-130.84	22:18:15	-15.289	2.231
S9	20161	993D4 0018C 00F9D	50.82115	-1.19024	-123.26	22:03:22	-3.118	0.627
S9	20160	993D4 0018C 00F9D	50.82027	-1.20020	-120.07	20:23:50	11.690	0.285
S7	41554	993D4 0018C 00F9D	50.82132	-1.19353	-120.14	19:00:04	-17.997	0.461
S6	58592	993D4 0018C 00F9D	50.81992	-1.20929	-130.20	18:57:07	14.892	0.827
S7	41553	993D4 0018C 00F9D	50.82393	-1.19373	-121.54	17:19:13	-2.087	0.701

Ratio of Successful Solutions = $\frac{\text{number of Doppler solutions within 5km with } 1^\circ < \text{CTA} < 21^\circ}{\text{number of satellite passes over test duration with } 1^\circ < \text{CTA} < 21^\circ}$

$$= \frac{15}{15} = 100 \%$$

2.2 SATELLITE QUALITATIVE TESTS – T.007 Configuration B.5

Date of the Test: 5th and 6th June
 Time of the Test: 16:15 to 09:00
 Beacon Model: E5 Smartfind EPIRB 406 (Non-GPS)
 Beacon 15 Hex ID: 993D4 0018C 00F9D
 Actual location of the test beacon: Latitude: 052° 14.447' N
 Longitude: 001° 43.970' W

Beacon test configuration (e.g. on dry ground floating in water etc): C/S T.007 Figure B.5*

Satellite ID	Satellite Pass Number	15 Hex ID Provided by LUT	Doppler Latitude	Doppler Longitude	Mean Rx Power (dBm)	TCA	CTA (deg)	Location Error (km)
S7	41918	993D4 0018C 00F9D	52.23919	-1.72415	-133.39	08:53:30	18.825	0.617
S6	58953	993D4 0018C 00F9D	52.24808	-1.70639	-136.29	08:29:51	-16.411	1.974
S7	41917	993D4 0018C 00F9D	52.24178	-1.71239	-127.08	07:14:50	6.155	1.395
S8	29403	993D4 0018C 00F9D	52.23979	-1.72184	-132.39	06:12:38	16.475	0.756
S7	41916	993D4 0018C 00F9D	52.24057	-1.72359	-126.57	05:34:47	-8.797	0.629
S8	29402	993D4 0018C 00F9D	52.23913	-1.71765	-126.38	04:32:54	3.212	1.049
S10	5382	993D4 0018C 00F9D	52.23705	-1.72253	-129.52	04:02:56	12.023	0.815
S8	29401	993D4 0018C 00F9D	52.23543	-1.72154	-126.67	02:51:47	-12.058	0.972
S10	5381	993D4 0018C 00F9D	52.23903	-1.71868	-126.49	02:22:34	-2.259	0.983
S10	5380	993D4 0018C 00F9D	52.23644	-1.72018	-129.26	00:40:46	-17.827	0.987
S9	20517	993D4 0018C 00F9D	52.24377	-1.71560	-124.87	22:29:35	-7.110	1.219
S6	58947	993D4 0018C 00F9D	52.26444	-1.74213	-132.83	21:56:21	-11.091	2.704
S9	20516	993D4 0018C 00F9D	52.24607	-1.72368	-122.86	20:49:39	7.675	0.856
S9	20515	993D4 0018C 00F9D	52.24075	-1.73302	-126.84	19:11:04	19.965	0.013
S6	58946	993D4 0018C 00F9D	52.26468	-1.71514	-134.54	20:15:25	4.066	2.916
S7	41910	993D4 0018C 00F9D	52.24541	-1.71471	-134.22	19:06:19	-18.645	1.336
S6	58945	993D4 0018C 00F9D	52.26099	-1.74059	-136.88	18:35:51	17.156	2.307
S7	41909	993D4 0018C 00F9D	52.24503	-1.71671	-126.00	17:25:20	-3.202	1.194
S8	29395	993D4 0018C 00F9D	52.24695	-1.72531	-133.63	16:17:39	-15.415	0.855

Ratio of Successful Solutions = $\frac{\text{number of Doppler solutions within 5km with } 1^\circ < \text{CTA} < 21^\circ}{\text{number of satellite passes over test duration with } 1^\circ < \text{CTA} < 21^\circ}$

$$= \frac{19}{19} = 100 \%$$

2.2 SATELLITE QUALITATIVE TESTS – Floating in Salt water Configuration

Date of the Test: 15th and 16th May
 Time of the Test: 10:45 to 09:00
 Beacon Model: E5 Smartfind EPIRB 406 (Non-GPS)
 Beacon 15 Hex ID: 993D4 0018C 00F9D
 Actual location of the test beacon: Latitude: 050° 49.091' N
 Longitude: 001° 11.870' W
 Beacon test configuration (e.g. on dry ground floating in water etc): Floating in Salt Water (5% by weight)

Satellite ID	Satellite Pass Number	15 Hex ID Provided by LUT	Doppler Latitude	Doppler Longitude	Mean Rx Power (dBm)	TCA	CTA (deg)	Location Error (km)
S10	5086	993D4 0018C 00F9D	50.81736	-1.19356	-124.67	04:16:46	14.806	0.314
S7	41619	993D4 0018C 00F9D	50.80823	-1.20152	-131.11	08:52:59	19.843	1.136
S6	58656	993D4 0018C 00F9D	50.86079	-1.17305	-136.27	08:00:01	-20.573	5.044*
S7	41618	993D4 0018C 00F9D	50.81696	-1.19976	-124.43	07:14:22	6.739	0.192
S7	41617	993D4 0018C 00F9D	50.81063	-1.19896	-127.16	05:34:23	-8.669	0.843
S8	29106	993D4 0018C 00F9D	50.81417	-1.19712	-127.13	05:16:00	10.542	0.449
S8	29105	993D4 0018C 00F9D	50.81747	-1.19894	-124.73	03:35:36	-4.474	0.111
S10	5084	993D4 0018C 00F9D	50.81512	-1.19283	-120.67	00:55:09	-15.532	0.489
S8	29104	993D4 0018C 00F9D	50.81060	-1.18938	-127.35	01:53:43	-20.543	1.031
S9	20219	993D4 0018C 00F9D	50.82384	-1.19022	-130.56	23:52:39	-20.357	0.825
S9	20218	993D4 0018C 00F9D	50.82108	-1.18701	-125.01	22:11:31	-4.409	0.825
S6	58650	993D4 0018C 00F9D	50.84070	-1.21398	-128.77	21:25:55	-6.928	2.747
S9	20217	993D4 0018C 00F9D	50.82765	-1.21724	-125.71	20:31:52	10.567	1.721
S6	58649	993D4 0018C 00F9D	50.84208	-1.20787	-130.72	19:45:23	8.341	2.747
S7	41611	993D4 0018C 00F9D	50.82054	-1.18787	-130.55	19:05:04	-18.826	0.747
S6	58648	993D4 0018C 00F9D	50.83974	-1.21414	-134.45	18:06:15	20.979	2.655
S7	41610	993D4 0018C 00F9D	50.82183	-1.19172	-123.95	17:24:09	-2.897	0.590
S7	41609	993D4 0018C 00F9D	50.82444	-1.21466	-126.02	15:44:40	11.898	1.371
S8	29098	993D4 0018C 00F9D	50.82120	-1.18482	-125.60	15:18:58	-6.931	0.973
S8	29097	993D4 0018C 00F9D	50.82075	-1.20362	-121.35	13:38:20	8.373	0.496
S10	5078	993D4 0018C 00F9D	50.82590	-1.18774	-126.53	14:19:31	-11.405	1.112
S9	20212	993D4 0018C 00F9D	50.81452	-1.18956	-123.08	12:24:54	11.267	0.709
S10	5077	993D4 0018C 00F9D	50.82038	-1.20936	-124.37	12:38:22	4.343	0.845
S6	58644	993D4 0018C 00F9D	50.82953	-1.21181	-131.89	11:34:58	12.236	1.598
S10	5076	993D4 0018C 00F9D	50.88829	-1.15332	-126.48	10:58:39	17.922	8.393*

* Location error(s) ≥ 5km

Ratio of Successful Solutions = $\frac{\text{number of Doppler solutions within 5km with } 1^\circ < \text{CTA} < 21^\circ}{\text{number of satellite passes over test duration with } 1^\circ < \text{CTA} < 21^\circ}$

$$= \frac{23}{25} = 92.0 \%$$

2.3 BEACON CODING SOFTWARE

Examples of User Protocol Beacon Messages

T7NOV05

F - D - 1

C/S T.007 - Issue 4
November 2005

APPENDIX D TO ANNEX F

BEACON CODING SOFTWARE RESULTS

Table F-D.1: Examples of User Protocol Beacon Messages

(Examples required for each protocol requested for inclusion on the type approval certificate)

Protocol	Operational Message (in hexadecimal including bit and frame synchronisation bits)	Self-Test Message (in hexadecimal including bit and frame synchronisation bits)
Maritime User Protocol with MMSI	FFFE2F4C941861 8618668A26F190	FFFED04C941861 8618668A26F190
Maritime User Protocol with Radio Call Sign	FFFE2F4C9526F6 F06B268C679110	FFFED04C9526F6 F06B268C679110
Radio Call Sign User Protocol	FFFE2F4C9DBDBC 1A55468D215510	FFFED04C9DBDBC 1A55468D215510
Serial User: Float-Free EPIRB with Serial Number	FFFE2F4C96A000 C6007CED45E1D0	FFFED04C96A000 C6007CED45E1D0
Serial User: Non Float-Free EPIRB with Serial Number	FFFE2F4C972000 C6007CE8871240	FFFED04C972000 C6007CE8871240
Aviation User Protocol		
Serial User: ELT with Serial Number		
Serial User: ELT with Aircraft Operator Designator & Serial Number		
Serial User: ELT with Aircraft 24-bit address		
Serial User: PLB with Serial Number		
National User (Short)		
National User (Long)		

SECTION 3

TEST EQUIPMENT

3.1 TEST EQUIPMENT

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.1 Beacons - Spurious Emissions				
Attenuator (3dB,10W)	Texscan	HFP-50N	475	05/08/2006
Spectrum Analyser	Hewlett Packard	E4407B	1154	19/04/2006
20dB/20W Attenuator	JFW	50FHC-020-20	2774	O/P Mon

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMER AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
(Not UKAS Accredited).

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