Configuration 7 (SLP, TA000011 / TSR014)

Test Start: 2021-09-30 17:06 GMT
Test End: 2021-10-01 08:41 GMT
15 Hex ID: 193DF380C6FFBFF

Actual location of the test beacon: 50.814305
(Daedalus Airfield, Lee-on-the-Solent, Central) -1.2017598

Satellite ID	Satellite Pass Number	15 Hex ID Provided by LUT	Doppler Latitude	Doppler Longitude	TCA	CTA (deg)	Location Error (km)
12	65179	193DF380C665C05*	50.816	-1.199	2021-09-30 18:04:18	3.705	0.270
11	77571	193DF380C665C05*	50.821	-1.203	2021-09-30 20:07:36	-7.58	0.749
11	77570	193DF380C665C05*	50.827	-1.204	2021-09-30 18:27:30	7.777	1.419
114	11650	193DF380C665C05*	50.814	-1.206	2021-10-01 03:04:09	-5.222	0.300
114	11651	193DF380C665C05*	51.804	-0.014	2021-10-01 04:43:32	10	137.486
12	65180	193DF380C665C05*	50.813	-1.198	2021-09-30 19:45:21	-12.038	0.301

Location Errors greater than 5 km are marked in red text.

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

$$= \frac{5}{6}$$

$$= 83.33\%$$

*NOTE: Hex ID is provided with location but the Hex ID with default values is 193DF380C6FFBFF.

Configuration 8 (SLP, TA000011 / TSR014)

Test Start: 2022-04-21 15:02 GMT
Test End: 2022-04-22 08:33 GMT
15 Hex ID: 193DF380C6FFBFF

Actual location of the test beacon: 50.814333
(Daedalus Airfield, Lee-on-the-Solent, Central) -1.2017389

Satellite ID	Satellite Pass Number	15 Hex ID Provided by LUT	Doppler Latitude	Doppler Longitude	TCA	CTA (deg)	Location Error (km)
114	14532	193DF380C665C05*	50.818	-1.206	2021-06-18 16:14:16	-14.515	0.507
12	68044	193DF380C665C05*	50.814	-1.207	2021-06-18 16:41:46	18.985	0.369
12	68045	193DF380C665C05*	50.819	-1.198	2021-06-18 17:03:49	5.72	0.585
13	49769	193DF380C665C05*	50.818	-1.196	2021-06-18 18:21:53	10.095	0.576
12	68046	193DF380C665C05*	50.817	-1.234	2021-06-18 18:56:33	-9.831	2.283
13	49770	193DF380C665C05*	50.818	-1.206	2021-06-18 20:03:27	-4.949	0.507
10	87211	193DF380C665C05*	50.815	-1.207	2021-06-18 20:23:21	-3.322	0.376
10	87210	193DF380C665C05*	50.82	-1.202	2021-06-18 20:35:44	11.566	0.633
13	49771	193DF380C665C05*	50.841	-1.257	2021-06-18 22:16:20	-20.908	4.882
10	87212	193DF380C665C05*	50.824	-1.219	2021-06-19 02:44:00	-19.388	1.620
114	14538	193DF380C665C05*	50.814	-1.199	2021-06-19 04:24:01	-13.248	0.197
114	14539	193DF380C665C05*	50.814	-1.202	2021-06-19 06:02:38	2.49	0.038
114	14540	193DF380C665C05*	50.823	-1.23	2021-06-19 06:38:17	16.399	2.206
12	68052	193DF380C665C05*	50.811	-1.202	2021-06-19 06:52:16	-17.795	0.368

Location Errors greater than 5 km are marked in red text.

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

= $\frac{14}{14}$

= 100%

*NOTE: Hex ID is provided with location but the Hex ID with default values is 193DF380C6FFBFF

Summary

The EUT complies with clause A.2.5 of Cospas-Sarsat T.007.

2.13 BEACON ANTENNA TEST

2.13.1 Specification

Cospas-Sarsat T.007, Clause A.2.6

2.13.2 Equipment Under Test and Modification State

PLB-450, S/N:TA000011 - Modification State 0

2.13.3 Date of Test

25 August 2021 & 31 August 2021

2.13.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.13.5 Laboratory Environmental Conditions

Ambient Temperature 21.2 - 24°C
Relative Humidity 48.4 – 64.5%

Note: Battery Current comparison measurements were performed between all modifications states. The results can be found in Annex B below which shows that the measurements recorded are similar.

2.13.6 Test Results

Configuration 3 (Dry)

Legend: ~~Strikeout~~ **Under-range** **Over-range** Vv-Vh < 10 dB

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (Degrees)	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi
0	36.33	-0.24	40.44	3.87	41.57	5.00	36.50	-0.07	32.44	-4.13
30	36.43	-0.14	40.35	3.78	41.67	5.10	36.38	-0.19	32.77	-3.80
60	36.54	-0.03	40.34	3.77	41.76	5.19	36.36	-0.21	32.68	-3.89
90	36.75	0.18	40.43	3.86	41.98	5.41	35.92	-0.65	33.10	-3.47
120	36.57	0.00	40.42	3.85	41.97	5.40	35.77	-0.80	33.42	-3.15
150	36.18	-0.39	40.31	3.74	41.77	5.20	35.59	-0.98	33.08	-3.49
180	36.58	0.01	40.31	3.74	41.67	5.10	35.76	-0.81	33.32	-3.25
210	36.66	0.09	40.31	3.74	41.66	5.09	36.22	-0.35	33.31	-3.26
240	36.46	-0.11	40.11	3.54	41.75	5.18	36.81	0.24	32.30	-4.27
270	36.35	-0.22	40.11	3.54	41.55	4.98	36.85	0.28	~~31.48~~	-5.09
300	36.44	-0.13	40.12	3.55	41.85	5.28	36.68	0.11	32.74	-3.83
330	36.23	-0.34	40.03	3.46	41.66	5.09	36.69	0.12	32.37	-4.20

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (Degrees)	dBµVv	dBµVh	dBµVv	dBµVh	dBµVv	dBµVh	dBµVv	dBµVh	dBµVv	dBµVh
0	106.08	83.48	109.78	87.58	110.18	90.78	103.88	90.88	98.38	83.08
30	106.18	84.58	109.68	88.68	110.28	90.48	103.78	90.28	98.78	79.98
60	106.28	85.88	109.68	87.58	110.38	90.48	103.78	89.98	98.68	80.78
90	106.48	86.58	109.78	85.58	110.58	91.68	103.38	88.48	99.08	82.28
120	106.28	88.18	109.78	83.68	110.58	91.28	103.28	86.28	99.28	86.18
150	105.88	88.58	109.68	77.78	110.38	91.08	103.08	87.08	98.78	88.28
180	106.28	88.48	109.68	74.38	110.28	90.98	103.28	85.68	99.08	87.78
210	106.38	87.48	109.68	73.48	110.28	90.18	103.78	83.18	99.08	87.68
240	106.18	87.28	109.48	71.48	110.38	89.38	104.38	82.08	97.98	87.68
270	106.08	85.98	109.48	78.38	110.18	88.38	104.38	85.98	97.38	83.48
300	106.18	85.08	109.48	82.38	110.48	89.28	104.18	87.68	98.78	76.68
330	105.98	84.48	109.38	85.78	110.28	89.98	104.08	90.98	98.38	80.08
Min (Vv-Vh)	17.3		21.0		18.9		13.0		10.3	

$EIRP_{LOSS} = Pt_{ambient} - Pt_{EOL} =$ 36.57 - 36.80 = -0.23dB

$EIRP_{maxEOL} = Max[EIRP_{max}, (EIRP_{max} - EIRP_{LOSS})] =$ Max[41.98, 42.21]=42.21dBm

$EIRP_{minEOL} = Min[EIRP_{min}, (EIRP_{min} - EIRP_{LOSS})] =$ Min[32.30, 32.53]=32.30dBm

Configuration 3 (Wet)

Legend: ~~Strikeout~~ **Under-range** **Over-range** Vv-Vh < 10 dB

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (Degrees)	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi
0	35.94	-0.63	39.58	3.01	40.59	4.02	35.65	-0.92	~~31.52~~	-5.05
30	36.24	-0.33	39.77	3.20	40.78	4.21	34.80	-1.77	31.72	-4.85
60	36.13	-0.44	39.97	3.40	40.59	4.02	35.04	-1.53	32.23	-4.34
90	36.12	-0.45	39.76	3.19	40.97	4.40	35.12	-1.45	32.53	-4.04
120	35.71	-0.86	39.74	3.17	40.77	4.20	34.94	-1.63	32.34	-4.23
150	35.91	-0.66	39.63	3.06	40.86	4.29	34.76	-1.81	32.21	-4.36
180	35.81	-0.76	39.43	2.86	40.44	3.87	34.72	-1.85	~~31.41~~	-5.16
210	35.92	-0.65	39.23	2.66	40.44	3.87	34.99	-1.58	31.59	-4.98
240	35.73	-0.84	39.33	2.76	40.43	3.86	34.80	-1.77	~~31.43~~	-5.14
270	35.83	-0.74	39.44	2.87	40.74	4.17	35.32	-1.25	~~31.58~~	-4.99
300	35.54	-1.03	39.44	2.87	40.64	4.07	35.63	-0.94	~~31.47~~	-5.10
330	36.03	-0.54	39.56	2.99	40.76	4.19	35.39	-1.18	~~30.96~~	-5.61

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (Degrees)	dBµVh	dBµVh	dBµVh	dBµVh	dBµVh	dBµVh	dBµVh	dBµVh	dBµVh	dBµVh
0	105.68	84.98	108.88	90.58	109.18	90.98	102.98	90.98	97.48	81.58
30	105.98	84.88	109.08	90.68	109.38	91.08	102.08	90.88	97.58	84.58
60	105.88	83.88	109.28	90.58	109.18	91.08	102.28	91.58	98.18	82.68
90	105.88	80.98	109.08	89.18	109.58	90.28	102.48	89.88	98.48	83.08
120	105.48	78.48	109.08	87.48	109.38	89.68	102.38	87.98	98.28	82.98
150	105.68	76.68	108.98	84.58	109.48	88.58	102.28	84.58	97.98	86.58
180	105.58	78.88	108.78	83.88	109.08	86.58	102.28	80.88	97.18	85.68
210	105.68	82.08	108.58	84.58	109.08	84.68	102.58	75.58	97.38	85.58
240	105.48	82.88	108.68	84.98	109.08	82.48	102.38	75.78	97.28	84.48
270	105.58	83.88	108.78	86.18	109.38	84.78	102.88	81.18	97.58	79.68
300	105.28	84.28	108.78	86.58	109.28	86.48	103.18	83.48	97.48	78.68
330	105.78	84.28	108.88	88.98	109.38	89.38	102.78	89.58	96.98	77.88
Min (Vv-Vh)	20.7		18.3		18.1		10.7		11.4	

$EIRP_{LOSS} = Pt_{ambient} - Pt_{EOL} =$ 36.57 - 36.80 = -0.23dB

$EIRP_{maxEOL} = Max[EIRP_{max}, (EIRP_{max} - EIRP_{LOSS})] =$ Max[40.97, 41.20]=41.20dBm

$EIRP_{minEOL} = Min[EIRP_{min}, (EIRP_{min} - EIRP_{LOSS})] =$ Min[31.59, 31.82]=31.59dBm

Configuration 4

Legend: ~~Strikeout~~ **Under-range** **Over-range** Vv-Vh < 10 dB

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (Degrees)	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi
0	33.84	-2.73	36.94	0.37	38.13	1.56	36.21	-0.36	33.24	-3.33
90	38.11	1.54	38.54	1.97	39.06	2.49	36.82	0.25	34.80	-1.77
180	35.01	-1.56	38.71	2.14	39.35	2.78	37.71	1.14	36.20	-0.37
270	36.19	-0.38	39.69	3.12	39.61	3.04	36.64	0.07	35.08	-1.49

$EIRP_{LOSS} = Pt_{ambient} - Pt_{EOL}$ = 36.57 - 36.80 = -0.23dB

$EIRP_{maxEOL} = Max[EIRP_{max}, (EIRP_{max} - EIRP_{LOSS})]$ = Max[39.69, 39.92]=39.92dBm

$EIRP_{minEOL} = Min[EIRP_{min}, (EIRP_{min} - EIRP_{LOSS})]$ = Min[33.24, 33.47]=33.24dBm

Note: $Pt_{ambient}$ was measured in modification state 3
Pt_{EOL} was measured in modification state 2

Summary

The EUT fails to comply with clause A.3.2.1 of Cospas-Sarsat T.007 for Configuration 3 (Wet). Measurement outside the limits stated in C/S T.007. However, the result is within the Test Facility Accuracy stated in C/S T.007, clause A.1.

2.14 NAVIGATION SYSTEM TEST

2.14.1 Specification

Cospas-Sarsat T.007, Clause A.2.7

2.14.2 Equipment Under Test and Modification State

PLB3, S/N: TA000005 - Modification State 2

2.14.3 Date of Test

01 November 2021 & 04 November 2021 & 08 November 2021 & 10 November 2021 & 22 November 2021 & 23 November 2021

2.14.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.14.5 Laboratory Environmental Conditions

Ambient Temperature 15.5° - 23.6°C
Relative Humidity 42.5 - 88.7%

2.14.6 Test Results

Additional Test Information

Where a GNSS simulator was used the following settings applied:

Band: L1
Frequency: 1575.42 MHz
Free space loss at 1m used for signal strength calibration: 34.38792709

National Protocol

Position Data Default Values (C/S T.007 A.3.8.1):

No position data was provided for > 4 hours before the test started. The beacon was activated and operated for 30 minutes without providing data. Message content was checked for all bursts during this period.

36 Hex Message	Message Count
FFFE2F8C9B70465FC0FF0120A9379F3CFD3C	37

Position Acquisition Time and Position Accuracy (C/S T.007 A.3.8.2)

Locations:

A.3.8.2.1:	50° 52.1423' N	1° 14.6799' W	①
A.3.8.2.2:	50° 48.8584' N	1° 12.1056' W	①

The appropriate position was applied, the EUT activated and time to first message containing valid position data timed.

Configuration as per C/S T.007	C/S T.007 Section A.3.8.2.1		C/S T.007 Section A.3.8.2.2	
	Time to Acquire Position (sec)	Location Error in metres	Time to Acquire Position (sec)	Location Error in metres
Configuration 7 (Wet)	56	24	55	32.5
Configuration 8	56	24	55	32.5

Positional accuracy was calculated using the Haversine Formula, The Earth's radius was taken as 6367 km.

① GNSS Site Survey – Live Location

Encoded Position Data Update Interval (C/S T.007 A.3.8.3) – Short Test:

Location: N 51° 22.62' W 1° 49.86' ①		
Data Acquired at	16:06:36	FFFE2F8C9F00C04CD701CAD575F79208025B
Location: N 50° 48.66' W 1° 37.38' ①		
Data Updated at	16:15:02	FFFE2F8C9F00C04CB1019F102A3794200724
Data Update Interval	8 min 26 s	

① Input from GNSS simulator
Position 2 was applied immediately after the first message encoded with position 1.

Encoded Position Data Update Interval (C/S T.007 A.3.8.3) – Long Test:

Locations: N 45.25752° W 73.5913° (Start location). N 45.73752° W 73.5913° (Location 2) N 45.73752° W 73.5513° (Location 3) N 45.25752° W 73.5513° (Location 4) ①		
Parameter	Update interval	Limit
0 h to 2.5 h – Minimum	04:10*	≥ 04:25
0 h to 2.5 h – Maximum	08:23	≤ 16:30
Assessment	Result	Limit
Results indicate that data changes as per C/S T.001 4.5.5.4 (Y/N)	Y (see summary comment)	Y
Results indicate that data changes as per manufacturer's update scheme (Y/N)	Y	Y

① Input from GNSS simulator
Locations cycled through 1 to 4 continuously with an update interval of 02:00. Scenario moves in 2.225 km steps between locations 1 to 2 and 3 to 4. Steps size 3.105 km between locations 2 to 3 and 4 to 1.

*Refer to OSL document 921S-04094 Issue 01.40 showing 4:10s due to non synchronisation between 406 and GNSS timings.

Position Clearance After Deactivation (C/S T.007 A.3.8.4)

Following the Encoded Position Data Update Interval test, the beacon was deactivated and reactivated without providing navigation data. The Digital Message output was encoded with the default position data.

Position Data Input Update Interval (C/S T.007 A.3.8.5)

EUT does not accept external position input, test is not applicable.

Last Valid Position (C/S T.007 A.3.8.6)

Location: N 51° 22.583' W 1° 49.833' ①		
Data Acquired at	08:45:36	FFFE2F8C9B70464CD701CD8757379208FF77
GNSS Signal Navigation Data Removed		
Last Message with Encoded Data	12:45:06	FFFE2F8C9B70464CD701CD8757379208FF77
Data Updated at	12:45:54	FFFE2F8C9B70465FC0FF0120A9379F3CFD3C
Last Valid Position Held	239 min 30 s	
Return to Default Position	✓	

① Input from GNSS simulator

Standard Protocol

Position Data Default Values (C/S T.007 A.3.8.1):

No position data was provided for > 4 hours before the test started. The beacon was activated and operated for 30 minutes without providing data. Message content was checked for all bursts during this period.

36 Hex Message	Message Count
FFFE2F8C97F9C0637FDFFF11B23783E0F66C	37

Position Acquisition Time and Position Accuracy (C/S T.007 A.3.8.2)

Locations:

A.3.8.2.1:	50° 52.1423' N	1° 14.6799' W	①
A.3.8.2.2:	50° 48.8584' N	1° 12.1056' W	①

The appropriate position was applied, the EUT activated and time to first message containing valid position data timed.

Configuration as per C/S T.007	C/S T.007 Section A.3.8.2.1		C/S T.007 Section A.3.8.2.2	
	Time to Acquire Position (sec)	Location Error in metres	Time to Acquire Position (sec)	Location Error in metres
Configuration 7 (Wet)	56	24	55	32.5
Configuration 8	56	24	55	32.5

Positional accuracy was calculated using the Haversine Formula, The Earth's radius was taken as 6367 km.

① GNSS Site Survey – Live Location

Encoded Position Data Update Interval (C/S T.007 A.3.8.3) – Short Test:

Location: N 51° 22.62' W 1° 49.86' ①		
Data Acquired at	12:46:52	FFFE2F8C9EF9C06333A03ECA66771DA4D4D0
Location: N 50° 48.66' W 1° 37.38' ①		
Data Updated at	12:59:32	FFFE2F8C9EF9C06332E0311EC7778EA76951
Data Update Interval	12 min 40 s	

① Input from GNSS simulator

Encoded Position Data Update Interval (C/S T.007 A.3.8.3) – Long Test:

Locations: N 45.25752° W 73.5913° (Start location). N 45.73752° W 73.5913° (Location 2) N 45.73752° W 73.5513° (Location 3) N 45.25752° W 73.5513° (Location 4) ①		
Parameter	Update interval	Limit
0 h to 2.5 h – Minimum	04:10*	≥ 04:25
0 h to 2.5 h – Maximum	08:24	≤ 16:30
Assessment	Result	Limit
Results indicate that data changes as per C/S T.001 4.5.5.4 (Y/N)	Y (see summary comment)	Y
Results indicate that data changes as per manufacturer's update scheme (Y/N)	Y	Y

① Input from GNSS simulator
Locations cycled through 1 to 4 continuously with an update interval of 02:00. Scenario moves in 2.225 km steps between locations 1 to 2 and 3 to 4. Steps size 3.105 km between locations 2 to 3 and 4 to 1.

*Refer to OSL document 921S-04094 Issue 01.40 showing 4:10s due to non synchronisation between 406 and GNSS timings.

Position Clearance After Deactivation (C/S T.007 A.3.8.4)

Following the Encoded Position Data Update Interval test, the beacon was deactivated and reactivated without providing navigation data. The Digital Message output was encoded with the default position data.

Position Data Input Update Interval (C/S T.007 A.3.8.5)

EUT does not accept external position input, test is not applicable.

Last Valid Position (C/S T.007 A.3.8.6)

Location: N 51° 22' 36'' W 1° 49' 52'' ①		
Data Acquired at	11:11:48	FFFE2F8C97F9C06333A039E6C1F71DA4D4D0
GNSS Signal Navigation Data Removed		
Last Message with Encoded Data	15:11:25	FFFE2F8C97F9C06333A039E6C1F71DA4D4D0
Data Updated at	15:12:14	FFFE2F8C9EED00167FDFFECEA0B783E0F66C
Last Valid Position Held	239 mins 37 s	
Return to Default Position	✓	

① Input from GNSS simulator

RLS Protocol

Position Data Default Values (C/S T.007 A.3.8.1):

No position data was provided for > 4 hours before the test started. The beacon was activated and operated for 30 minutes without providing data. Message content was checked for all bursts during this period.

36 Hex Message	Message Count
FFFE2F8C9DFE7018DFEFF8129DF861F0FABE	37

Position Acquisition Time and Position Accuracy (C/S T.007 A.3.8.2)

Locations:

A.3.8.2.1:	50° 52.1423' N	1° 14.6799' W	①
A.3.8.2.2:	50° 48.8584' N	1° 12.1056' W	①

The appropriate position was applied, the EUT activated and time to first message containing valid position data timed.

Configuration as per C/S T.007	C/S T.007 Section A.3.8.2.1		C/S T.007 Section A.3.8.2.2	
	Time to Acquire Position (sec)	Location Error in metres	Time to Acquire Position (sec)	Location Error in metres
Configuration 7 (Wet)	56	24	56	32.5
Configuration 8	56	24	55	32.5

Positional accuracy was calculated using the Haversine Formula, The Earth's radius was taken as 6367 km.

① GNSS Site Survey – Live Location

Encoded Position Data Update Interval (C/S T.007 A.3.8.3) – Short Test:

Location: N 51° 22.62' W 1° 49.86' ①		
Data Acquired at	14:11:33	FFFE2F8C9DFE7018CCF024AD44F84ECA2A3C
Location: N 50° 48.66' W 1° 37.38' ①		
Data Updated at	14:21:41	FFFE2F8C9DFE7018CCD01C855BB856976D56
Data Update Interval	10 min 08 s	

① Input from GNSS simulator

Encoded Position Data Update Interval (C/S T.007 A.3.8.3) – Long Test:

Locations: N 45.25752° W 73.5913° (Start location). N 45.73752° W 73.5913° (Location 2) N 45.73752° W 73.5513° (Location 3) N 45.25752° W 73.5513° (Location 4) ①		
Parameter	Update interval	Limit
0 h to 24 h – Minimum	04:54	≥ 04:25
0 h to 24 h – Maximum	05:02	≤ 16:30
Assessment	Result	Limit
Results indicate that data changes as per C/S T.001 4.5.5.4 (Y/N)	Y (see summary comment)	Y
Results indicate that data changes as per manufacturer's update scheme (Y/N)	Y	Y

① Input from GNSS simulator
Locations cycled through 1 to 4 continuously with an update interval of 02:00. Scenario moves in 2.225 km steps between locations 1 to 2 and 3 to 4. Steps size 3.105 km between locations 2 to 3 and 4 to 1.

Position Clearance After Deactivation (C/S T.007 A.3.8.4)

Following the Encoded Position Data Update Interval test, the beacon was deactivated and reactivated without providing navigation data. The Digital Message output was encoded with the default position data.

Position Data Input Update Interval (C/S T.007 A.3.8.5)

EUT does not accept external position input, test is not applicable.

Last Valid Position (C/S T.007 A.3.8.6)

Location: N 51° 22' 36'' W 1° 49' 52'' ①		
Data Acquired at	11:14:18	FFFE2F8C9DFB40058CF02511A9B84ECA2A3C
GNSS Signal Navigation Data Removed		
Last Message with Encoded Data	15:11:55	FFFE2F8C9DFB40058CF02511A9B84ECA2A3C
Data Updated at	15:12:44	FFFE2F8C9DFE7018DFEFF8129DF861F0FABE
Last Valid Position Held	237 mins 37 s	
Return to Default Position	✓	

① Input from GNSS simulator

Summary

The EUT complies with clause A.2.7* of Cospas-Sarsat T.007.

*The EUT complies with T.001 clause 4.5.5.4 and is compliant with T.007 clause A.3.8.3 but deviates from the requirements of Annex B Table F.1 element 17.

2.15 BEACON CODING SOFTWARE

2.15.1 Specification

Cospas-Sarsat T.007, Clause A.2.8

Refer to Manufacturer document ‘921S-04041-PLB3 Navigation System, Beacon and Message Coding_01.02.pdf’

2.16 RLM RECEPTION VERIFICATION

2.16.1 Specification

Cospas-Sarsat T.007, Clause A.3.8.8

2.16.2 Equipment Under Test and Modification State

PLB3, S/N: TA000003 - Modification State 2

2.16.3 Date of Test

01 November 2021, 03 November 2021, 30 November 2021 & 10 December 2021

2.16.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.16.5 Laboratory Environmental Conditions

Ambient Temperature 8.2 - 23°C
Relative Humidity 36.3 – 79.5%

2.16.6 Test Results

RLS Indication Test

Requirement	Comments
Description of RLS indication as observed during the test	When the EUT request RLS it will do 5 Magenta flashes on the LED if no GNSS fix, or 5 Blue flashes with a GNSS fix
Description of RLM indication as observed during the test	Once the EUT has received RLM, the flashing LED with change from red to blue to indicate that RLM has been acknowledged.
Description of message encoding used to demonstrate that the RLS indication remain inactive at all times when the beacon is encoded with any protocol other than the RLS Location Protocol or RLS Location Test Protocol.	When the EUT is programmed in a non-RLS protocol, then the LED's that indicate RLS request and acknowledgement do not occur.

Moffset – Configuration 7

Action	Timestamp (hh:mm:ss UTC)	Comments
Timestamp of the beacon activation	11:05:34	
Timestamp of the first message with RLS request	11:06:29	
Timestamp of RLS indication	11:06:30	
RLS request – 36 HEX with bit 111 set to 0 and a decode of this message[1]	-	FFFE2F8C9DFFD08FCCD012092FF84FBEA8E5[1]
Timestamp of the internal GNSS activation	11:05:34	The GNSS receiver activates at beacon start up.
Timestamp of UTC acquisition	11:05:42	
Timestamp of the navigation data sent to the beacon from the internal GNSS	11:06:02	
Timestamp of the beacon message with navigation data encoded	11:06:29	
Timestamp when the RLM was received	11:06:56	
Timestamp of the RLM indication	11:06:57	
Timestamp with the beacon message with bit 111 reverted to 1, beacon message content in 36-HEX and a decode of this message[2]	11:07:21	FFFE2F8C9DFE7018CCD01533237A4FBEA421[2]
Timestamp when the beacon was de-activated	11:49:30	

[1]Message Decode

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C9DFFD08FCCD012092FF84FBEA8E5**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6.

Unique identifier:
193BFFA11FBFDFF

Bit numbers in message	Binary content	Field Name	Description
1-16	1111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	11110100001000111111	Last 6 digits MMSI	999999
67-75	001100110	Latitude	51.0 Degrees North (51.0)
76-85	1000000010	Longitude	1.0 Degrees West (-1.0)
86-106	01000001001001011111	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	0	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) not received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	001111101	Latitude offset	7.0 minutes 52.0 seconds (negative)
124-132	111101010	Longitude offset	14.0 minutes 40.0 seconds (positive)
133-144	100011100101	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	50.869 -1.244

[2]Message Decode

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C9DFFD08FCCD012092FFA4FBEA421**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6.

Unique identifier:
193BFFA11FBFDFF

Bit numbers in message	Binary content	Field Name	Description
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code:	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	11110100001000111111	Last 6 digits MMSI	999999
67-75	001100110	Latitude	51.0 Degrees North (51.0)
76-85	1000000010	Longitude	1.0 Degrees West (-1.0)
86-106	01000001001001011111	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	1	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	001111101	Latitude offset	7.0 minutes 52.0 seconds (negative)
124-132	111101010	Longitude offset	14.0 minutes 40.0 seconds (positive)
133-144	010000100001	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	50.869 -1.244

Moffset – Configuration 8

Action	Timestamp (hh:mm:ss UTC)	Comments
Timestamp of the beacon activation	09:06:35	
Timestamp of the first message with RLS request	09:07:32	
Timestamp of RLS indication	09:07:33	
RLS request – 36 HEX with bit 111 set to 0 and a decode of this message[1]	-	FFFE2F8C9DFFD08FCCD012092FF84FBEA8E5[1]
Timestamp of the internal GNSS activation	09:06:35	The GNSS receiver activates at beacon start up.
Timestamp of UTC acquisition	09:06:46	
Timestamp of the navigation data sent to the beacon from the internal GNSS	09:07:00	
Timestamp of the beacon message with navigation data encoded	09:07:32	
Timestamp when the RLM was received	09:08:05	
Timestamp of the RLM indication	09:08:06	
Timestamp with the beacon message with bit 111 reverted to 1, beacon message content in 36-HEX and a decode of this message[2]	09:08:26	FFFE2F8C9DFFD08FCCD012092FFA4FBEA421[2]
Timestamp when the beacon was de-activated	09:49:27	

[1]Message Decode

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C9DFFD08FCCD012092FF84FBEA8E5**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6.

Unique identifier:
193BFFA11FBFDFF

Bit numbers in message	Binary content	Field Name	Description
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	11110100001000111111	Last 6 digits MMSI	999999
67-75	001100110	Latitude	51.0 Degrees North (51.0)
76-85	1000000010	Longitude	1.0 Degrees West (-1.0)
86-106	01000001001001011111	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	0	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) not received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	001111101	Latitude offset	7.0 minutes 52.0 seconds (negative)
124-132	111101010	Longitude offset	14.0 minutes 40.0 seconds (positive)
133-144	100011100101	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	50.869 -1.244

[2]Message Decode

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C9DFFD08FCCD012092FFA4FBEA421**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6.

Unique identifier:
193BFFA11FBFDFF

Bit numbers in message	Binary content	Field Name	Description
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code:	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	1111010000 1000111111	Last 6 digits MMSI	999999
67-75	001100110	Latitude	51.0 Degrees North (51.0)
76-85	1000000010	Longitude	1.0 Degrees West (-1.0)
86-106	0100000100 1001011111 1	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	1	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	001111101	Latitude offset	7.0 minutes 52.0 seconds (negative)
124-132	111101010	Longitude offset	14.0 minutes 40.0 seconds (positive)
133-144	0100001000 01	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	50.869 -1.244

UTC – Configuration 7

Action	Timestamp (hh:mm:ss UTC)	Comments
Timestamp of the beacon activation	12:10:57	
Timestamp of the first message with RLS request	12:11:52	
Timestamp of RLS indication	12:11:53	
RLS request – 36 HEX with bit 111 set to 0 and a decode of this message[1]	-	FFFE2F8C9DFFD08FCCD012092FF84FBEA8E5[1]
Timestamp of the internal GNSS activation	12:10:57	
Timestamp of UTC acquisition	12:11:07	
Timestamp of the navigation data sent to the beacon from the internal GNSS	12:11:31	
Timestamp when the navigation signal was denied	12:12:14	
Duration of GNSS receiver stayed active since turn on	00:30:06	GNSS Sleep at 12:41:03
Timestamp when navigation signal was allowed	14:01:05	
Timestamp when RLM was received	14:09:57	
Timestamp of the RLM indication	14:09:58	
Timestamp with the beacon message with bit 111 reverted to 1, beacon message content in 36-HEX format and a decode of this message[2]	14:10:33	FFFE2F8C9DFFD08FCCD012092FFA4FBEA421[2]
Timestamp when the beacon was de-activated	14:22:30	

[1]Message Decode

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C9DFFD08FCCD012092FF84FBEA8E5**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6.

Unique identifier:
193BFFA11FBFDFF

Binary Range	Binary Content	Field Name	Decoded Value
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code:	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	11110100001000111111	Last 6 digits MMSI	999999
67-75	001100110	Latitude	51.0 Degrees North (51.0)
76-85	1000000010	Longitude	1.0 Degrees West (-1.0)
86-106	01000001001001011111	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	0	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) not received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	001111101	Latitude offset	7.0 minutes 52.0 seconds (negative)
124-132	111101010	Longitude offset	14.0 minutes 40.0 seconds (positive)
133-144	100011100101	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	50.869 -1.244

2Message Decode

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C9DFFD08FCCD012092FFA4FBEA421**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6.

Unique identifier:
193BFFA11FBFDFF

Bit numbers in message	Binary content	Field Name	Description
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location; further information provided in "Protocol Code"
27-36	0011001001	Country code:	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	11110100001000111111	Last 6 digits MMSI	999999
67-75	001100110	Latitude	51.0 Degrees North (51.0)
76-85	1000000010	Longitude	1.0 Degrees West (-1.0)
86-106	01000001001001011111	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	1	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	001111101	Latitude offset	7.0 minutes 52.0 seconds (negative)
124-132	111101010	Longitude offset	14.0 minutes 40.0 seconds (positive)
133-144	010000100001	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	50.869 -1.244

UTC – Configuration 8

Action	Timestamp (hh:mm:ss UTC)	Comments
Timestamp of the beacon activation	14:16:06	
Timestamp of the first message with RLS request	14:17:01	
Timestamp of RLS indication	14:17:02	
RLS request – 36 HEX with bit 111 set to 0 and a decode of this message[1]	-	FFFE2F8C9DFFD08FCCD012092FF84FBEA8E5[1]
Timestamp of the internal GNSS activation	14:16:06	GNSS receiver activates at beacon start up.
Timestamp of UTC acquisition	14:16:16	
Timestamp of the navigation data sent to the beacon from the internal GNSS	14:16:44	
Timestamp when the navigation signal was denied	14:17:21	
Duration of GNSS receiver stayed active since turn on	00:30:04	GNSS Sleep at 14:46:10
Timestamp when navigation signal was allowed	16:01:05	
Timestamp when RLM was received	16:06:25	
Timestamp of the RLM indication	16:06:26	
Timestamp with the beacon message with bit 111 reverted to 1, beacon message content in 36-HEX format and a decode of this message[2]	16:06:33	FFFE2F8C9DFFD08FCCD012092FFA4FBEA421[2]
Timestamp when the beacon was de-activated	16:18:40	

[1]Message Decode

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C9DFFD08FCCD012092FF84FBEA8E5**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6.

Unique identifier:
193BFFA11FBFDFF

Bit numbers in message	Binary content	Field Name	Description
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	11110100001000111111	Last 6 digits MMSI	999999
67-75	001100110	Latitude	51.0 Degrees North (51.0)
76-85	1000000010	Longitude	1.0 Degrees West (-1.0)
86-106	01000001001001011111	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	0	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) not received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	001111101	Latitude offset	7.0 minutes 52.0 seconds (negative)
124-132	111101010	Longitude offset	14.0 minutes 40.0 seconds (positive)
133-144	100011100101	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	50.869 -1.244

[2]Message Decode

Decoded Beacon Message

Hexadecimal code: **FFFE2F8C9DFFD08FCCD012092FFA4FBEA421**

The code consists of 36 hexadecimal characters representing a first generation beacon message with the format flag set to Long including bit and frame synchronization pattern prefix (24 bits) as defined by T.001 Issue 4 - Rev.6.

Unique identifier:
193BFFA11FBFDFF

Bit numbers in message	Binary content	Field Name	Description
1-15	111111111111111	Bit-synchronization pattern consisting of "1"s shall occupy the first 15-bit positions	True
16-24	000101111	Frame Synchronization Pattern	Correct. Operational Message
25	1	Format Flag	Long Message
26	0	Protocol Flag	Location, further information provided in "Protocol Code"
27-36	0011001001	Country code	Albania - 201
		For associated SAR Points of Contact (SPOC) related to Albania - 201 :	Search Contact list here
37-40	1101	Protocol Code	Location: RLS Location Protocol
41-42	11	Beacon type	RLS Test Location
43-46	1111	Identification type	RLS protocol coded with MMSI last 6 digits
47-66	11110100001000111111	Last 6 digits MMSI	999999
67-75	001100110	Latitude	51.0 Degrees North (51.0)
76-85	1000000010	Longitude	1.0 Degrees West (-1.0)
86-106	01000001001001011111	BCH-1 error correcting code	BCH-1 code in message matches the recalculated BCH-1 from the PDF-1 field
107	1	Encoded position source	Encoded position data is provided by an internal navigation device
108	1	121.5 Mhz Homing Device	Included in beacon
109	1	Beacon capability to process and automatically generated RLM Type-1	Capable to process an automatically generated RLM Type-1
110	0	Beacon capability to process a manually generated RLM Type-1 RLM Type-2	Not capable to process a manually generated RLM Type-2
111	1	Beacon Feedback on receipt of RLM Type-1	RLM Type-1 (automatic) received by this beacon
112	0	Beacon Feedback on receipt of RLM Type-2	RLM Type-2 (manual) not received by this beacon
113-114	01	RLS Provider Identification	GALILEO Return Link Service Provider
115-123	001111101	Latitude offset	7.0 minutes 52.0 seconds (negative)
124-132	111101010	Longitude offset	14.0 minutes 40.0 seconds (positive)
133-144	010000100001	BCH-2 error correcting code	BCH-2 code in message matches the recalculated BCH-2 from the PDF-2 field
		Composite location	50.869 -1.244

Cospas-Sarsat T.007, Clause A.3.8.8.4 RLS GNSS Receiver Satellite Tracking refer to Manufacturer document : 921S-04096 Issue 01.00 PLB3 RLS GNSS Receiver Satellite Tracking Report.pdf.

Summary

The EUT complies with clause A.3.8.8 of Cospas-Sarsat T.007.

2.17 TESTING OPERATOR CONTROLS

2.17.1 Specification

Cospas-Sarsat T.007, Clause A.3.10

2.17.2 Equipment Under Test and Modification State

PLB3, S/N: TA000005 - Modification State 2

2.17.3 Date of Test

28 October 2021

2.17.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.17.5 Laboratory Environmental Conditions

Ambient Temperature 23.6°C
Relative Humidity 46.6%

2.14.6 Observations

Testing Self-Test Controls

The EUT has a common Self-Test and GNSS Self-Test control, however the differentiation between these modes is that a Self-Test is activated by holding the test button down for less the 5 seconds, while the GNSS Self-Test is activated by holding it down for >5-10 seconds.

In accordance with C/S T.007, section A.3.10, the EUT was tested as follows (the results are presented in a table of bursts captured):

Test 1

The Self-Test controls were operated and maintained in the activation mode for a period of X-1 seconds. X being the time to trigger a GNSS Self-Test. Therefore, the test button was held for 5 seconds:

Burst	Message
1	FFFED08C9DFE7018DFEFF8129DF861F0FABE

The EUT transmitted a single 406 burst and self-terminated.

Test 2

The GNSS Self-Test controls were operated and maintained in the activation mode for a period of at least 5 minutes longer than the maximum duration of the GNSS Self-Test.

The EUT did not transmit a 406MHz burst, and self-terminated after going into the programming options mode.

Testing Operational Controls

Test 1

The EUT was activated by pressing the operational control button and was held for 3 minutes longer than the declared time to transmit the first 406MHz distress message:

Burst	Message	Rep Rate
1	FFFE2F8C9DFE7018DFEFF8129DF861F0FABE	0
2	FFFE2F8C9DFE7018DFEFF8129DF861F0FABE	50.901
3	FFFE2F8C9DFE7018DFEFF8129DF861F0FABE	52.16
4	FFFE2F8C9DFE7018DFEFF8129DF861F0FABE	51.701

The EUT activates and transmits 406MHz distress messages. The beacon doesn't transmit more frequently than the repetition period defined in C/S T.001 Section 2.2.1.

Test 2

The EUT was activated by pressing the test button and held for 2 seconds, before then holding down the ON button. Both buttons were held for 3 minutes longer than the declared time to transmit the first 406MHz distress message.

The EUT did not transmit a 406MHz burst, and self-terminated after going into the programming options mode.

Test 3

The EUT was activated by pressing the operational control button and held for 5 seconds, before then holding down the Test button. Both buttons were held for 3 minutes longer than the declared time to transmit the first 406MHz distress message:

Burst	Message	Rep Rate
1	FFFE2F8C9DFE7018DFEFF8129DF861F0FABE	0
2	FFFE2F8C9DFE7018DFEFF8129DF861F0FABE	50.9
3	FFFE2F8C9DFE7018DFEFF8129DF861F0FABE	51
4	FFFE2F8C9DFE7018DFEFF8129DF861F0FABE	52.281

The EUT turns on and transmits 406MHz distress messages. The beacon doesn't transmit more frequently than the repetition period defined in C/S T.001 Section 2.2.1. The EUT remains in the ON condition and does not activate the self-test function and transmit a self-test burst.

2.14.7 Conclusions

The EUT does not transmit more than one 406MHz burst in Self-Test or GNSS Self-Test mode as required by C/S T.001.

The EUT does not transmit more frequently than the repetition rate defined by C/S T.001.

Summary

The EUT complies with clause A.3.10 of Cospas-Sarsat T.007.

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT

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

Note: some tests took place over one or more days and consequently it may appear that some of the test equipment could have been outside of the valid calibration period at the time of testing. However, we confirm that all equipment held a valid and in-date calibration when used, and we hold this information on record.

TU – Traceability Unscheduled
OP MON – Output Monitored with Calibrated Equipment

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Expiry Date
Section 2.13 Beacons - Antenna Characteristics					
Roberts Antenna 406MHz	Compliance Design		1860	24	13-Jul-2022
Hygrometer	Rotronic	HP21	3718	12	14-Apr-2022
Inclinometer, Digital	Radio Spares	01-900-020003 (RS 667-3916)	4125	12	16-Nov-2022
Portable Network Analyser	Rohde & Schwarz	ZVH4	5397	12	19-Nov-2021
30m LMR-300-DB COAXIAL CABLE	IntelliConnect Limited	C-NPNP-LMR300DB-30M	5588	12	O/P Mon
Section 2.10 Beacons - Battery Current Measurements					
Attenuator: 10dB/20W	Narda	766-10	480	12	03-Aug-2022
Hygromer	Rotronic	I-1000	2829	12	06-Apr-2022
Hygrometer	Rotronic	I-1000	2891	12	16-Oct-2021
GNSS/SBAS Simulator	Spirent	STR4500	3056	0	03-Nov-2021
Termination (50ohm, 1W)	Suhner	50ohm 1W	3080	12	10-May-2022
Termination (50ohm, 2W)	Omni-Spectra	3001-6100	3081	12	18-Feb-2022
Termination (50ohm, 15W)	Diamond Antenna	DL-30N	3098	12	03-Aug-2022
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	19-Apr-2022
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	19-Aug-2022
8 Channel Datalogger + Terminal Board	Pico Technology Ltd	ADC-16	3287	12	11-Jan-2022
GNSS Antenna	ACC	PA175-S	4228	-	TU
Variable Resistive Load	TUV SUD	n/a	5057	12	16-Dec-2021
Tester (Beacon)	WS Technologies	BT200-1100Y	5395	12	TU
Digital Timer	Radio Spares	RS Pro	5603	12	26-Aug-2022
Section 2.1 - 2.6 Beacons - Constant Temperature Tests					
Rubidium Frequency Standard	Quartzlock	A10-B	92	12	08-Mar-2022
Signal Generator	Hewlett Packard	8644A	96	12	06-May-2022
Beacon RF Unit	TUV SUD	N/A	97	-	TU
Signal Generator (100kHz to 2.6GHz)	Hewlett Packard	8663A	1063	12	19-Jan-2022
Spectrum Analyser	Agilent Technologies	E4407B	1154	12	09-Dec-2021
Immersible SAR Probe	IndexSar Ltd	IXP-050	1554	-	TU
Distress Beacon RF Unit	TUV SUD	-	2445	-	TU

Hygromer	Rotronic	I-1000	2829	12	06-Apr-2022
Hygrometer	Rotronic	I-1000	2891	12	16-Oct-2021
Termination (50ohm, 1W)	Suhner	50ohm 1W	3080	12	10-May-2022
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	19-Apr-2022
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	20-Aug-2021
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-03-34	3162	12	02-Jul-2022
Bandpass filter	Trilithic	5BE406/35-1-AA	3206	12	23-Nov-2021
Time Interval Analyser	Yokogawa	TA720 704510	3253	12	24-Nov-2021
ScopeCorder	Yokogawa	DL750 701210	3254	12	16-Nov-2021
ESA-E Series Spectrum Analyser	Agilent Technologies	E4402B	3348	12	06-Jan-2022
Rubidium Frequency Standard	Symmetricom	8040C	3490	12	27-May-2022
Thermocouple Data Logger	Pico Technology Ltd	TC-08	3782	12	23-Jun-2021
Thermocouple Data Logger	Pico Technology Ltd	TC-08	3783	12	24-Jun-2022
1 metre N-Type Cable	Florida Labs	NMS-235SP-39.4-NMS	4511	12	03-Sep-2021
Time Interval Analyser	Yokogawa	TA720	4550	12	19-Mar-2022
Oscilloscope	Yokogawa	DL750	4552	12	07-Apr-2022
Bandpass Filter (1MHz)	KR Electronics	3219-SMA	4601	12	07-Sep-2022
Bandpass Filter (1MHz)	KR Electronics	3219-SMA	4602	12	07-Sep-2021
Type T PFA Insulated Thermocouple	TC Limited	Type-T	4739	12	26-Jul-2022
USB Peak and Average Power Sensor	Keysight Technologies	U2042XA	4993	12	26-Apr-2022
Cable (18 GHz)	Rosenberger	LU7-036-1000	5025	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-1000	5026	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-1000	5027	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-1000	5030	12	08-Oct-2021
Cable (18 GHz)	Rosenberger	LU7-036-1000	5034	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-2000	5035	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-2000	5037	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-2000	5039	12	19-Oct-2021
Climatic Chamber	Rotronic	DY110C	5448	12	O/P Mon
Environmental Chamber	ACS	DY110TC	5589	-	O/P Mon
Digital Timer	Radio Spares	RS Pro	5602	12	26-Aug-2022
Digital Timer	Radio Spares	RS Pro	5603	12	28-Aug-2021
Signal Analyzer	Keysight Technologies	N9020B-ATO-43105	5743	12	03-Feb-2022
Section 2.14 Beacons - Navigation System					
Load (50ohm/30W)	Weinschel	50T-054	285	12	26-Jul-2022
Termination (50ohm, 15W)	Diamond Antenna	DL-30N	3098	12	03-Aug-2022
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-03-34	3162	12	02-Jul-2022
Copper GRP	TUV SUD	27cm Diameter	3538	-	TU
Hygrometer	Rotronic	HP21	3718	12	14-Apr-2022
1 MHz / 10 MHz reference	Quartzlock	E10-X	4973	12	30-Apr-2022
Cable (18 GHz)	Rosenberger	LU7-036-1000	5026	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-2000	5035	-	O/P Mon
Tester (Beacon)	WS Technologies	BT200-1100Y	5394	12	TU
Desktop Stopwatch	Radio Spares	RS Pro	5570	12	27-Aug-2022
RF distribution box	TUV SUD		5626	12	Class 1 (Int)

Signal Analyzer	Keysight Technologies	N9020B-ATO-43105	5742	12	03-Feb-2022
Section 2.10 Beacons - Operating Lifetime					
Power Meter	Hewlett Packard	436A	83	12	10-Mar-2022
Attenuator (10dB, 75W)	Bird	8308-100	469	12	19-Mar-2022
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	04-Feb-2022
Attenuator: 10dB/20W	Narda	766-10	480	12	03-Aug-2022
Spectrum Analyser	Agilent Technologies	E4407B	1154	12	09-Dec-2021
Signal Generator	Marconi	2031	2015	12	31-Mar-2022
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	05-Mar-2022
Hygromer	Rotronic	I-1000	2829	12	06-Apr-2022
GNSS/SBAS Simulator	Spirent	STR4500	3056	0	03-Nov-2021
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	19-Apr-2022
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	19-Aug-2022
ESA-E Series Spectrum Analyser	Agilent Technologies	E4402B	3348	12	06-Jan-2022
Rubidium Frequency Standard	Symmetricom	8040C	3490	12	27-May-2022
Thermocouple Data Logger	Pico Technology Ltd	TC-08	3783	12	24-Jun-2022
GNSS Antenna	ACC	PA175-S	4228	-	TU
1 metre N-Type Cable	Florida Labs	NMS-235SP-39.4-NMS	4511	12	03-Sep-2021
Multi-GNSS Simulator (GNSS)	Spirent	GSS6700	4596	12	20-Aug-2022
Type T PFA Insulated Thermocouple	TC Limited	Type-T	4739	12	26-Jul-2022
1 MHz / 10 MHz reference	Quartzlock	E10-X	4973	12	30-Apr-2022
USB Peak and Average Power Sensor	Keysight Technologies	U2042XA	4993	12	26-Apr-2022
Cable (18 GHz)	Rosenberger	LU7-036-1000	5026	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-1000	5027	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-1000	5029	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-1000	5030	12	08-Oct-2021
Cable (18 GHz)	Rosenberger	LU7-036-1000	5034	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-2000	5035	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-2000	5037	-	O/P Mon
Climatic Chamber	Rotronic	DY110C	5448	12	O/P Mon
RF distribution box	TUV SUD		5626	12	Class 1 (Int)
Thermocouple Data Logger	Pico Technology Ltd	TC-08 + Type T Thermocouple	5740	12	01-Mar-2022
Signal Analyzer	Keysight Technologies	N9020B-ATO-43105	5742	12	03-Feb-2022
Signal Analyzer	Keysight Technologies	N9020B-ATO-43105	5743	12	03-Feb-2022
Section 2.12 Beacons - Satellite Qualitative Test					
Hygrometer	Rotronic	HP21	3718	12	14-Apr-2022
Non Conductive Standoff Box	TUV SUD	Non Conductive Standoff Box	4966	-	TU
Tester (Beacon)	WS Technologies	BT200-1100Y	5394	12	TU
Desktop Stopwatch	Radio Spares	RS Pro	5570	12	27-Aug-2022
Section 2.8 Beacons - Self Test					
Rubidium Frequency Standard	Quartzlock	A10-B	92	12	08-Mar-2022
Signal Generator	Hewlett Packard	8644A	96	12	06-May-2022
Beacon RF Unit	TUV SUD	N/A	97	-	TU

Load (50ohm/30W)	Weinschel	50T-054	285	12	26-Jul-2022
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	12	04-Feb-2022
Spectrum Analyser	Agilent Technologies	E4407B	1154	12	09-Dec-2021
Hygrometer	Rotronic	I-1000	2891	12	16-Oct-2021
GNSS/SBAS Simulator	Spirent	STR4500	3056	0	03-Nov-2021
Termination (50ohm, 1W)	Suhner	50ohm 1W	3080	12	10-May-2022
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	19-Apr-2022
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	20-Aug-2021
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-03-34	3162	12	02-Jul-2022
ScopeCorder	Yokogawa	DL750 701210	3254	12	16-Nov-2021
GNSS Antenna	ACC	PA175-S	4228	-	TU
1 metre N-Type Cable	Florida Labs	NMS-235SP-39.4-NMS	4511	12	03-Sep-2021
Time Interval Analyser	Yokogawa	TA720	4550	12	19-Mar-2022
Bandpass Filter (1MHz)	KR Electronics	3219-SMA	4602	12	07-Sep-2021
USB Peak and Average Power Sensor	Keysight Technologies	U2042XA	4993	12	26-Apr-2022
Cable (18 GHz)	Rosenberger	LU7-036-1000	5030	12	08-Oct-2021
Cable (18 GHz)	Rosenberger	LU7-036-2000	5039	12	19-Oct-2021
Environmental Chamber	ACS	DY110TC	5589	-	O/P Mon
Section 2.11 Beacons - Temperature Gradient Combined					
Load (50ohm/30W)	Weinschel	50T-054	285	12	26-Jul-2022
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-03-34	3162	12	02-Jul-2022
1 MHz / 10 MHz reference	Quartzlock	E10-X	4973	12	30-Apr-2022
Cable (18 GHz)	Rosenberger	LU7-036-1000	5026	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-1000	5030	12	08-Oct-2021
Environmental Chamber	ACS	DY110TC	5589	-	O/P Mon
Thermocouple Data Logger	Pico Technology Ltd	TC-08 + Type T Thermocouple	5740	12	01-Mar-2022
Signal Analyzer	Keysight Technologies	N9020B-ATO-43105	5742	12	03-Feb-2022
Section 2.9 Beacons - Thermal Shock					
Termination (50ohm)	Meca	405-1	364	12	16-Dec-2021
Signal Generator (100kHz to 2.6GHz)	Hewlett Packard	8663A	1063	12	19-Jan-2022
Distress Beacon RF Unit	TUV SUD	-	2445	-	TU
Stop Clock	R.S Components	RS328 061	2674	12	26-Jul-2022
Hygromer	Rotronic	I-1000	2829	12	06-Apr-2022
Termination (50ohm, 2W)	Omni-Spectra	3001-6100	3081	12	18-Feb-2022
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	19-Apr-2022
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-03-34	3162	12	02-Jul-2022
Time Interval Analyser	Yokogawa	TA720 704510	3253	12	24-Nov-2021
Rubidium Frequency Standard	Symmetricom	8040C	3490	12	27-May-2022
Thermocouple Data Logger	Pico Technology Ltd	TC-08	3783	12	24-Jun-2022
Oscilloscope	Yokogawa	DL750	4552	12	07-Apr-2022
Bandpass Filter (1MHz)	KR Electronics	3219-SMA	4601	12	07-Sep-2022
Type T PFA Insulated Thermocouple	TC Limited	Type-T	4739	12	26-Jul-2022
Cable (18 GHz)	Rosenberger	LU7-036-1000	5034	-	O/P Mon
Cable (18 GHz)	Rosenberger	LU7-036-2000	5037	-	O/P Mon

Climatic Chamber	Rotronic	DY110C	5448	12	O/P Mon
Environmental Chamber	ACS	DY110TC	5589	-	O/P Mon
Section 2.6 Beacons - VSWR					
Rubidium Frequency Standard	Quartzlock	A10-B	92	12	08-Mar-2022
Signal Generator	Hewlett Packard	8644A	96	12	06-May-2022
Beacon RF Unit	TUV SUD	N/A	97	-	TU
Termination (50ohm)	Meca	405-1	547	12	16-Dec-2021
Spectrum Analyser	Agilent Technologies	E4407B	1154	12	09-Dec-2021
Hygrometer	Rotronic	I-1000	2891	12	16-Oct-2021
Termination (50ohm, 1W)	Suhner	50ohm 1W	3080	12	10-May-2022
Termination (50ohm, 15W)	Diamond Antenna	DL-30N	3098	12	03-Aug-2021
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	19-Apr-2022
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	20-Aug-2021
Bandpass filter	Trilithic	5BE406/35-1-AA	3206	12	23-Nov-2021
ScopeCorder	Yokogawa	DL750 701210	3254	12	16-Nov-2021
Short Circuit	TUV SUD	Short Cicuit	3272	-	TU
1 metre N-Type Cable	Florida Labs	NMS-235SP-39.4-NMS	4511	12	03-Sep-2021
Time Interval Analyser	Yokogawa	TA720	4550	12	19-Mar-2022
Bandpass Filter (1MHz)	KR Electronics	3219-SMA	4602	12	07-Sep-2021
USB Peak and Average Power Sensor	Keysight Technologies	U2042XA	4993	12	26-Apr-2022
Cable (18 GHz)	Rosenberger	LU7-036-1000	5030	12	08-Oct-2021
Cable (18 GHz)	Rosenberger	LU7-036-2000	5039	12	19-Oct-2021
Environmental Chamber	ACS	DY110TC	5589	-	O/P Mon

TU –Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment

3.2 MEASUREMENT UNCERTAINTY

Summary of Uncertainty Values

Measured Parameter	C/S Required Uncertainty	Calculated Lab Uncertainty
Repetition Time	± 0.01 seconds	± 0.0006 seconds CL 95%
Total Transmission Time	± 1.0 ms	± 0.062 ms CL 95%
CW Preamble	± 1.0 ms	± 0.062 ms CL 95%
Bit Rate	± 0.6 bps	± 0.0014 bps CL 95%
Nominal frequency	± 100 Hz	± 1.24 Hz CL 95%
Short-Term Stability	± 1 * 10-10	± 0.79 * 10-10 CL 95%
Medium-Term Stability – MS	± 1 * 10-10	± 2.04 * 10-11 CL 95%
Medium-Term Stability – RFV	± 1 * 10-10	± 3.34 * 10-11 CL 95%
Conducted Transmitted Power	± 0.5 dB	± 0.49 dB CL 95%
Carrier Power Rise Time	± 0.5 ms	± 0.051 ms CL 95%
Modulation Rise / Fall Time	± 25 µs	± 4.32 µs CL 95%
Modulation Symmetry	± 0.01	± 0.0014 CL 95%
Modulation Phase Deviation	± 0.04 radians	± 0.0384 radians CL 95%

All uncertainty calculations were carried out in accordance with UKAS M3003.

SECTION 4

PHOTOGRAPHS

4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

Figure 1 - Antenna Characteristics Configuration 1

Figure 2 – Showing plastic container for 'Wet' configuration

Figure 3 – Antenna Characteristics Configuration 4

Figure 4 - Satellite Qualitative and A.3.8.2 - Configuration 7

Figure 5 - Satellite Qualitative and A.3.8.2 - Configuration 8

Figure 6 - A.3.8.2 – Configuration 7 (Wet)

Figure 7 - A.3.8.8.1 Configuration 8

Figure 8 - A.3.8.8.1 Configuration 7

Figure 9 - A.3.8.8.2 Configuration 7

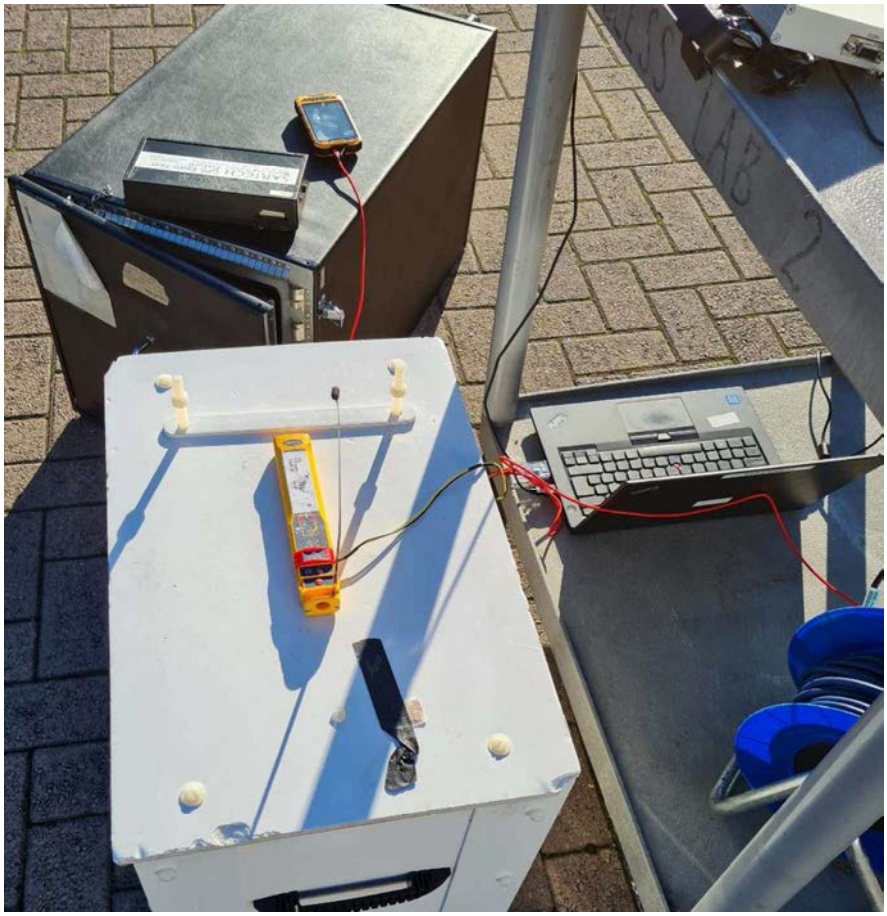

Figure 10 - A.3.8.8.2 Configuration 8

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS 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).

ANNEX A

MANUFACTURER SUPPLIED INFORMATION

ocean SIGNAL

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web
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16th December 2021

Ocean Signal Limited PLB3 (rescueME PLB3) and ACR PLB-450 (ResQLink AIS) – Statement of Equivalence

Dear Sir/Madam,

The Ocean Signal PLB3 and ACR PLB-450 are essentially the same product with different exterior labels and body colours (Ocean Signal Yellow and ACR Chartreuse) as shown in Figure 1.

The electronics, battery, firmware and functionality are identical in both products.

Both products are manufactured by Ocean Signal Limited at their manufacturing site in the UK under the same quality system and testing regime.

The Manuals, Quick Start guides and retail boxes for each product have different branding accordingly.

Justification for acceptance of both models as having equivalent performance is based upon comparison Satellite Quality testing during Cospas Sarsat Pre - Application Type Approval. (Reference email from Eric Harpell, 13/09/2021).

The two branded products will also have additional names that may be used in different markets as follows:
PLB3 will also be known as rescueME PLB3.
PLB-450 will also be known as ResQLink AIS.

Signed on behalf of Ocean Signal Limited.

Mark Newton
Approvals Manager

Registration No
6627101

Vat No
938 4374 89

Registered Office
27 New Dover Road
Canterbury
Kent
CT1 3DN

PLB3

(rescueME PLB3)

PLB-450

(ResQLink AIS)

Figure 1

T.007; 5.j Compliance statements

i. Protection against continuous transmission

(see section A.3.4)

406MHz Transmit Time Out

The precise timing control of a 406MHz transmission is performed by the micro controller, IC4, which controls the application of PA supply voltage. To ensure that a transmission can last no longer than 45 seconds due to a fault, when the PA supply voltage is switched on, C42 is charged through R25. The time constant of this network is much shorter than the 45 seconds limit. This charging voltage is compared to the input threshold of TR3B. When the threshold has been exceeded TR3B switches on, turning TR3A off, which in turn switches TR4 off thus removing the supply voltage from the PA and ending any further transmission.

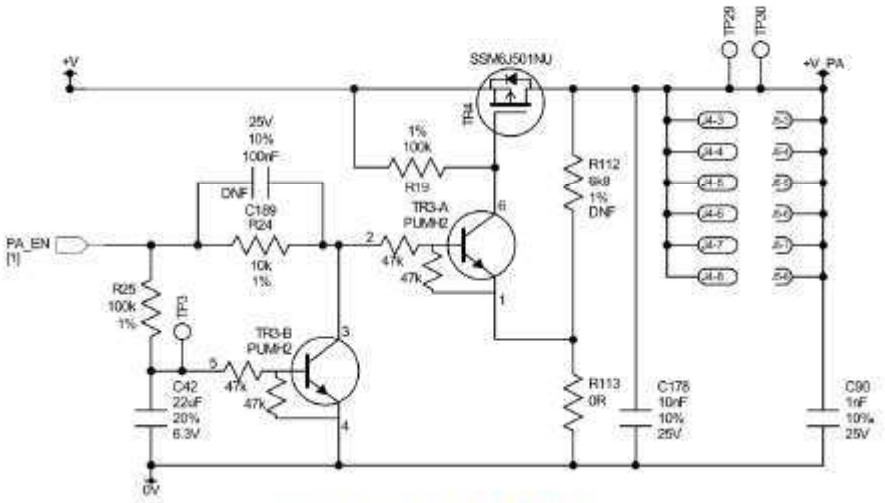

Figure 1: TX Timeout Circuitry

ii. Protection against repetitive self-test

(see section A.3.6.1)

406MHz Transmit Time Out

a. Beacon Self-Test

The self-test function of the beacon is implemented in the following sequence of in-line steps; there is no looping or repetition of any step:

- The 121.5MHz homing beacon is started, the modulation is monitored and after three sweeps of the modulation frequency the beacon is turned off.
- The AIS transmitter is activated and monitored; after one test message has been transmitted the transmitter is turned off.
- The 406MHz message transmitter is activated and monitored; after one test message has been transmitted the transmitter is turned off.
- The strobe LED light is activated and after one flash it is turned off.
- The indicator LEDs are flashed to indicate pass / fail status.
- The beacon then enters a shutdown mode in which it switches off power from the battery to all parts of the circuit except the micro. It is not possible to start another self-test if the test switch is held down.

To prevent inadvertent lockup of the test mode during the self-test procedure, the switch is continuously monitored by sampling its condition every 10 milliseconds by interrupt under the control of a hardware timer. The operation of the hardware timer and the operational software are continuously monitored for integrity by the use of a hardware watchdog timer.

If the self-test key were to remain pressed, no further action would occur. The key is connected to the power circuit via a series capacitor (C95); therefore, when the key is pressed to initiate the test a pulse is sent through to the power circuit to initiate the self-test sequence. Continuous pressing of the key will result in no further signal being passed through to the power circuit.

In summary, it is not possible to perform repeated self-tests unless by deliberate action on the part of the user to re-initiate the test.

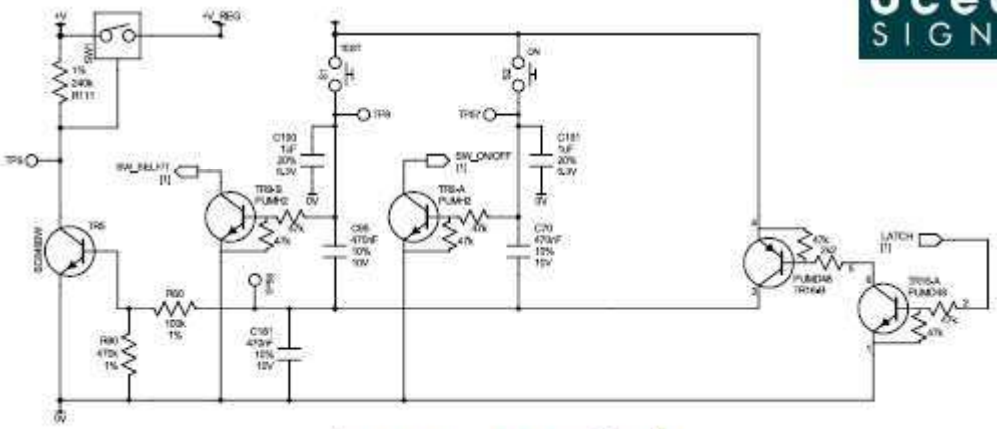

Figure 2: Beacon Keypad Circuit.

b. GNSS Receiver Self-Test

The GNSS self-test is limited to checking operation of the internal GNSS receiver only. If a fix is acquired during the test the beacon shall encode the position and perform a burst of 8 AIS transmissions followed by a 406MHz transmission. If a fix is not obtained the beacon shall not perform any transmission.

The test involves turning on the internal GNSS receiver and waiting for a position fix to be obtained. Once this condition is met then the beacon will report the status by transmission of AIS and 406 messages followed by use of the LEDs and then switch off. At the time that the GNSS receiver is turned on a timer is also started. This timer is implemented by counting interrupts generated from a hardware timer which in turn is monitored by the system watchdog. This timer will run for 90 seconds or be stopped by a position fix being obtained, whichever occurs first. If the timer completes its run then the beacon will report a failure by the use of the LEDs. It is not possible to repeat the test or perform any other function if the switch is held down.

On the initiation of a GNSS self-test the beacon checks in memory to see if any more GNSS self-tests are permitted (maximum 60). If a test is permitted, the GNSS receiver performs a cold start and waits for a maximum of 90 seconds.

If a usable fix is received within the 90 second window, the GNSS module is powered off. A burst of 8 AIS messages is scheduled at two second intervals. On completion of the 8th AIS transmission, the AIS transmitter is disabled and a single 406MHz is scheduled for immediate transmission.

On completion of a 406MHz transmission, the 406MHz transmitter is disabled and the beacon indicates that the test was successful via a sequence of green LED flashes.

In the event that no usable fix was received within the 90 second window, no AIS or 406MHz messages are transmitted and the beacon indicates that the test was unsuccessful via a sequence of red LED flashes.

If there are no tests available, the beacon indicates this by flashing the red LED rapidly twice, the GNSS is not enabled and no RF transmissions are made.

On completion of any of the above LED flashing sequences, the beacon is shut down.

This ensures that there can only be eight AIS transmissions, one 406MHz transmission and that the duration of the GNSS self-test is no longer than 115.62 seconds.

iii. Self-test default values

When sending a standard self-test message, the code that assembles the 406 message to be transmitted sets the GNSS latitude to longitude to be encoded as INVALID_POS. This has the effect of setting the appropriate location bits to the default values for the location protocol in use.

iv. Protection against GNSS receiver faulty operation

(see section 4.5.5 of C/S T.001)

The internal navigation device communicates with the beacon using a binary data format that includes a 16 bit checksum which is checked before any received data is processed further.

The encoded position data is only updated when the GNSS has reported that the fix is valid, the HDOP and horizontal accuracy are checked to be within defined limits and the time since the previous fix is greater than four minutes 30 seconds.

The non-reception of data, or the reception of invalid or corrupted data, or data that does not meet the criteria stated above will result in no change in encoded position unless the previous position is older than six hours at which point the default position will be used.

v. National-User protocol message encoding

The PLB3/PLB-450 does not support the use of National-User protocol long or short format.

ANNEX B

MODIFICATION STATE COMPARISON DATA