



Product Service

2.14 STROBE LIGHT TEST

2.14.1 Specification Reference

RTCM Paper 77-2002/SC110-STD, Clause A13.2

2.14.2 Equipment Under Test

RLB-36, Unit #4

2.14.3 Date of Test and Modification State

08 to 10 July 2008 - Modification State 1

2.14.4 Test Equipment Used

N/A – Test was performed by a Subcontractor

2.14.5 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Operating

2.14.6 Environmental Conditions

Ambient Temperature 20.6°C
Relative Humidity 52.1%

2.14.7 Test Results

Note: All tests completed as per sub contract report (Solar Simulator, REF: TUVUKJonestr270508TO) except strobe light duration. See Annex B – Sub Contractor Reports. Strobe light duration completed by TÜV as per results below. Test was conducted under the scope of this report at all three temperatures – extreme operating high, low and ambient for comparison.

Strobe Light Duration Summary

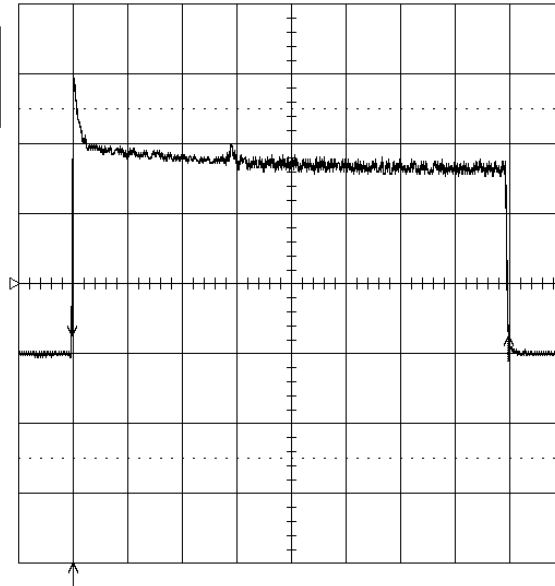
Parameter	Units	Test Results		
		T _{min} (-20°C)	T _{amb} (21.6°C)	T _{max} (+55°C)
Pulse duration, 10% Points	ms	39.98	39.98	39.91



Product Service

9-Jul-08
10:07:20

1
5 ms
30.0 mV
30.0 mV



5 ms BWL

1 .1 V DC

Δt 39.984 ms $\frac{1}{\Delta t}$ 25.010 Hz

2 .5 V DC

1 DC 106 mV

MEASURE

OFF **Cursors**
Parameters

mode
Time
Amplitude

type
Relative
Absolute

show
Diff - Ref
Diff & Ref

Reference
cursor
Track **OFF** On

Difference
cursor

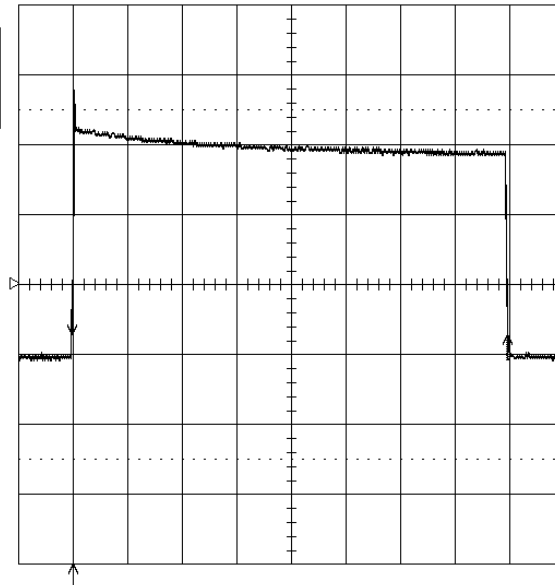
1 MS/s

STOPPED

Pulse Duration – Ambient

8-Jul-08
10:25:11

2
5 ms
33.1 mV
33.1 mV



5 ms BWL

1 5 V AC

Δt 39.915 ms $\frac{1}{\Delta t}$ 25.053 Hz

2 .1 V DC

2 DC 108 mV

MEASURE

OFF **Cursors**
Parameters

mode
Time
Amplitude

type
Relative
Absolute

show
Diff - Ref
Diff & Ref

Reference
cursor
Track **OFF** On

Difference
cursor

1 MS/s

STOPPED

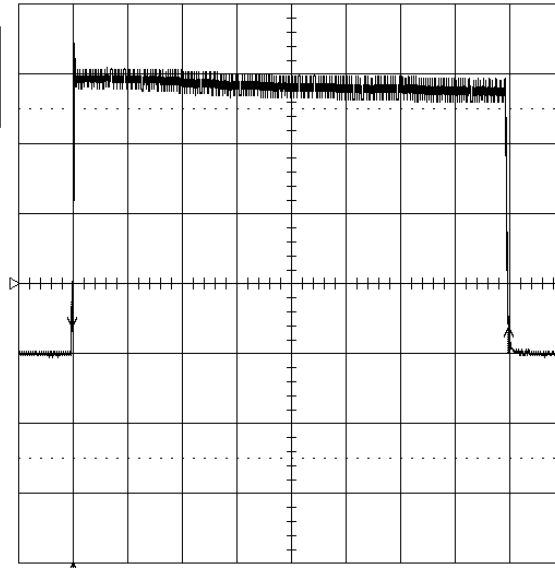
Pulse Duration – High Temperature (+55°C)



Product Service

9-Jul-08
13:47:42

1
5 ms
42.5 mV
42.5 mV



5 ms BWL

1 .1 V DC

Δt 39.981 ms $\frac{1}{\Delta t}$ 25.012 Hz

2 .5 V DC

1 DC 106 mV

MEASURE

OFF **Cursors**
Parameters

mode
Time
Amplitude

type
Relative
Absolute

show
Diff - Ref
Diff & Ref

Reference
cursor
Track **OFF** On

Difference
cursor

1 MS/s

□ STOPPED

Pulse Duration – Low Temperature (-20°C)



Product Service

2.15 SELF-TEST

2.15.1 Specification Reference

RTCM Paper 77-2002/SC110-STD, Clause A13.3

2.15.2 Equipment Under Test

RLB-36, Serial Number 007

2.15.3 Date of Test and Modification State

Test at Ambient:	21 July 2008	- Modification State 1
Test at +55°C and -20°C:	18 July 2008	- Modification State 1

2.15.4 Test Equipment Used

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

2.15.5 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Operating and Self-test

2.15.6 Environmental Conditions

	21 July 2008
Ambient Temperature	19.7°C
Atmospheric Pressure	1018mbar

2.15.7 Test Results

Summary of Aliveness test results

The EUT was stabilised at the relevant temperature for a minimum of 3 hours, it was then activated and an Aliveness test performed.

Stage	Pass / Fail
Ambient Aliveness Test	Pass
High Temperature (+55°C) Aliveness Test	Pass
Low Temperature (-20°C) Aliveness Test	Pass

Detailed Beacon Test Reports can be found below.



Product Service

Self-test Results

Following the Aliveness test the EUT was deactivated and allowed to rest for a minimum of 5 minutes. It was then re-activated in the self-test mode and the following measurements were made.

- Check that EUT reports successful self-test
- Beacon Test Report captured to demonstrate Digital Message and Hex ID are provided
- EUT Connected to 50Ω test system to measure/verify the following:
 - Pulse duration
 - Frame sync pattern
 - Number of bursts
 - 15 Hex ID

Results were as follows:

Parameter	Units	Test Results		
		T _{min} (-20°C)	T _{amb}	T _{max} (+55°C)
Self-test Indication	Pass/Fail	Pass	Pass	Pass
Pulse duration	ms	439.9193	439.9327	439.9418
Frame sync pattern	9 binary bits	0 1101 0000	0 1101 0000	0 1101 0000
Number of bursts	number	1	1	1
15 Hex ID	15 hexadecimal bits	2DDC4 407D4 FFBFF	2DDC4 407D4 FFBFF	2DDC4 407D4 FFBFF

Beacon Test Reports demonstrating Digital Message and Hex ID are provision can be found below.



Product Service

Beacon Test Report (Aliveness Test, Ambient Temperature)

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/21/08 8:52:23 AM
Tester Model/Serial No./File Name: BT100S/1025/02695-RTCM_STamb-2
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 22°C

PASS **FAIL** **INITIALS:** _____

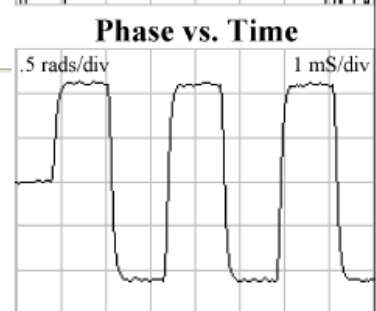
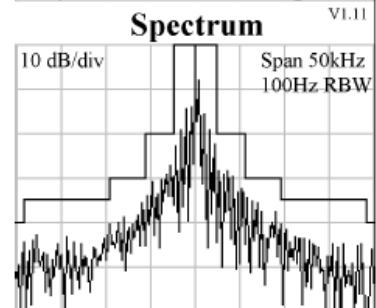
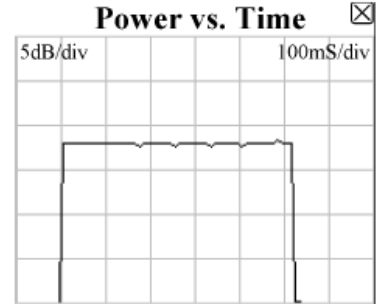
Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFE2F96EE2203EA7FDFCE287F783E0F66C
Burst Mode: Normal Mode (Long)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

406 MHz Measurements
406 Frequency (EXT REF): 406.036688 MHz
406 Power (5 Watt): 37.4 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.1 +1.1 radians
Modulation Rise Time: 177 uS
Modulation Fall Time: 198 uS
Modulation Symmetry: 0%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160.1 ms

DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.



Note: Beacon tester out of calibration, traceability maintained for frequency measurement by using a calibrated external reference. Power measurement for reference/comparison only and hence traceability unimportant. Similarly for the other parameters (e.g. modulation details).



Product Service

Beacon Test Report (Self-test, Ambient Temperature)

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/21/08 9:05:01 AM
Tester Model/Serial No./File Name: BT100S/1025/02695-RTCM_STamb-6
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 26°C

PASS **FAIL** **INITIALS:** _____

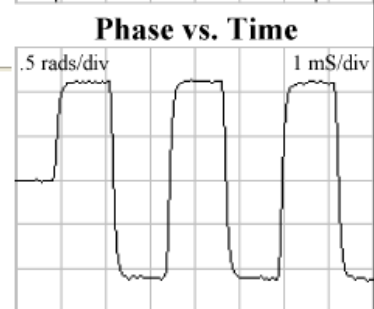
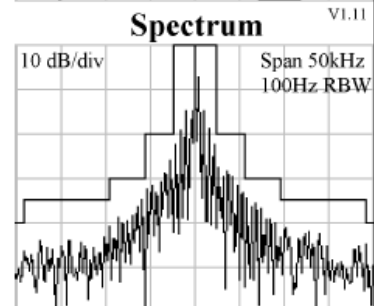
Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFED096EE2203EA7FDFFCE287F7
Burst Mode: Self Test Mode (Short)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

406 MHz Measurements
406 Frequency (EXT REF): 406.036709 MHz
406 Power (5 Watt): 37.4 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.09 +1.11 radians
Modulation Rise Time: 177 uS
Modulation Fall Time: 177 uS
Modulation Symmetry: 0%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160.4 ms

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Note: Beacon tester out of calibration, traceability maintained for frequency measurement by using a calibrated external reference. Power measurement for reference/comparison only and hence traceability unimportant. Similarly for the other parameters (e.g. modulation details).



Product Service

Beacon Test Report (Aliveness Test, High Temperature, +55°C)

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/18/08 5:03:11 PM
Tester Model/Serial No./File Name: BT100S/1025/02695-RTCM_ST+55-1
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 25°C

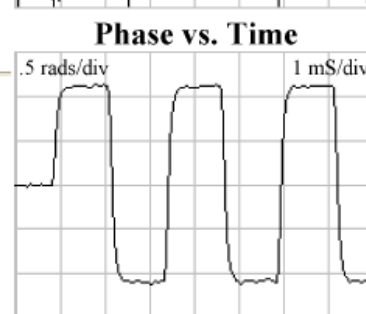
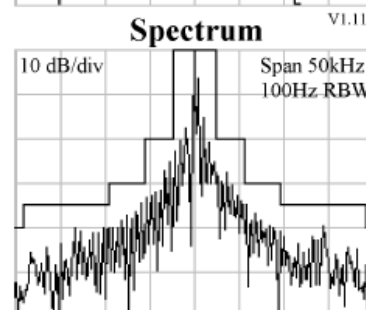
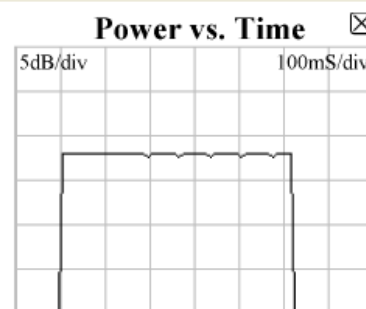
PASS **FAIL** **INITIALS:** _____

Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFE2F96EE2203EA7FDFCE287F783E0F66C
Burst Mode: Normal Mode (Long)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

406 MHz Measurements
406 Frequency (EXT REF): 406.036662 MHz
406 Power (5 Watt): 37.2 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.09 +1.11 radians
Modulation Rise Time: 188 uS
Modulation Fall Time: 188 uS
Modulation Symmetry: 0.4%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160.2 ms



DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.

Note: Beacon tester out of calibration, traceability maintained for frequency measurement by using a calibrated external reference. Power measurement for reference/comparison only and hence traceability unimportant. Similarly for the other parameters (e.g. modulation details).



Product Service

Beacon Test Report (Self-test, High Temperature, +55°C)

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/18/08 5:25:07 PM
Tester Model/Serial No./File Name: BT100S/1025/02695-RTCM_ST+55-9
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 24°C

PASS **FAIL** **INITIALS:** _____

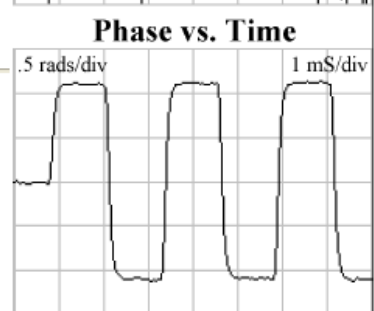
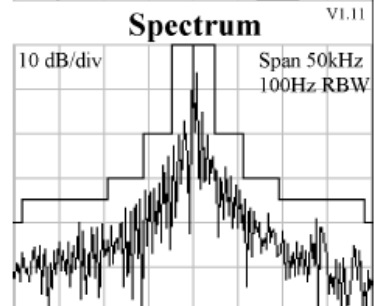
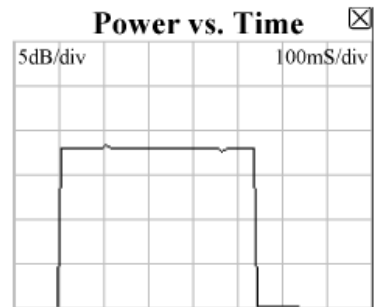
Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFED096EE2203EA7FDFFCE287F7
Burst Mode: Self Test Mode (Short)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

406 MHz Measurements
406 Frequency (EXT REF): 406.036659 MHz
406 Power (5 Watt): 37.7 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.09 +1.11 radians
Modulation Rise Time: 188 uS
Modulation Fall Time: 177 uS
Modulation Symmetry: 0%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160.3 ms

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Note: Beacon tester out of calibration, traceability maintained for frequency measurement by using a calibrated external reference. Power measurement for reference/comparison only and hence traceability unimportant. Similarly for the other parameters (e.g. modulation details).



Product Service

Beacon Test Report (Aliveness Test, Low Temperature, -20°C)

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/18/08 12:08:25 PM
Tester Model/Serial No./File Name: BT100S/1025/02695-RTCM_ST-5
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 25°C

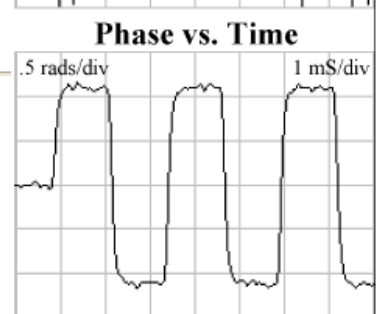
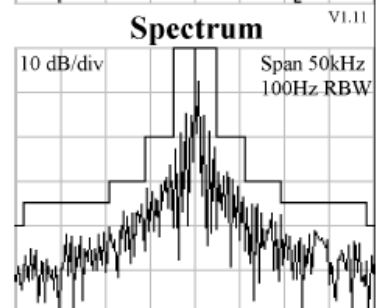
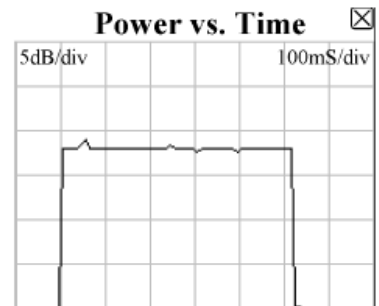
PASS
 FAIL
 INITIALS: _____

Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFE2F96EE2203EA7FDFCE287F783E0F66C
Burst Mode: Normal Mode (Long)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

406 MHz Measurements
406 Frequency (EXT REF): 406.036698 MHz
406 Power (5 Watt): 37.7 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.11 +1.1 radians
Modulation Rise Time: 177 uS
Modulation Fall Time: 165 uS
Modulation Symmetry: 0%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160.2 ms



DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.

Note: Beacon tester out of calibration, traceability maintained for frequency measurement by using a calibrated external reference. Power measurement for reference/comparison only and hence traceability unimportant. Similarly for the other parameters (e.g. modulation details).



Product Service

Beacon Test Report (Self-test, Low Temperature, -20°C)

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/18/08 12:16:08 PM
Tester Model/Serial No./File Name: BT100S/1025/02695-RTCM_ST-7
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 25°C

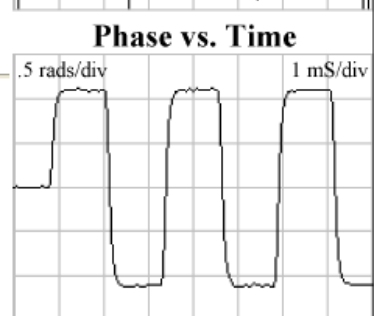
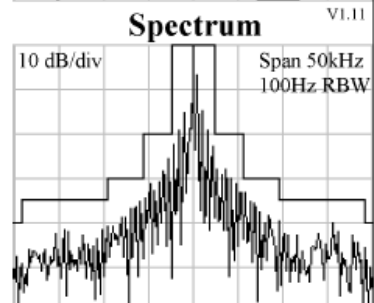
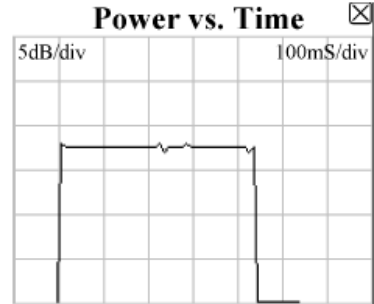
PASS
 FAIL
 INITIALS: _____

Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFED096EE2203EA7FDFFCE287F7
Burst Mode: Self Test Mode (Short)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

406 MHz Measurements
406 Frequency (EXT REF): 406.03672 MHz
406 Power (5 Watt): 37.5 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.11 +1.1 radians
Modulation Rise Time: 177 uS
Modulation Fall Time: 177 uS
Modulation Symmetry: 0%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160.4 ms



DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.

Note: Beacon tester out of calibration, traceability maintained for frequency measurement by using a calibrated external reference. Power measurement for reference/comparison only and hence traceability unimportant. Similarly for the other parameters (e.g. modulation details).



Product Service

2.16 AUTOMATIC RELEASE MECHANISM AND AUTOMATIC ACTIVATION TESTS

2.16.1 Specification Reference

RTCM Paper 77-2002/SC110-STD, Clause A14.0

2.16.2 Test Results

Test completed as per sub contract report (Qinetiq certificate number QINETIQ/MS.EES.TC0800450). See Annex B – Sub Contractor Reports.



Product Service

2.17 STABILITY AND BUOYANCY TEST**2.17.1 Specification Reference**

RTCM Paper 77-2002/SC110-STD, Clause A15.0

2.17.2 Equipment Under Test

RLB-36, Unit #10

2.17.3 Date of Test and Modification State

03 April 2008 - Modification State 0

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 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Idle*

*Note: EUT activated (entered Operating mode automatically) on contact with water.

2.17.6 Environmental Conditions

Ambient Temperature	23.2°C
Relative Humidity	39.1%
Atmospheric Pressure	1025mbar

2.17.7 Test ResultsStability

The EUT was completely submerged and held below the surface of the freshwater in the horizontal plane. It was then released and its return to the vertical position was timed. The test was repeated an additional 2 times to obtain an average duration:

Test₁ = 1.88sTest₂ = 1.47sTest₃ = 1.8sTest_{Average} = 1.72s



Product Service

Uprightness

The EUT was immersed in calm fresh water as shown in the following photograph and floated upright.



EUT Immersed In Fresh Water

Antenna Height

When floating in the upright position the base of the antenna was 45mm above the surface of the water.



Product Service

Reserve Buoyancy

A large tank was filled with domestic tap water. A 20kg mass with a pulley attachment was submerged into the tank. The pulley converted an upwards vertical force into a downwards force, completely submerging the EUT into the tank. The upwards vertical force supplied by the engineer was measured with a force gauge. This was the buoyant force. The EUT was strapped with cable ties to create a central fixing point for the pulley at the base of the EUT.

EUT mass = 0.603 kg
 EUT weight = 5.92 N

Buoyant forces measured were 1.7, 1.5 and 1.8 N
 Mean = 1.67 N

Reserve buoyancy = $\frac{\text{Buoyant Force}}{\text{Weight}}$ = $\frac{1.67}{5.92}$

Reserve buoyancy = 0.282



Product Service

2.18 INADVERTENT ACTIVATION TEST

2.18.1 Specification Reference

RTCM Paper 77-2002/SC110-STD, Clause A16.0

2.18.2 Equipment Under Test

RLB-36, Unit #10

2.18.3 Date of Test and Modification State

07 April 2008 - Modification State 0

2.18.4 Test Equipment Used

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

2.18.5 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Idle



Test Set-up



Product Service

2.18.6 Environmental Conditions

Ambient Temperature	8.7°C
Relative Humidity	52%
Atmospheric Pressure	998mbar

2.18.7 Test Results

The test was conducted in accordance with The Standard/Clause as detailed in “Specification Reference” above.

During the test the EUT was monitored for any 406 MHz transmissions. None was detected.

The EUT remained secure in the bracket/housing throughout the test.



Product Service

2.19 CARRIER FREQUENCY TEST**2.19.1 Specification Reference**

RTCM Paper 77-2002/SC110-STD, Clause A17.1

2.19.2 Equipment Under Test

RLB-36, Serial Number 007

2.19.3 Date of Test and Modification State

Test at +55°C: 20 June 2008 - Modification State 1
 Test at -20°C: 01 July 2008 - Modification State 1

2.19.4 Test Equipment Used

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

2.19.5 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Operating

2.19.6 Test Results

Parameter	Units	Test Results	
		T _{min} (-20°C)	T _{max} (+55°C)
Carrier Frequency	MHz	121.497469	121.499082



Product Service

2.20 MODULATION CHARACTERISTICS (TRANSMITTER DUTY CYCLE)

2.20.1 Specification Reference

RTCM Paper 77-2002/SC110-STD, Clause A17.2

2.20.2 Equipment Under Test

RLB-36, Serial Number 007

2.20.3 Date of Test and Modification State

Test at +55°C: 07 July 2008 - Modification State 1
 Test at -20°C: 27 June 2008 - Modification State 1

2.20.4 Test Equipment Used

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

2.20.5 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Operating

2.20.6 Test Results

Parameter	Units	Test Results	
		T _{min} (-20°C)	T _{max} (+55°C)
121.5 MHz transmission interruption duration	seconds	1.992*	2.026*
121.5 MHz transmission interruption interval	seconds	46.82	47.58
Transmitter Duty Cycle	%	95.9	95.9

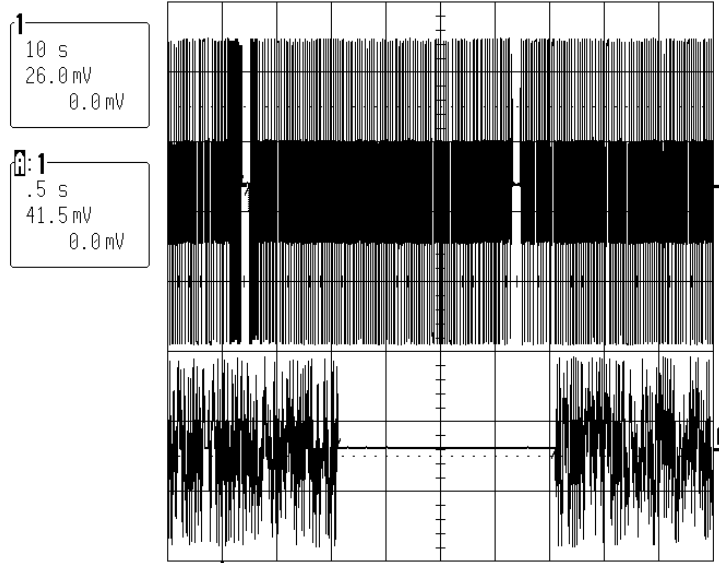
* Following consultation with the customer regarding this result, the customer implemented a modification reducing the interruption duration from 200 * 10 ms (2000 ms) to 199 * 10 ms (1990 ms). Details of the modification can be found at Annex A, customer supplied information. The following table shows the would-be results if reduced by 100 ms.

Parameter	Units	Test Results	
		T _{min} (-20°C)	T _{max} (+55°C)
121.5 MHz transmission interruption duration	seconds	1.892	1.926



Product Service

7-Jul-08
15:04:10



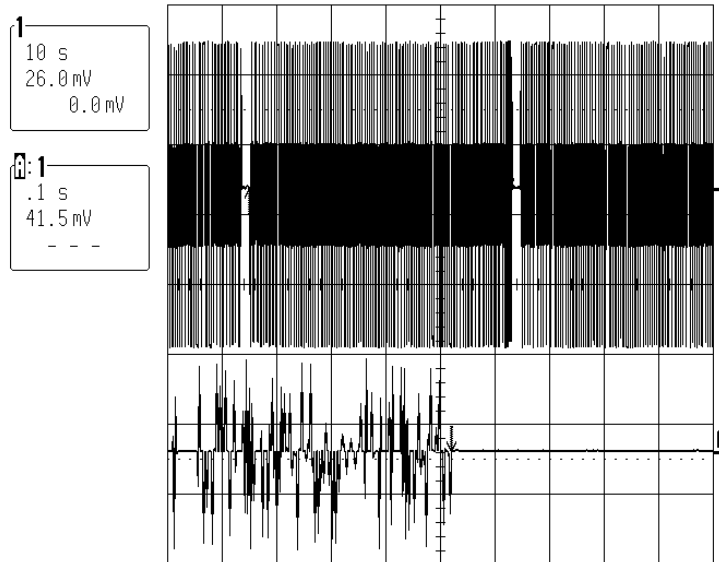
10 s BWL
1 26.0 mV AC Δt 2.026 s $\frac{1}{\Delta t}$ 493.5 MHz 500 S/s

2 .5 V DC 2 DC 0.00 V

STOPPED

Plot showing 121.5MHz interruption duration (High Temperature, +55°C)

7-Jul-08
15:05:40



10 s BWL
1 26.0 mV AC Δt -47.5862 s $\frac{1}{\Delta t}$ -21.014 MHz 500 S/s

2 .5 V DC 2 DC 0.00 V

STOPPED

Plot showing 121.5MHz interruption interval (High Temperature, +55°C)

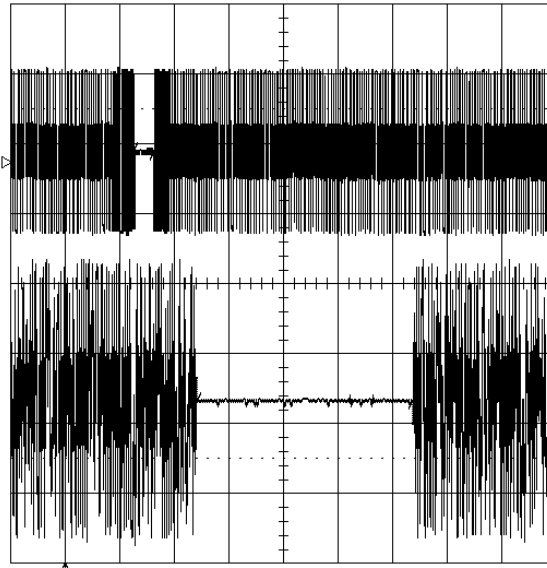


Product Service

27-Jun-08
15:32:39

1
5 s
200 mV
6 mV

2
.5 s
116 mV
6 mV



MEASURE

OFF **Cursors**
Parameters

mode
Time
Amplitude

type
Relative
Absolute

show
Diff - Ref
Diff & Ref

Reference
cursor
Track **OFF** On

Difference
cursor

5 s BWL

1 .2 V AC

Δt 1.992 s $\frac{1}{\Delta t}$ 502.0 MHz

1 kS/s

2 2 V DC



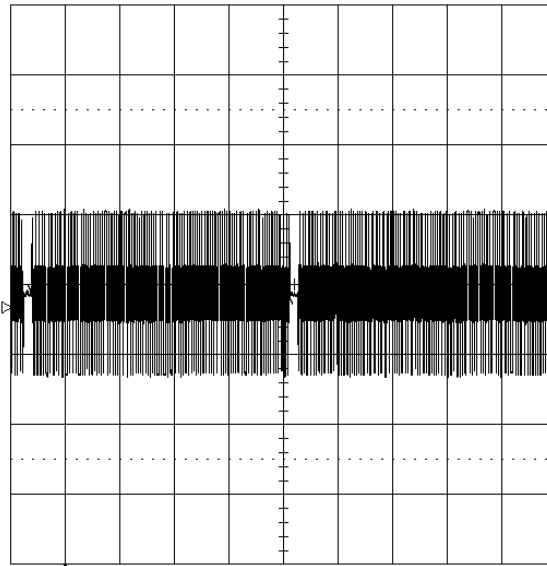
1 DC -0.028 V

□ STOPPED

Plot showing 121.5MHz interruption duration (Low Temperature, -20°C)

27-Jun-08
15:41:07

1
10 s
200 mV
0 mV



MEASURE

OFF **Cursors**
Parameters

mode
Time
Amplitude

type
Relative
Absolute

show
Diff - Ref
Diff & Ref

Reference
cursor
Track **OFF** On

Difference
cursor

10 s BWL

1 .2 V AC

Δt 46.823 s $\frac{1}{\Delta t}$ 21.357 MHz

500 S/s

2 2 V DC



1 DC -0.028 V

□ STOPPED

Plot showing 121.5MHz interruption interval (Low Temperature, -20°C)



Product Service

2.21 MODULATION CHARACTERISTICS (MODULATION FREQUENCY AND SWEEP REPETITION RATE, MODULATION DUTY CYCLE)

2.21.1 Specification Reference

RTCM Paper 77-2002/SC110-STD, Clause A17.2

2.21.2 Equipment Under Test

RLB-36, Serial Number 007

2.21.3 Date of Test and Modification State

Test at +55°C: 20 June 2008 - Modification State 1
 Test at -20°C: 01 July 2008 - Modification State 1

2.21.4 Test Equipment Used

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

2.21.5 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Operating

2.21.6 Test Results

The EUT was connected to the automated test rack, the following results were obtained.

Parameter	Units	Test Results	
		T _{min} (-20°C)	T _{max} (+55°C)
Frequency Range	Hz	1026.74	1032.75
Minimum Frequency	Hz	540.5	533.3
Maximum Frequency	Hz	1567.24	1566.05
Sweep Direction	Upward / Downward	Downward	Downward
Modulation Duty Cycle	%	35.71	36.09
Sweep repetition rate	sweeps per second	2.56	2.56



Product Service

2.22 MODULATION CHARACTERISTICS (MODULATION FACTOR)

2.22.1 Specification Reference

RTCM Paper 77-2002/SC110-STD, Clause A17.2

2.22.2 Equipment Under Test

RLB-36, Serial Number 007

2.22.3 Date of Test and Modification State

Test at +55°C: 08 July 2008 - Modification State 1
 Test at -20°C: 09 July 2008 - Modification State 1

2.22.4 Test Equipment Used

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

2.22.5 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Operating

2.22.6 Test Results

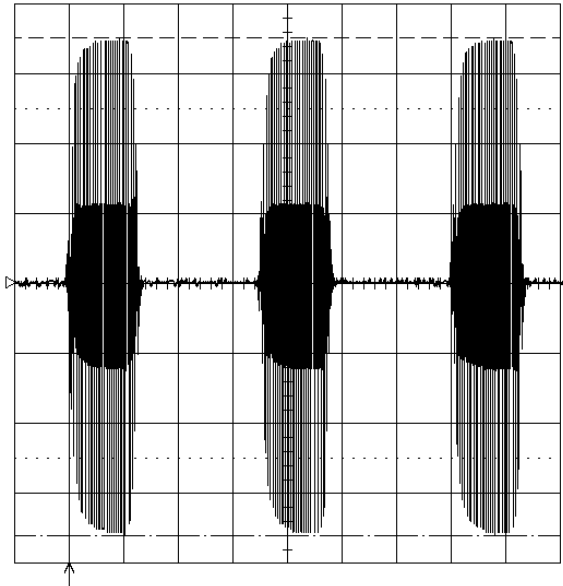
Parameter	Units	Test Results	
		T _{min} (-20°C)	T _{max} (+55°C)
A	mv	370.3	114.0
B	mv	11.3	2.7
Modulation Duty Cycle		0.94	0.95



Product Service

8-Jul-08
9:13:22

1
.2 ms
16.0 mV
114.0 mV



MEASURE

OFF **Cursors**
Parameters

mode
Time
Amplitude

type
Relative
Absolute

Reference
cursor
Track **OFF** On

Difference
cursor

25 MS/s

STOPPED

.2 ms BWL

1 16.0 mV AC

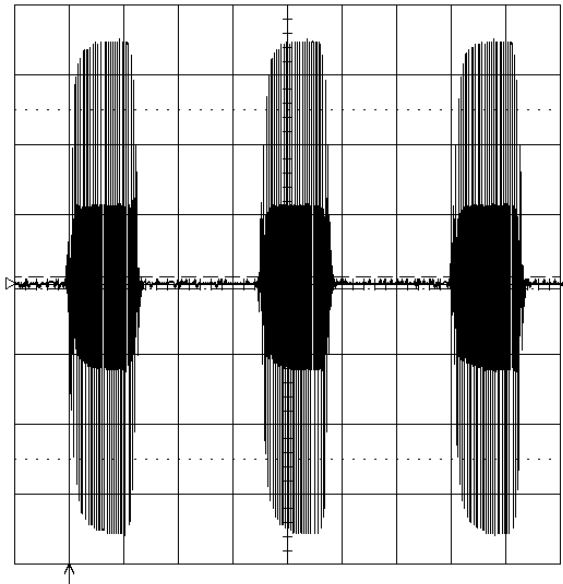
2 .5 V DC

1 DC 0.3 mV

Plot showing "A" (High Temperature, +55°C)

8-Jul-08
9:15:44

1
.2 ms
16.0 mV
2.7 mV



MEASURE

OFF **Cursors**
Parameters

mode
Time
Amplitude

type
Relative
Absolute

Reference
cursor
Track **OFF** On

Difference
cursor

25 MS/s

STOPPED

.2 ms BWL

1 16.0 mV AC

2 .5 V DC

1 DC 0.3 mV

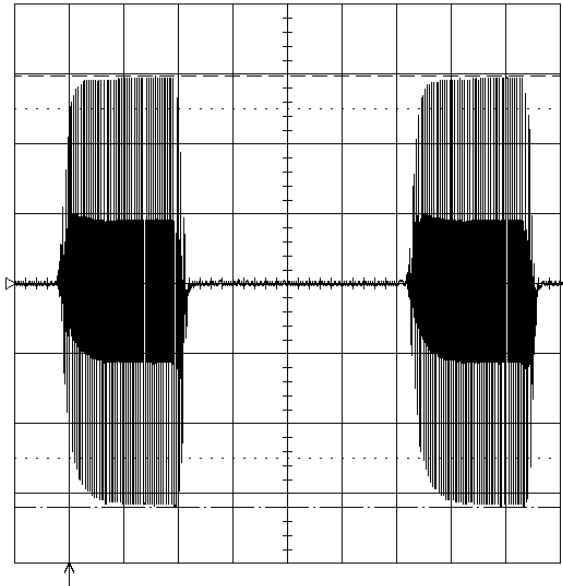
Plot Showing "B" (High Temperature, +55°C)



Product Service

9-Jul-08
13:37:44

1
.2 ms
60 mV
370.3 mV



MEASURE

OFF **Cursors**
Parameters

mode
Time
Amplitude

type
Relative
Absolute

Reference
cursor
Track **OFF** On

Difference
cursor

.2 ms BWL

1 60 mV DC

2 .5 V DC

1 DC 0 mV

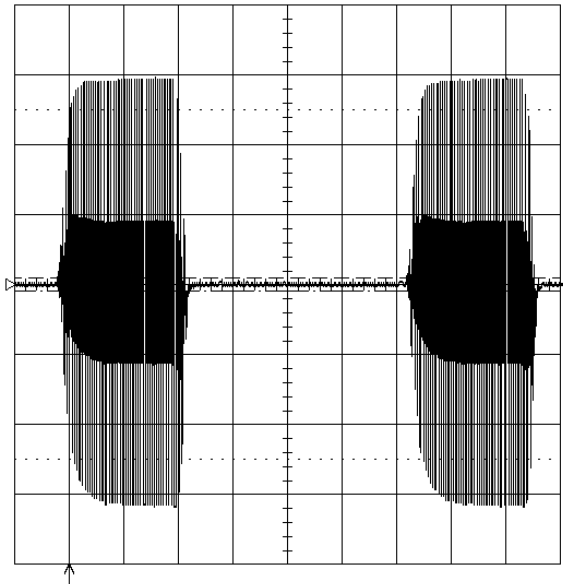
25 MS/s

STOPPED

Plot showing "A" (Low Temperature, -20°C)

9-Jul-08
13:38:34

1
.2 ms
60 mV
11.3 mV



MEASURE

OFF **Cursors**
Parameters

mode
Time
Amplitude

type
Relative
Absolute

Reference
cursor
Track **OFF** On

Difference
cursor

.2 ms BWL

1 60 mV DC

2 .5 V DC

1 DC 0 mV

25 MS/s

STOPPED

Plot Showing "B" (Low Temperature, -20°C)



Product Service

2.23 MODULATION CHARACTERISTICS (FREQUENCY COHERENCE)

2.23.1 Specification Reference

RTCM Paper 77-2002/SC110-STD, Clause A17.2

2.23.2 Equipment Under Test

RLB-36, Serial Number 007

2.23.3 Date of Test and Modification State

Test at +55°C:	20 June 2008	- Modification State 1
Test at -20°C:	27 June 2008	- Modification State 1

2.23.4 Test Equipment Used

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

2.23.5 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Operating

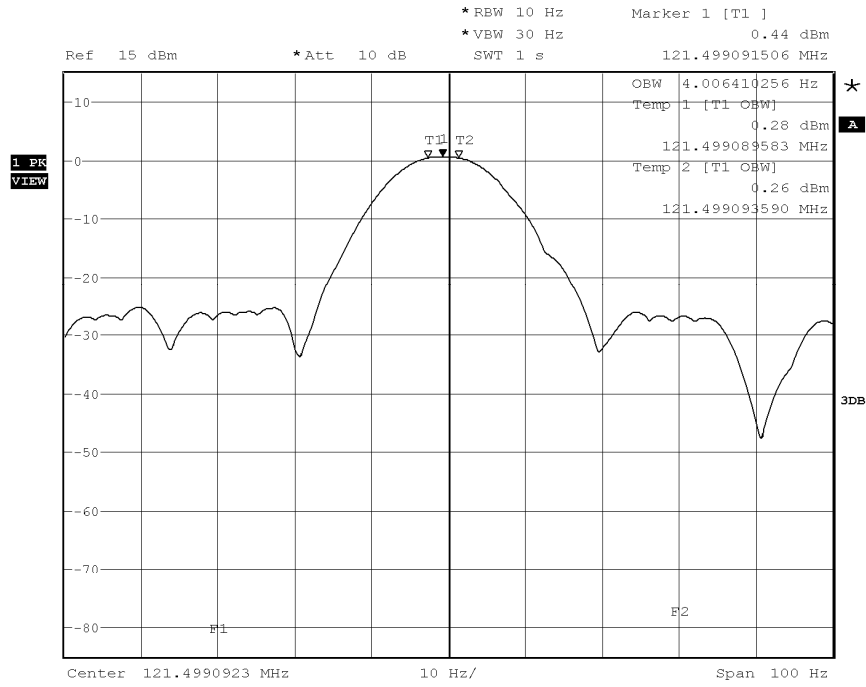
2.23.6 Test Results

The following plots show that 30% of the output power of the EUT does lie within ± 30 Hz of the carrier.

The frequency drift shows the outline of the transmitted RF (121.5 MHz) before and after the interruption for the 406 MHz RF burst. It can be seen that the carrier did not shift by more than ± 30 Hz.



Product Service

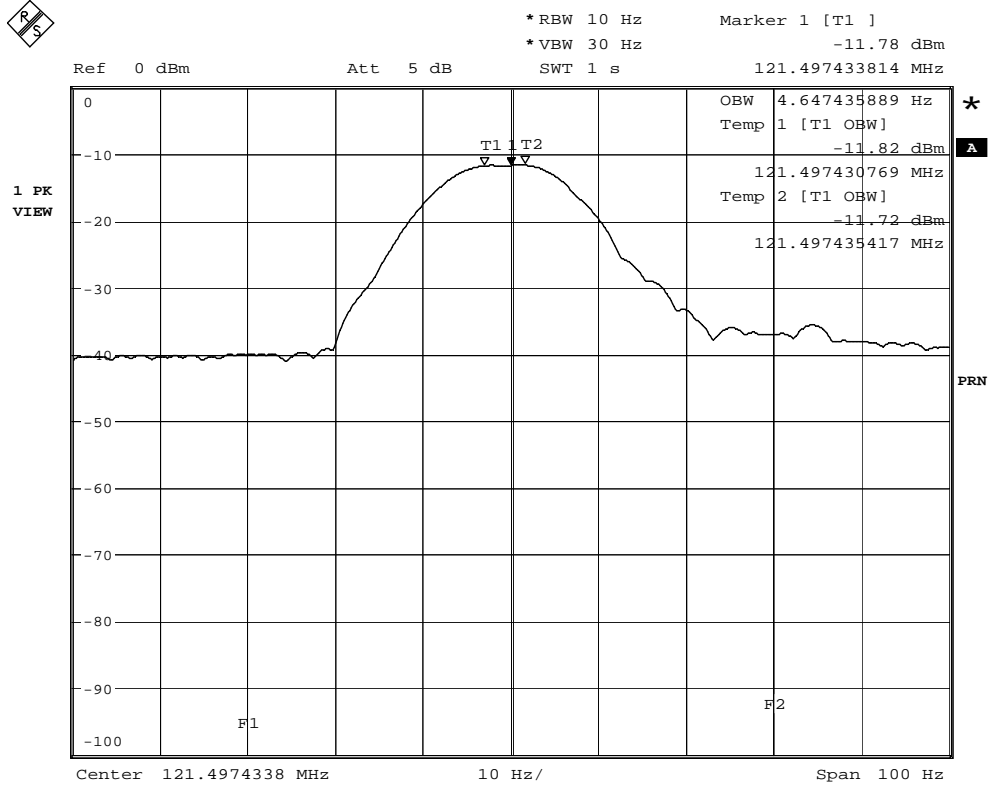


FR
 Date: 20.JUN.2008 14:09:32

Frequency Coherence and Drift – High (+55°C)



Product Service



Date: 27.JUN.2008 16:09:22

Frequency Coherence and Drift – Low (-20°C)



Product Service

2.24 PEAK EFFECTIVE RADIATED POWER

2.24.1 Specification Reference

RTCM Paper 77-2002/SC110-STD, Clause A17.3

2.24.2 Equipment Under Test

RLB-36, Serial Number Unit #10

2.24.3 Date of Test and Modification State

24 April 2008 - Modification State 0

2.24.4 Test Equipment Used

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

2.24.5 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Operating

2.24.6 Test Results

Note: EUT battery used for test had been operational in the same beacon for a duration of >44 hours.

Measurements were made (in dBm) at an arbitrarily chosen azimuth angle across a range of elevation angles. Upon finding the maximum, the elevation was fixed and 12 measurements made at 30° azimuth increments.

These results (from the vertically polarised dipole) were converted to PERP in mW. See the following table.

Elevation (°)	Azimuth (°)											
	0	30	60	90	120	150	180	210	240	270	300	330
5	156.82	98.97	88.20	88.20	88.20	130.5	101.3	98.97	98.97	143.05	98.97	98.97
10	118.98	-	-	-	-	-	-	-	-	-	-	-
15	105.27	-	-	-	-	-	-	-	-	-	-	-
20	92.514	-	-	-	-	-	-	-	-	-	-	-

The median result was calculated to be 98.70 mW, or 19.95dBm.

The ratio between the maximum and minimum values was calculated to be 1.62dB (showing the antenna to be Omnidirectional in accordance with The Standard which specifies <4dB)



Product Service

2.25 VSWR MEASUREMENT

2.25.1 Specification Reference

RTCM Paper 77-2002/SC110-STD, Clause A17.4

2.25.2 Test Results

Antenna is not removable, hence test is not applicable.



Product Service

2.26 HUMIDITY TEST

2.26.1 Specification Reference

RTCM Paper 77-2002/SC110-STD, Clause A18.0

2.26.2 Equipment Under Test

RLB-36, Unit #10

2.26.3 Date of Test and Modification State

02 and 03 April 2008 - Modification State 0

2.26.4 Test Equipment Used

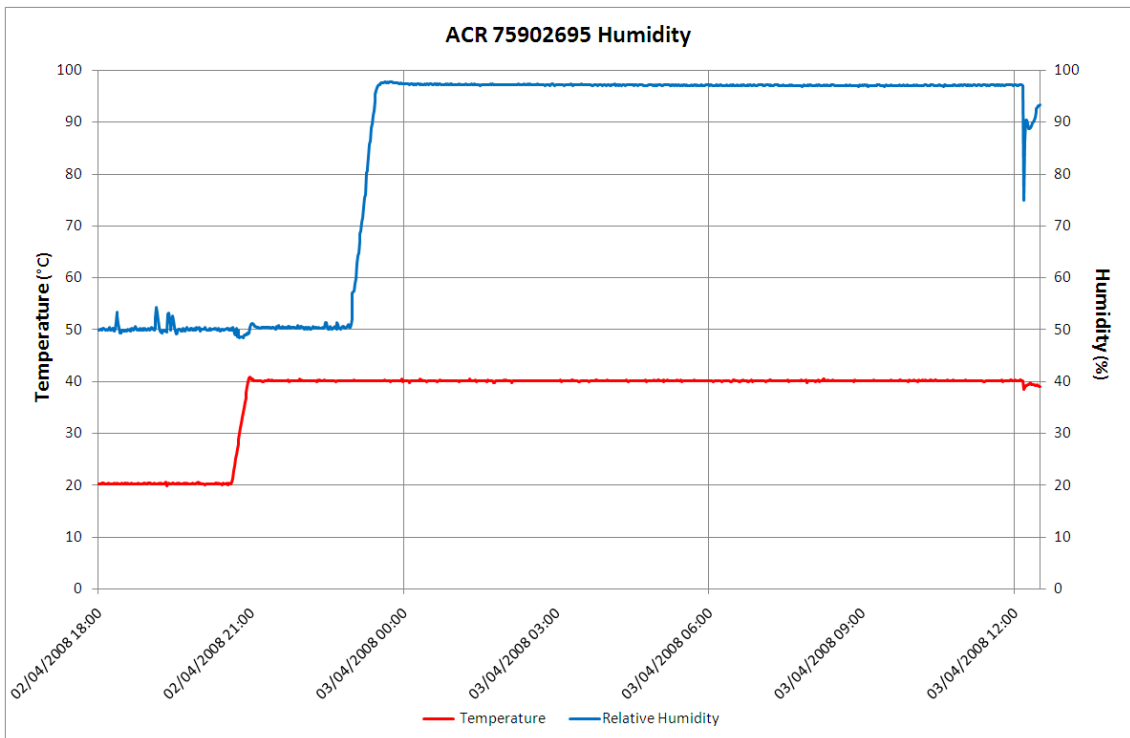
The major items of test equipment used for the above tests are identified in Section 3.1.

2.26.5 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Idle and Operating

2.26.6 Environmental Conditions

Humidity Test Conditions Plot





Product Service

2.26.7 Test Results02 April 2008

The EUT was dismantled, exposing the internal electrical components to the humid test environment.

The EUT was positioned in the climatic chamber. The chamber conditions were adjusted to +40°C, 97% RH. The chamber conditions were maintained for a period of 13 hours 30 minutes.

03 April 2008

The EUT was removed from the chamber into laboratory ambient conditions. The EUT was powered on immediately after being removed from the chamber. An Aliveness Test was performed 15 minutes after the EUT was removed from the chamber, see Beacon Test Report below.



Product Service

Beacon Test Report (Post-Test)

Beacon Test Report

2DDC4407D2FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 4/3/08 12:11:25 PM
Tester Model/Serial No./File Name: BT100S/1025/02695_Post-Hum-1
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 23°C

PASS
 FAIL
 INITIALS: _____

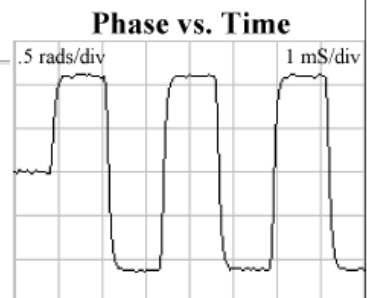
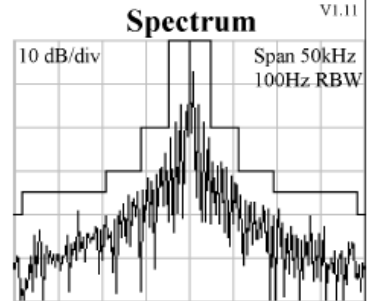
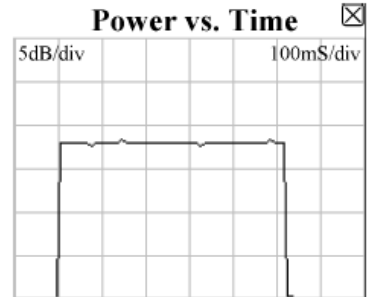
Notes: Add text comments here.

15 Hex ID: 2DDC4407D2FFBFF
Full Hex: FFFE2F96EE2203E97FDFFA885FF783E0F66C
Burst Mode: Normal Mode (Long)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229225

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

406 MHz Measurements
406 Frequency (EXT REF): 406.036596 MHz
406 Power (INT ANT): 82%
Power Rise Time: < 5 ms
Phase Deviation: -1.12 +1.09 radians
Modulation Rise Time: 177 uS
Modulation Fall Time: 177 uS
Modulation Symmetry: 0.3%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160.2 ms

DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.





Product Service

Beacon Test Report

2DDC4407D2FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 4/3/08 12:30:57 PM
Tester Model/Serial No./File Name: BT100S/1025/02695_Post-Hum-24
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 28°C

PASS **FAIL** **INITIALS:** _____

Notes: Add text comments here.

15 Hex ID: 2DDC4407D2FFBFF
Full Hex: FFFED096EE2203E97FDFFA885FF7
Burst Mode: Self Test Mode (Short)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229225

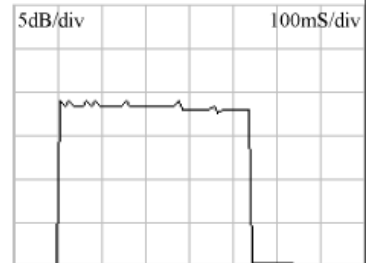
Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

406 MHz Measurements
406 Frequency (EXT REF): 406.036632 MHz
406 Power (5 Watt): 20.8 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.11 +1.08 radians
Modulation Rise Time: 198 uS
Modulation Fall Time: 188 uS
Modulation Symmetry: 0%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160 ms

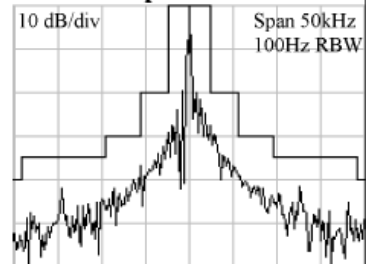
121.5 MHz Measurements
121 Frequency (EXT REF): Detected.
121 Power (5 Watt): -1 dBm
Signal was unmodulated.

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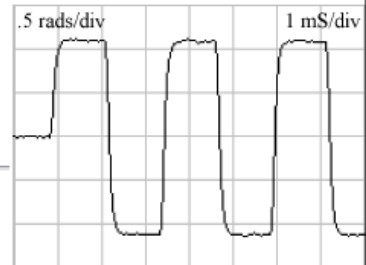
Power vs. Time



Spectrum VI.11



Phase vs. Time





Product Service

2.27 ORIENTATION TEST**2.27.1 Specification Reference**

RTCM Paper 77-2002/SC110-STD, Clause A19.0

2.27.2 Equipment Under Test

RLB-36, Serial Number 007

2.27.3 Date of Test and Modification State

02 July 2008 - Modification State 1

2.27.4 Test Equipment Used

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

2.27.5 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Operating

2.27.6 Environmental Conditions

Ambient Temperature	21.7°C
Relative Humidity	34.2%
Atmospheric Pressure	1013mbar



Product Service

2.27.7 Test Results

Beacon Orientation – Vertical (Initial)

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/2/08 4:09:45 PM
Tester Model/Serial No./File Name: BT100S/1025/2695up-1
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 20°C

PASS

 FAIL

 INITIALS: _____

Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFED096EE2203EA7FDFFCE287F7
Burst Mode: Self Test Mode (Short)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * **°**'***
Longitude: * **°**'***

406 MHz Measurements
406 Frequency (INT REF): 406.0371 MHz
406 Power (5 Watt): 37.6 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.09 +1.1 radians
Modulation Rise Time: 209 uS
Modulation Fall Time: 177 uS
Modulation Symmetry: 0%
Modulation Bit Rate: 399.8 bps
CW Preamble: 159.9 ms

Power vs. Time

Spectrum VI.11

Phase vs. Time

DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.



Product Service

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/2/08 4:11:38 PM
Tester Model/Serial No./File Name: BT100S/1025/2695up-2
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 24°C

PASS
 FAIL
 INITIALS: _____

Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFE2F96EE2203EA7FDFFCE287F783E0F66C
Burst Mode: Normal Mode (Long)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

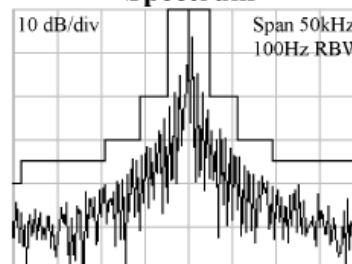
406 MHz Measurements
406 Frequency (INT REF): 406.0371 MHz
406 Power (5 Watt): 38.3 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.11 +1.09 radians
Modulation Rise Time: 177 uS
Modulation Fall Time: 177 uS
Modulation Symmetry: 0.3%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160 ms

DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.

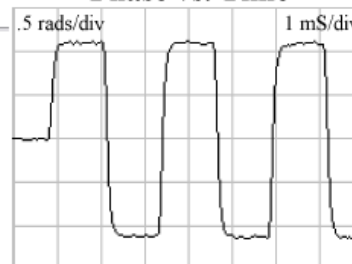
Power vs. Time



Spectrum VI.11



Phase vs. Time





Product Service

Beacon Orientation – Horizontal

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/2/08 4:14:24 PM
Tester Model/Serial No./File Name: BT100S/1025/2695up-4
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 23°C

PASS
 FAIL
 INITIALS: _____

Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFED096EE2203EA7FDFFCE287F7
Burst Mode: Self Test Mode (Short)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

406 MHz Measurements
406 Frequency (INT REF): 406.0371 MHz
406 Power (5 Watt): 38.4 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.1 +1.1 radians
Modulation Rise Time: 177 uS
Modulation Fall Time: 165 uS
Modulation Symmetry: 0.3%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160.1 ms

Power vs. Time

Spectrum VI.11

Phase vs. Time

DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.



Product Service

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/2/08 4:14:08 PM
Tester Model/Serial No./File Name: BT100S/1025/2695up-3
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 23°C

PASS

 FAIL

 INITIALS: _____

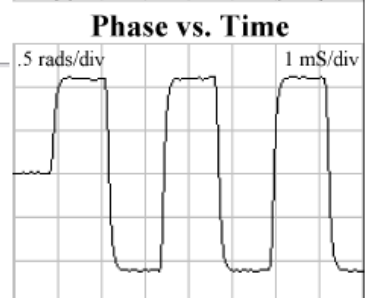
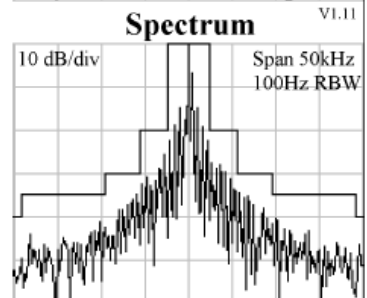
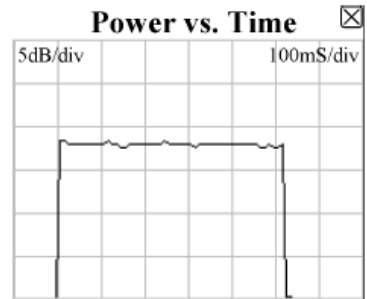
Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFE2F96EE2203EA7FDFFCE287F783E0F66C
Burst Mode: Normal Mode (Long)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

406 MHz Measurements
406 Frequency (INT REF): 406.0371 MHz
406 Power (5 Watt): 37.8 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.1 +1.09 radians
Modulation Rise Time: 177 uS
Modulation Fall Time: 177 uS
Modulation Symmetry: 0%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160.2 ms

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Product Service

Beacon Orientation – Inverted

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/2/08 4:20:03 PM
Tester Model/Serial No./File Name: BT100S/1025/2695up-6
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 23°C

PASS

 FAIL

 INITIALS: _____

Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFED096EE2203EA7FDFFCE287F7
Burst Mode: Self Test Mode (Short)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

406 MHz Measurements
406 Frequency (INT REF): 406.0371 MHz
406 Power (5 Watt): 37.6 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.1 +1.11 radians
Modulation Rise Time: 177 uS
Modulation Fall Time: 188 uS
Modulation Symmetry: 0.4%
Modulation Bit Rate: 399.8 bps
CW Preamble: 159.9 ms

Power vs. Time

Spectrum VI.11

Phase vs. Time

DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.



Product Service

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/2/08 4:19:46 PM
Tester Model/Serial No./File Name: BT100S/1025/2695up-5
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 23°C

PASS **FAIL** **INITIALS:** _____

Notes: Add text comments here.

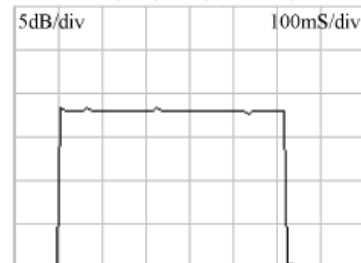
15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFE2F96EE2203EA7FDFFCE287F783E0F66C
Burst Mode: Normal Mode (Long)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

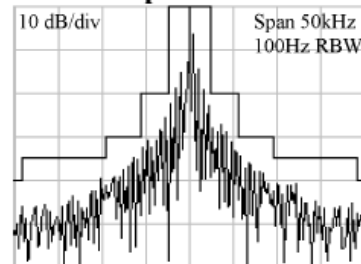
406 MHz Measurements
406 Frequency (INT REF): 406.0371 MHz
406 Power (5 Watt): 37.6 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.09 +1.1 radians
Modulation Rise Time: 177 uS
Modulation Fall Time: 177 uS
Modulation Symmetry: 0%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160.3 ms

DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.

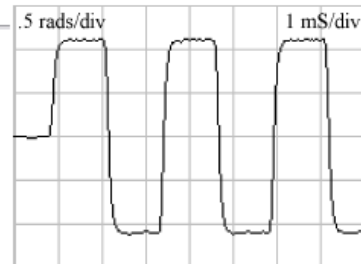
Power vs. Time



Spectrum VI.11



Phase vs. Time





Product Service

Beacon Orientation – Vertical

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/2/08 4:25:05 PM
Tester Model/Serial No./File Name: BT100S/1025/2695up-8
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 23°C

PASS
 FAIL
 INITIALS: _____

Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFED096EE2203EA7FDFFCE287F7
Burst Mode: Self Test Mode (Short)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

406 MHz Measurements
406 Frequency (INT REF): 406.0371 MHz
406 Power (5 Watt): 37.6 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.11 +1.09 radians
Modulation Rise Time: 188 uS
Modulation Fall Time: 177 uS
Modulation Symmetry: 0%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160.3 ms

Power vs. Time

Spectrum VI.11

Phase vs. Time

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Product Service

Beacon Test Report

2DDC4407D4FFBFF

Organization: TÜV Product Service Ltd
Tested By: Emergency Beacons Dept.
Date: 7/2/08 4:24:40 PM
Tester Model/Serial No./File Name: BT100S/1025/2695up-7
Tester Cal Due Date: Nov 10, 2006
Tester Temperature: 23°C

PASS

 FAIL

 INITIALS: _____

Notes: Add text comments here.

15 Hex ID: 2DDC4407D4FFBFF
Full Hex: FFFE2F96EE2203EA7FDFCE287F783E0F66C
Burst Mode: Normal Mode (Long)
Protocol: Standard Test Protocol
Country 366: United States
Bits 41 - 64: 2229226

Position Source: Internal GPS
Auxiliary Radio: 121.5 MHz
Bits 107-110: Default
Latitude: * * * * *
Longitude: * * * * *

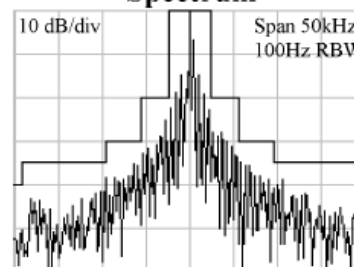
406 MHz Measurements
406 Frequency (INT REF): 406.0371 MHz
406 Power (5 Watt): 37.9 dBm
Power Rise Time: < 5 ms
Phase Deviation: -1.1 +1.11 radians
Modulation Rise Time: 188 uS
Modulation Fall Time: 198 uS
Modulation Symmetry: 0%
Modulation Bit Rate: 399.8 bps
CW Preamble: 160.1 ms

DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.

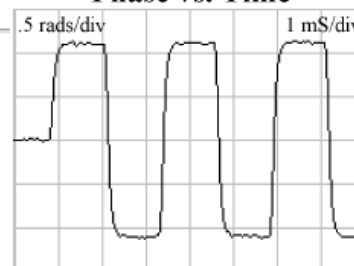
Power vs. Time



Spectrum VI.11



Phase vs. Time





Product Service

SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

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

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.23 Beacons - 121 Frequency Coherence					
Climatic Chamber	Heraeus Votsch	VM 04/100	85	-	O/P Mon
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	12	3-Jun-2009
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3158	12	18-Jun-2009
Section 2.21 Beacons - 121 Modulation Characteristics					
Climatic Chamber	Heraeus Votsch	VMT 04/30	40	-	O/P Mon
Signal Generator	Hewlett Packard	8644A	96	12	17-Apr-2009
Beacon RF Unit	TUV	N/A	97	-	TU
Time Interval Analyser	Yokogawa	TA720	181	12	27-Feb-2009
High Resolution Oscilloscope	Gould	840	182	12	6-Mar-2009
Attenuator 10dB 25W	Weinschel	46-10-43	400	12	6-May-2009
Attenuator 10dB/10W)	Trilithic	HFP-50N	454	0	19-Jul-2008
Attenuator (10dB, 75W)	Bird	8308-100	469	12	29-Nov-2008
3dB/10W Attenuator	Texscan	HFP-50N	475	12	20-Mar-2009
Attenuator: 6dB/10W	Trilithic	HFP-50N	476	12	19-Jul-2008
Attenuator: 10dB/20W	Narda	766-10	480	12	19-Jul-2008
Signal Generator	Hewlett Packard	8663A	1063	12	13-Feb-2009
Attenuator (10dB, 10W)	Trilithic	HFP-50N	1377	12	5-Sep-2008
Hygromer	Rotronic	Hygropalm	2404	12	5-Dec-2008
Termination (50ohm, 15W)	Radio Spares	612-192	2425	12	5-Sep-2008
Distress Beacon RF Unit	TUV	-	2445	-	TU
Beacon RF Unit	TUV	N/A	3066	-	TU
Termination (50ohm, 6W)	Micronde	R404613	3074	12	15-Mar-2009
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-3-34	3161	12	2-Jun-2009



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.21 Beacons - 121 Modulation Characteristics (continued)					
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-3-34	3162	12	18-Jun-2009
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-3-34	3163	12	2-Jun-2009
Bandpass Filter	Trilithic	5BE406/35-1-AA	3205	12	28-Jul-2008
Bandpass Filter	Trilithic	5BE406/35-1-AA	3207	12	18-Sep-2008
Time Interval Analyser	Yokogawa	TA720 704510	3253	12	6-Nov-2008
ScopeCorder	Yokogawa	DL750 701210	3254	12	6-Nov-2008
Cable (1m, N type)	Rhophase	NPS-1601-1000-NPS	3350	12	22-Apr-2009
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3358	12	22-Apr-2009
Cable (3m, N-type)	Rhophase	NPS-1601-3000-NPS	3360	12	22-Apr-2009
Bandpass Filter	Trilithic	5BE121.55/35-3-BA	3411	12	28-Jul-2008
Section 2.22 & 2.19 Beacons - 121 Modulation Factor and Carrier Frequency					
Climatic Chamber	Heraeus Votsch	VMT 04/30	40	-	O/P Mon
3dB/10W Attenuator	Texscan	HFP-50N	475	12	20-Mar-2009
1GHz Digital Oscilloscope	Lecroy	9370M	612	12	24-Sep-2008
Hygrometer	Rotronic	I-1000	3068	12	26-Jun-2009
Thermocouple Thermometer	Fluke	51	3174	12	26-Jun-2009
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3359	12	22-Apr-2009



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.10 Beacons - 121 Spurious Emissions					
Climatic Chamber	Heraeus Votsch	VM 04/100	85	-	O/P Mon
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	9-Jun-2009
Termination (50ohm, 15W)	Diamond Antenna	DL-30N	3097	12	15-Mar-2009
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3158	12	18-Jun-2009
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3354		22-Apr-2009
Section 2.20 Beacons - 121 Transmitter Duty Cycle					
Climatic Chamber	Heraeus Votsch	VM 04/100	85	-	O/P Mon
Attenuator: 10dB/20W	Narda	766-10	480	12	19-Jul-2008
1GHz Digital Oscilloscope	Lecroy	9370M	612	12	24-Sep-2008
Section 2.24 Beacons - Antenna Characteristics					
Spectrum Analyser	Hewlett Packard	8568B	571	12	1-Feb-2009
Signal Generator	Rohde & Schwarz	SMS-2/28	1431	12	2-May-2008
Antenna Mast	EMCO	1050	1707	-	TU
Turntable Controller	Various	RH253	1708	-	TU
Open Area Site 2	TUV	OATS2	1850	36	3-Oct-2008
Turntable Interface	Various	RH-253.6	1855	-	TU
Antenna Tower 6M	EMCO	1050	1859	-	TU
Roberts Antenna 406MHz	Compliance Design	-	1860	24	29-Jun-2009
Section 2.13 Beacons - Battery Current Measurements					
PICO ADC-16 High Resoulution Data Logger	Pico Technology Ltd	ADC-16	2264	12	6-Jan-2009
Termination (50ohm, 15W)	Radio Spares	612-192	2416	12	5-Sep-2008
Hygrometer	Rotronic	I-1000	3068	12	25-Apr-2008
Resistor (Nominal 0.25ohm)	TUV	2x RS Components 188-071 R5/100W Resistors	3343	-	TU



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.13 Beacons - Operating Lifetime					
Climatic Chamber	Heraeus Votsch	VMT 04/30	40	-	O/P Mon
Power Supply Unit	Farnell	LT-30-2	41	-	O/P Mon
Power Meter	Hewlett Packard	436A	47	12	9-Jul-2008
Power Meter	Hewlett Packard	436A	83	12	11-Aug-2008
Climatic Chamber	Heraeus Votsch	VM 04/100	85	-	O/P Mon
Beacon Tester	WS Technologies	BT 100S	87	-	TU
Rubidium Frequency Standard	Quartzlock	A10-B	92	12	2-Jan-2009
Time Interval Analyser	Yokogawa	TA720	181	12	27-Feb-2009
High Resolution Oscilloscope	Gould	840	182	12	6-Mar-2009
Load (50ohm)	Diamond	DL-30N	392	12	28-Aug-2008
Attenuator 10dB/10W)	Trilithic	HFP-50N	454	0	19-Jul-2008
Signal Generator	Hewlett Packard	8663A	765	12	10-Jan-2009
Load (50ohm, 15W)	Diamond Antenna	DL-30N	822	12	5-Sep-2008
Signal Generator	Hewlett Packard	8663A	1063	12	13-Feb-2009
Power Sensor	Hewlett Packard	8482A	1341	12	15-Oct-2008
Cable (1m N(m) - N(m))	Reynolds	269-0088-1000	2397	12	18-Sep-2008
Termination (50ohm, 15W)	Radio Spares	612-192	2416	12	5-Sep-2008
Multimeter	Iso-tech	IDM101	2421	12	13-Aug-2008
Termination (50ohm, 15W)	Radio Spares	612-192	2425	12	5-Sep-2008
Distress Beacon RF Unit	TUV	-	2445	-	TU
Stop Clock	R.S Components	RS328 061	2674	-	TU
Beacon RF Unit	TUV	N/A	3066	-	TU
Hygrometer	Rotronic	I-1000	3068	12	25-Apr-2008
Termination (50ohm, 15W)	Diamond Antenna	DL-30N	3098	12	15-Mar-2009



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.13 Beacons - Operating Lifetime (continued)					
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3158	12	30-May-2008
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	30-May-2008
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	30-May-2008
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-3-34	3161	12	30-May-2008
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-3-34	3162	12	19-Jun-2008
Thermocouple Thermometer	Fluke	51	3172	12	18-Jun-2008
Bandpass Filter	Trilithic	5BE406/35-1-AA	3205	12	28-Jul-2008
Bandpass Filter	Trilithic	5BE406/35-1-AA	3207	12	18-Sep-2008
Cable (2m, SMA Type)	Reynolds	262-0248-2000	3222	12	17-Sep-2008
Time Interval Analyser	Yokogawa	TA720 704510	3253	12	6-Nov-2008
ScopeCorder	Yokogawa	DL750 701210	3254	12	6-Nov-2008
Timer	Radio Spares	427-590	3282	-	TU
Power Sensor	Agilent	8482A	3290	12	26-Nov-2008
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	16-Apr-2008
Cable (1m, N type)	Rhophase	NPS-1601-1000-NPS	3350	12	18-Apr-2008
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3351	12	18-Apr-2008
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3354		22-Apr-2009
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3355	12	22-Apr-2009
Rubidium Frequency Standard	Symmetricom	8040C	3490	12	21-Feb-2009



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.27 Beacons - Orientation Test					
Beacon Tester	WS Technologies	BT 100S	87	-	TU
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3158	12	18-Jun-2009
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	21-Apr-2009
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3359	12	22-Apr-2009
Section 2.15 Beacons - Self Test					
Climatic Chamber	Heraeus Votsch	VM 04/100	85	-	O/P Mon
Beacon Tester	WS Technologies	BT 100S	87	-	TU
Rubidium Frequency Standard	Quartzlock	A10-B	92	12	2-Jan-2009
Signal Generator	Hewlett Packard	8663A	1063	12	13-Feb-2009
Beacon RF Unit	TUV	N/A	3066	-	TU
Termination (50ohm, 1W)	Suhner	-	3080	12	15-Mar-2009
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	2-Jun-2009
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-3-34	3163	12	2-Jun-2009
Thermocouple Thermometer	Fluke	51	3172	12	3-Jul-2009
Bandpass Filter	Trilithic	5BE406/35-1-AA	3205	12	28-Jul-2008
Time Interval Analyser	Yokogawa	TA720 704510	3253	12	6-Nov-2008
ScopeCorder	Yokogawa	DL750 701210	3254	12	6-Nov-2008
Timer	Radio Spares	427-590	3282	-	TU
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3352	12	22-Apr-2009
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3359	12	22-Apr-2009



Section 2.10 Beacons - 406 Spurious Emissions					
Climatic Chamber	Heraeus Votsch	VM 04/100	85	-	O/P Mon
Rubidium Frequency Standard	Quartzlock	A10-B	92	12	2-Jan-2009
Hygrometer	Rotronic	I-1000	3068	12	25-Apr-2008
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	30-May-2008
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-3-34	3162	12	19-Jun-2008
Thermocouple Thermometer	Fluke	51	3172	12	18-Jun-2008
Bandpass Filter	Trilithic	5BE406/35-1-AA	3207	12	18-Sep-2008
EPIRB Tester	Arg Electro Design	5412	3270	-	TU
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	16-Apr-2008
Cable (1m, N type)	Rhophase	NPS-1601-1000-NPS	3350	12	18-Apr-2008
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3353	12	18-Apr-2008
Cable (3m, N-type)	Rhophase	NPS-1601-3000-NPS	3361	12	18-Apr-2008
Section 2.14 Beacons - Strobe Light Test					
Climatic Chamber	Heraeus Votsch	VMT 04/30	40	-	O/P Mon
1GHz Digital Oscilloscope	Lecroy	9370M	612	12	24-Sep-2008
Thermocouple Thermometer	Fluke	51	3174	12	26-Jun-2009
Strobe Light Transducer	TUV	5 to 20 volts	3459		TU
Section 2.6 Climatic – Salt Fog Test					
Weiss Technik (T)	Weiss Technik	SALT MIST	2121	12	9-Nov-2008
FISONS 5	Fisons	FISONS 5	2123	12	26-Oct-2008
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	21-Apr-2009
Beacon Tester	WS Technologies	BT 100S	87	-	TU
EPIRB Tester	Arg Electro Design	5412	3270	-	TU



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.2 Climatic - High Temperature					
Climatic Chamber	Climatec	CLIMATEC 3	2846	12	18-Apr-2008
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	21-Apr-2009
Beacon Tester	WS Technologies	BT 100S	87	-	TU
EPIRB Tester	Arg Electro Design	5412	3270	-	TU
Sections 2.3 and 2.26 Climatic - Humidity					
Beacon Tester	WS Technologies	BT 100S	87	-	TU
Stopwatch	Farnell	SUPER LAB/SPLIT	2465	12	15-Jun-2008
Climatic Chamber	Climatec	CLIMATEC 2	2845	12	5-Nov-2008
Climatic Chamber	Climatec	CLIMATEC 3	2846	12	18-Apr-2008
EPIRB Tester	Arg Electro Design	5412	3270	-	TU
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	16-Apr-2008
Section 2.9 Climatic - Leakage And Immersion Test					
Beacon Tester	WS Technologies	BT 100S	87	-	TU
Climatic Chamber	Climatec	Climatec 1	2124	12	5-Nov-2008
Montford 8F3	Montford	8FT CUBED	2127	12	5-Apr-2008
Climatic Chamber	Unitemp	MINISTRAT	2129	12	7-Sep-2008
Data Logger	Pico Technology Ltd	TC-08	2226	12	11-Dec-2008
Temperature Logger	Digitron	2098T	2479	12	14-Sep-2008
Hygromer	Rotronic	A1	2677	12	23-Oct-2008
Hygrometer	Rotronic	A1	2760	12	4-Jun-2008
Climatic Chamber	Climatec	CLIMATEC 2	2845	12	5-Nov-2008
Digital Force Gauge (500N)	TWL	AFG4	2971	12	7-Nov-2008
Thermocouple	Unknown	Type T	3415	24	8-Feb-2009
5 metre Tape Measure	Stanley	33-719	3549	-	TU



Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Sections 2.4 and 2.5 Vibration Test & Bump					
Vibrator	Derritron	VP400	2286	6	24-Apr-2008
Vibration Controller	Muller & Partner	NT VX1	2509	12	5-Apr-2008
Isotron Accelerometer	Endevco	256-10	3118	6	27-Mar-2008
Accelerometer	Endevco	256-10	3432	6	27-Feb-2008
Charge Amplifier	Endevco	133	3481	12	22-May-2008
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	21-Apr-2009
Beacon Tester	WS Technologies	BT 100S	87	-	TU
EPIRB Tester	Arg Electro Design	5412	3270	-	TU
Section 2.1 Initial Aliveness Test					
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	21-Apr-2008
Beacon Tester	WS Technologies	BT 100S	87	-	TU
EPIRB Tester	Arg Electro Design	5412	3270	-	TU
Section 2.7 Drop Test (On Hard Surface)					
Beacon Tester	WS Technologies	BT 100S	87	-	TU
Tape Measure	Stanley		2363	-	TU
Hardwood Block	Unknown	ELM	2650	-	TU
Beacon Tester	WS Technologies	BT100S	3263	-	TU
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	16-Apr-2008
Section 2.8 Drop Test (In Water)					
Beacon Tester	WS Technologies	BT 100S	87	-	TU
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	16-Apr-2008



Product Service

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Sections 2.11 & 2.12 Thermal Shock Test					
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	21-Apr-2009
Beacon Tester	WS Technologies	BT 100S	87	-	TU
EPIRB Tester	Arg Electro Design	5412	3270	-	TU
Climatic Chamber	Climatec	Climatec 1	2124	12	5-Nov-2008
Climatic Chamber	Climatec	CLIMATEC 2	2845	12	5-Nov-2008
Section 2.17 Stability And Buoyancy Test					
Force Gauge	TWL	AFG 4	926	12	13-Jun-2008
Tape Measure	Stanley	-	2363	-	TU
Stopwatch	Farnell	SUPER LAB/SPLIT	2465	12	15-Jun-2008
Section 2.18 Inadvertent Activation Test					
Beacon Tester	WS Technologies	BT 100S	87	-	TU

TU – Traceability Unscheduled

OP MON – Output Monitored with Calibrated Equipment



Product Service

SECTION 4

PHOTOGRAPHS



4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)



Front View of EUT: Unit #3



View of EUT: Unit #10 in release mechanism



Product Service

SECTION 5

DISCLAIMERS AND COPYRIGHT



Product Service

5.1 DISCLAIMERS AND COPYRIGHT

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

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Product Service

ANNEX A

CUSTOMER SUPPLIED INFORMATION



Product Service

Customer Supplied Description of Modification 1 and Impact on Testing***“Explanation of Digital Message Error in Modification State 0***

The microcontroller used in the RLB-36 is the Microchip PIC18F4525. The PIC18F4525 RevA Silicon has an Interrupt bug, which caused the Digital Message Error. The work around is to change the C compiler option to disable the Fast Return and use Standard Return instead, as suggested by Microchip.

The conducted units were tested with reprogrammed SW that fixed the interrupt issue in chip vendor silicon by re-compiling the C code with the Standard Return option (Modification State 1), instead of the Fast Return option.

The environmental/radiated unit was tested as originally provided (Modification State 0) without any modifications. The reason we did not re-program this unit is this vendor silicon issue does not affect the test data/results, and also the test was in progress for over a week on this unit.”

Customer Supplied Description of Modification 2 and Impact on Testing

“From: Chung Tong [ctong@acrelectronics.com]
Sent: 21 July 2008 19:31
To: Jones, Sarah; Hampton, Robert
Cc: Chung Tong; Kaiyu Wu
Subject: RE: RTCM report, ACR letter of Modification

Hi Sarah and Rob,

This email confirms that ACR has modified the RLB-36 software in the 121.5 TX timing, to provide another 100 milliseconds margin to the 2-second of maximum time of interruption due to the 406-MHz transmitter. The 406 TX interruption time is now 1.9 seconds.

The modification has been done by setting the timer counter as follow: In the RLB-36, the 121.5 off time is based on the 10ms hardware timer, this timer counter is now set to 1900 milliseconds, instead of a dead-on 2000 msec., and this modification provides a 100 milliseconds less to the maximum limit of 2 seconds per RTCM specification.

This change in software does not affect other 121.5 parameters.

*Best regards,
Chung Tong”*



Product Service

Customer Supplied Statement On Homer Sweep Direction

From: Chung Tong [mailto:ctong@acrelectronics.com]
Sent: 22 July 2008 17:00
To: Jones, Sarah
Subject: RE: RTCM Report

Hi Sarah and Rob,

This email confirms that the RLB-36 beacon is software programmable to be in either direction for the sweeping 121 homer.

It is possible to reprogram the beacon for operation in either direction.

*Best regards,
Chung"*

ANNEX B

SUBCONTRACTOR REPORTS



Test Report
Confidential
1/3

Ref. No.: TUVUKJonestr270508TO.pdf

● Luna Optical Analysis

Customer:

TÜV Product Service Ltd.
Sarah Jones
Octagon House
Concorde Way
Segensworth North
Fareham
Hampshire PO15 5RL
United Kingdom

Research Contract:

TUVUKJonesta230408HS.pdf

Target:

Strobe led light integrated in an EPRIB (10), with antenna (52)



Test time:

Measurement time: 27th - 28th of May, 2008

Purpose of the test:

To measure the effective luminous intensity of a strobe light in the beacon at the normal temperature and extreme temperatures.

Test method:

The light intensity of led was measured with a photodiode and photomultiplier with an integration mode measurement system. The measurement is done at a room temperature +23°C and at a temperature of -20°C and +55°C. The standards used are: IEC 61097-2 (2002) and RTCM Paper 77-2002/SC110-STD.

Validation of test method:

Silicon based detector and photomultiplier can be used to measure the luminous intensity of pulsed sources.

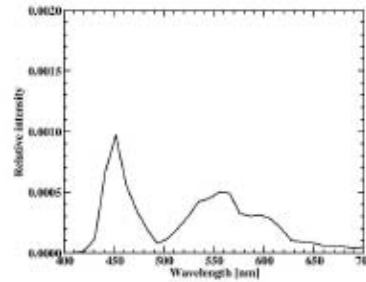
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Performed actions:

The spectrum of the strobe light in the beacon was measured with a spectroradiometer at an interval of 10 nm.



The luminous intensity of one of the strobe lights (photograph on the right) was measured at the room temperature of +23°C. The intensity was also measured after cooling the beacon to -25°C after which the beacon was brought to the measurement system. The beacon warmed to -20°C during the intensity measurement. The light intensity was also measured after warming the beacon to the temperature of +59°C. The beacon was brought to the measurement system and the light intensity was measured when the temperature of the beacon had cooled to the temperature of +55°C.



According to the IEC 61097-2 the effective luminous intensity of a strobe light is defined by the formula

$$\frac{\int_{t_1}^{t_2} i \cdot dt}{0,2 + (t_2 - t_1)}$$

where
i is the instantaneous intensity,
 0,2 Blondel-Ray constant,
*t*₂ - *t*₁ time limit of integration in seconds.

The measurement results are tabulated

Temperature [°C]	Effective luminous intensity [Cd]
+23	1.0
< -20	1.0
> +55	0.9

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Test Report
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Conclusions:

The effective luminous intensity of a strobe light in the beacon was measured. According to the standards IEC 61097-2 and RTCM Paper 77-2002/SC110-STD the effective luminous intensity should be at least 0.75 Cd.

Temperature [°C]	Effective luminous intensity [Cd]	Approval verdict
+23	1.0	Passed
< -20	1.0	Passed
> +55	0.9	Passed

Remarks:

The batteries used in the beacon were new ones.

The effective luminous intensity measurement accuracy is ±15%.

Actions, operations and reporting are in accordance with IEC/ISO 17025 'General requirements for the competence of testing laboratories'.

Used measurement instruments:

Temperature measurement Pt100, equipment 42 / chamber 4, calibration 3.1.2008 is valid

Spectroradiometer IL700: , calibration 27.5.2008 is valid

Signatures:

In Littoinen, Finland

Timo Oksa
30th of May, 2008



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QinetiQ Test Report – Automatic Release Mechanism and Automatic Activation Tests (A14.0)

QinetiQ/MS/EES/TC0800450

QinetiQ Proprietary
Commercial in Confidence

Certificate of Test



Certificate number: QINETIQ/MS/EES/TC0800450
Date of issue: 23/06/2008
Issue: 4.0

EMES Group
EES Division
QinetiQ Farnborough
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Hampshire. GU14 0LX, UK
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Administrative Information

Customer:	TUV Product Services
Customer Representative:	Miss S Jones
Customer Address:	Octagon House, Concorde Way, Fareham, Segensworth North, Hampshire, PO15 5RL
Customer Contact Number:	01489 558100
Customer Contract Number:	PO 11000667 dated 21.05.2008
QinetiQ EMES Task Number :	EMES 1402 and 1503
Equipment Under Test (EUT):	ACR RLB 36 EPIRB in hydrostatic release housing
Model/Serial Numbers:	Detailed below
Control / Test Plan References:	N/A
Test Specifications:	IEC 61097-2: 2002, A2.2 Clause 5.2.1 & A2.4 5.3.3.1 RTCM EPIRB Standard, Test A14.0
Test Dates:	Initial testing carried out 23 rd – 25 th April 2008 and repeat test following modifications on 11 th June 2008
EMES Test Engineers:	K Welton; R Frater; N Vickers
EMES Test Manager:	A H Bowdell
EMES QA Authority:	C Stenning
Location of Testing:	Building A23, QinetiQ Farnborough.

Test Item Details

Item	Type	Notes
ACR 406 MHz EPIRB	RLB-36	NK
Hydrofix Hydrostatic Release	HRU-100	8 x disposable release

Test Conditions and Details

Build Standard:	Declared as production units
Test Limits	Float Free at between 1 & 4 metre depth – Temp Class 2
Pool Temperature:	Fresh Water, temperature 9° C
Modes of operation:	EPIRB in standby condition
Test equipment used	Acoustic Materials Test Tank; Climatic chamber; Metal measurement tape.
Uncertainty of measurement	Direct depth measurement ±5 cm; Temperature ±2° C

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Test Results

Test	Pre-condition Temperature	Position/Attitude of release housing during test.	Clear release and EPIRB float free?	Depth of release (Metres)	Result (Pass/Fail)
1	-30°C (Min Stow)	Vertical – Normal Attitude	YES	3.8	Pass
2	Ambient	Vertical - Normal Attitude	YES	2.6	Pass
3	Ambient	Rolling 90° to Starboard	YES	2.7	Pass
4	Ambient	Rolling 90° to Port	YES	2.7	Pass
5	Ambient	Horizontal.- Pitching Cover Up	YES (see note 1)	3.5	Pass
6	Ambient	Horizontal –Pitching Cover down	YES	3.1	Pass
7	Ambient	Vertical -. Inverted (Upside down)	YES	2.8	Pass
8	+65°C(Max Stow)	Vertical - Normal Attitude	YES	2.5	Pass

NOTE 1: Compliance of the product to the specification requirements was obtained following the introduction of the modification to the "Sea Shelter Assembly", which detailed the incorporation of a new spacer fitted between the handle back and spiral spring. See Figure 5 for the details of the assembly diagram.

Test Summary**Hydrostatic Release Test**

The release mechanism primed ready for the cover to be put on, Hydroflex HRU-100 release can be seen to the right of centre and when hydrostatically triggered will release the black rods that hold the cover on. The sprung metal-hinged release plate will then push up and away the ACR RLB-36 beacon. As shown in Figures 1 and 2.



Figure 1: EPIRB with release mechanism primed



Figure 2: EPIRB mounted on the plunge pole ready for testing, Vertical Normal attitude.

The method for the conduct of the test is to fix the EPIRB release housing on to the plunge pole in the required attitude, as shown in Figure 2, the pole would then be gently lowered into the plunge pool until the release mechanism actuates and the depth is then noted.

A "Clean Release" is expected, which is defined as the EPIRB beacon being lowered slowly in to the pool and separating away from the housing and cover, and floating freely to the surface without undue delay, as shown in Figure 3.

Salt Water Activation Test

Prior to each test the activation contacts were checked to ensure they were clean and dry. The ACR RLB-36 Beacon was then floated in the salt solution (0.1 % salt as defined in clause 5.3.3.1) and checked for correct operation; this was observed by the activation of the flashing light and bleeper. When the beacon was removed from the solution and the contacts dried the beacon deactivated. This test was repeated three times and each time the ACR RLB-36 Beacon was observed to operate correctly, as shown in Figure 4.

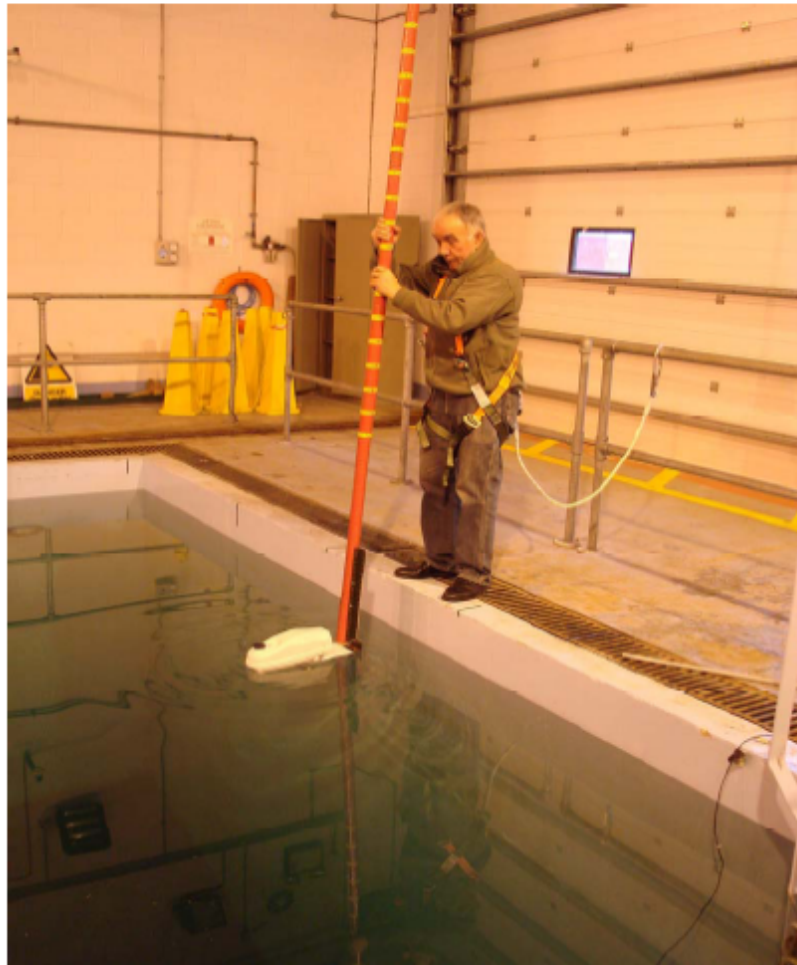


Figure 3: Typical test set-up and overall view of plunge pool.

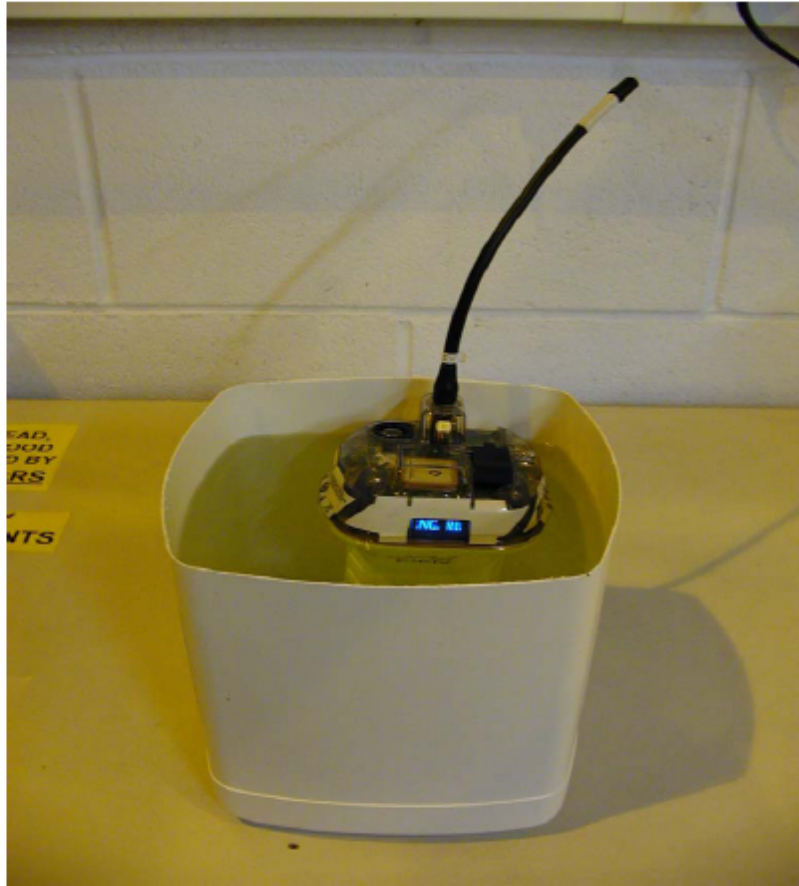


Figure 4: ACR RLB-36 Beacon in a salt-water solution

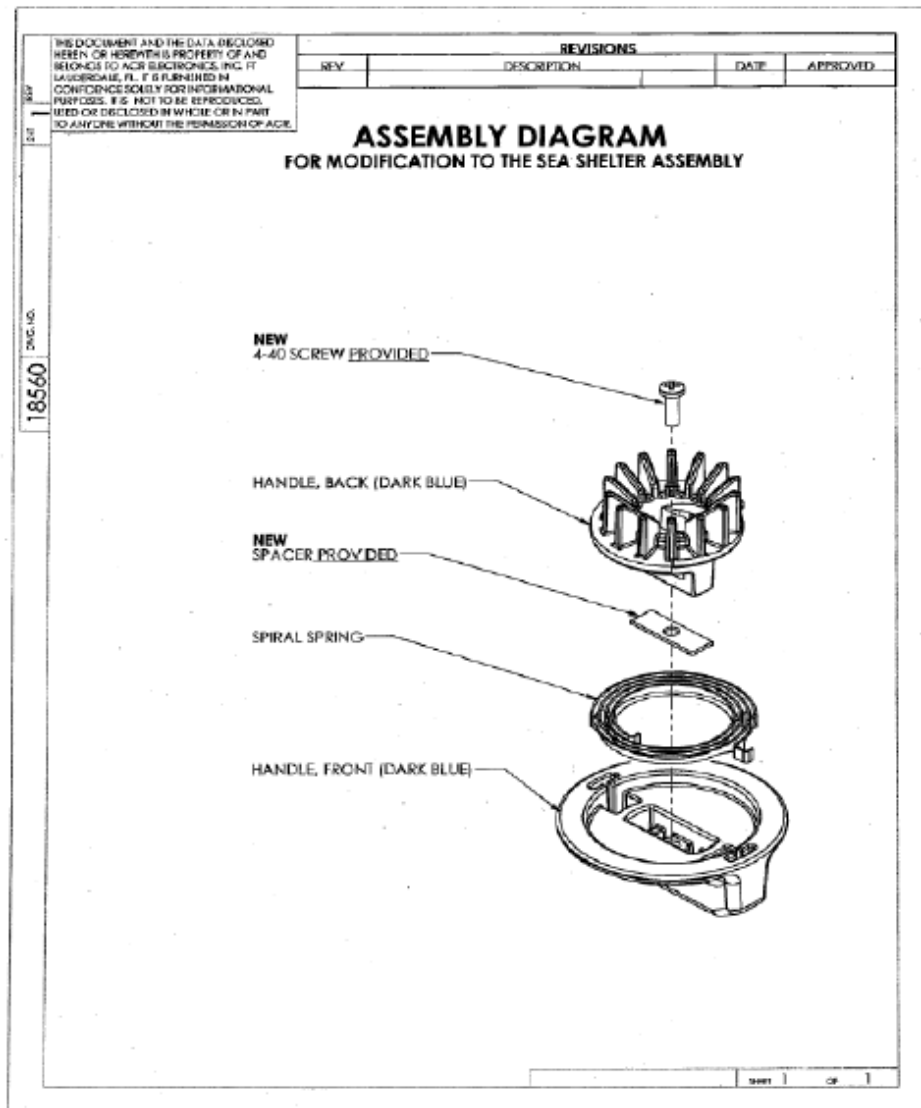


Figure 5: Modification details to the Sea Shelter Assembly

IT IS HEREBY CERTIFIED THAT THE TESTS DETAILED IN THIS CERTIFICATE HAVE BEEN CARRIED OUT AS SPECIFIED, WITH THE RESULTS SHOWN TO THE REQUIREMENTS OF THE CONTRACT.
Full test details are retained in the QinetiQ File reference: QinetiQ/EMES/1402 and 1503

Signed

A handwritten signature in black ink, appearing to read 'A.H. Bowdell', is centered on the page. The signature is written in a cursive style with a long horizontal flourish extending to the right.

A.H. Bowdell
EMC and Environmental Test and Trials Manager
Electromagnetic and Environmental Services (EMES)
EES Division

Date: 23: June: 2008