# CHAPTER 12

# AUXILIARY RADIO-LOCATING DEVICE TRANSMETTER TEST

## 12.1 - ELECTRICAL AND FUNCTIONAL TEST OF 121,5 MHZ AT THREE CONSTANT TEMPERATURE

### 12.1.1 TEST SPECIFICATIONS AND PROGRAMME

Following section A12.0 of RTCM Recommended Standards for 406 MHz Satellite PLBs (Version 1.1 Feb 4, 2003) :

• Perform following measurements.
- Carrier frequency
- Modulation frequency
- Transmitter duty cycle
- Sweep repetition rate
- Modulation duty cycle
- Modulation factor

**Note** : These tests are performed during the COSPAS-SARSAT Type Approval tests (chapter 10)

### 12.1.2 EQUIPMENT UNDER TEST

| | | |
|---|---|---|
| Beacon Unit | : | 1/2 (with 50 ohm output) |
| Name | : | MARTEC OPALE |
| Type | : | XS3_GPS |
| Number | : | UT1 |

### 12.1.3 TEST SITE

INTESPACE Laboratory.

### 12.1.4 TEST EQUIPMENT

• Climatic chamber : CLIMATS F.C.H. – Type: Austral 137H60/1,5E - S/N: S4880.
• Argos - Cospas/Sarsat Test Bench

### 12.1.5. RESULTS OF HOMING TRANSMITTER TESTS

Beacon Unit : 1/2 (with 50 ohm output)
Name : MARTEC / KANNAD
Type : XS3 GPS
Number : UT1

| | | | T min.<br>- 20° C | T amb.<br>22° C | T max<br>+ 55° C |
|---|---|---|---|---|---|
| 1 - OPERATING LIFETIME AT MINIMUM TEMPERATURE | | 24H | ≈ 28 h | | |
| 2 - CARRIER FREQUENCY | * | 121500 kHz± 5 kHz | 121.5028 | 121.5017 | 121.5008 |
| 3 - PEAK ENVELOPE OUTPUT POWER ( into 50 Ohms load ) | ** | 14 dBm + 6/- 2 dBm | 19 dBm | 18.9 dBm | 18.5 dBm |
| 4 - TRANSMITTER DUTY CYCLE | | continuous | Cont. | Cont. | Cont. |
| 5 - MODULATION FREQUENCY | | 300 to 1 600 Hz | 490 to 1390 | 490 to 1310 | 490 to 1310 |
| 6 - MODULATION DUTY CYCLE | | 33 % - 55 % | 52 % | 53 % | 53 % |
| 7 - MODULATION FACTOR | | > 0.85 | . > 0.85 | > 0.85 | > 0.85 |
| 8 - SWEEP REPETITION RATE | | 2 Hz - 4 Hz | 3.0 Hz | 3.1 Hz | 3.1 Hz |
| 9 - HOMING TRANSMISSION CODING | * | Bits 112 = 1 | 1 | 1 | 1 |

* See data and graphs of results on chapter 10 " Cospas-Sarsat Type Approval Tests Report "

### 12.1.6. SPECTRUM MEASUREMENT RESULTS

See graphs of results on chapter 10 "Cospas-Sarsat Type Approval Tests Report"
and chapter 9 "Spurious Emission Test"

## 12.2- HOMING RADIATED OUTPUT POWER ON UUT 2/3

### 12.2.1 - ADMINISTRATION

| | | |
|---|---|---|
| 12.2.1.1 | WORK ORDER : | Reference: E7555-RTCM |
| 12.2.1.2 | TEST TEAM : | François Esquevin |
| 12.2.1.3 | SCHEDULE : | 22 November 2007 |

### 12.2.2 - PURPOSE

The radiation tests of the dedicated radio beacon are performed in INTESPACE EMC Laboratory in compliance with the test methods described in Section A12.3 of RTCM Recommended Standards for 406 MHz Satellite PLBs (Version 1.1 Feb 4, 2003)

Frequency tested : 121.5 MHz.

### 12.2.3 - RADIO BEACON IDENTIFICATIONS

| | | |
|---|---|---|
| Beacon Unit | : | 2/2 (normal fitted PLB) |
| Name | : | MARTEC / KANNAD |
| Type | : | XS3 GPS |
| Number | : | UT2 |
| Antenna | : | Kannad Integrated Antenna |

### 12.2.4 - TEST SITE DESCRIPTION

Tests are performed in an anechoic chamber (size 16 m x 10 m x 11 m) .
Walls, ceilling and doors are lined with EMERSON CUMING foams VHP 36 and VHP 26 type.
The PLB is placed as shown on figures n° 1 and n° 2 next pages .

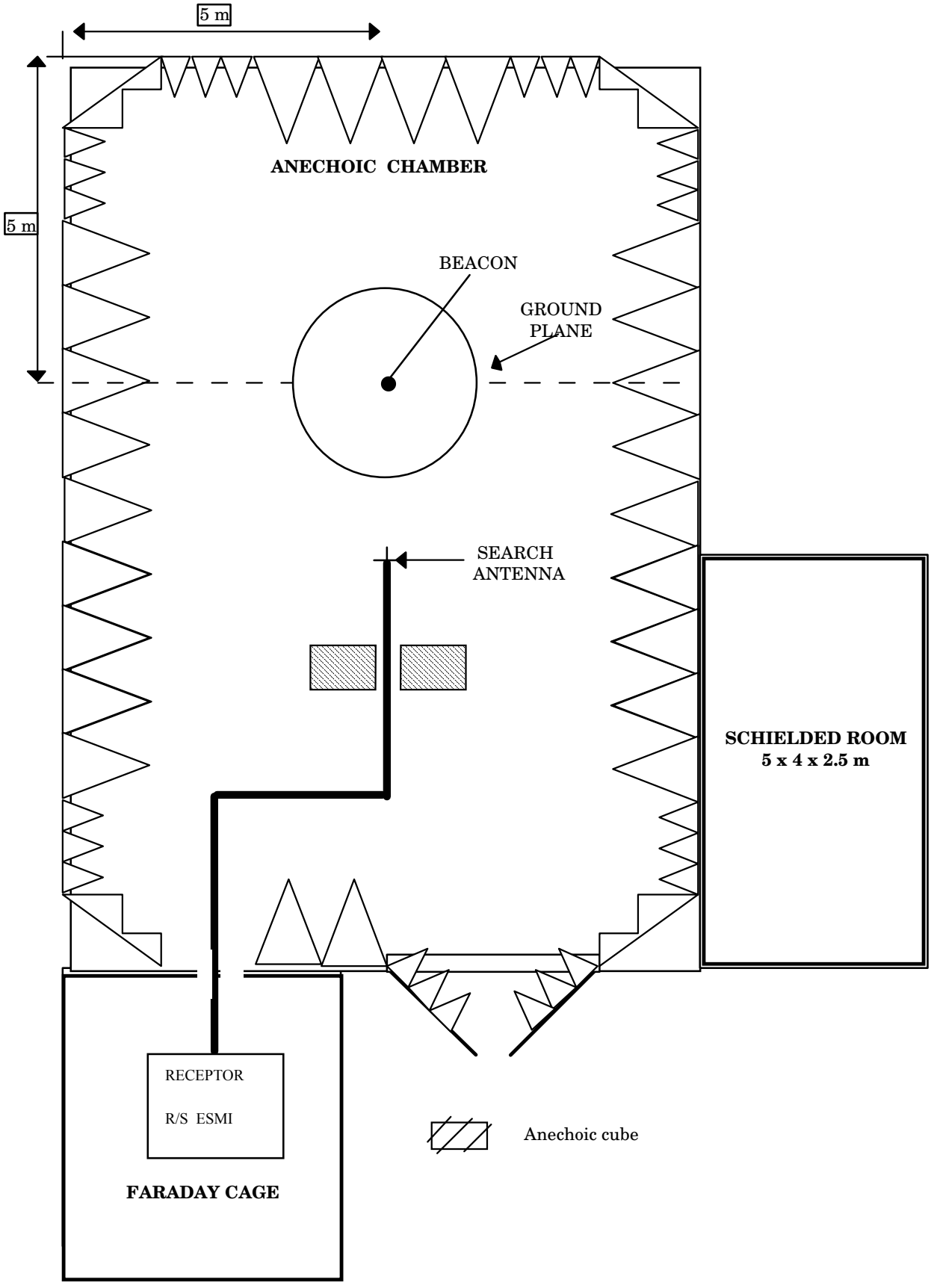

5 m
5 m
ANECHOIC CHAMBER
BEACON
GROUND
PLANE
SEARCH
ANTENNA
SCHIELDED ROOM
5 x 4 x 2.5 m
RECEPTOR
R/S ESMI
FARADAY CAGE
Anechoic cube

FIGURE 1

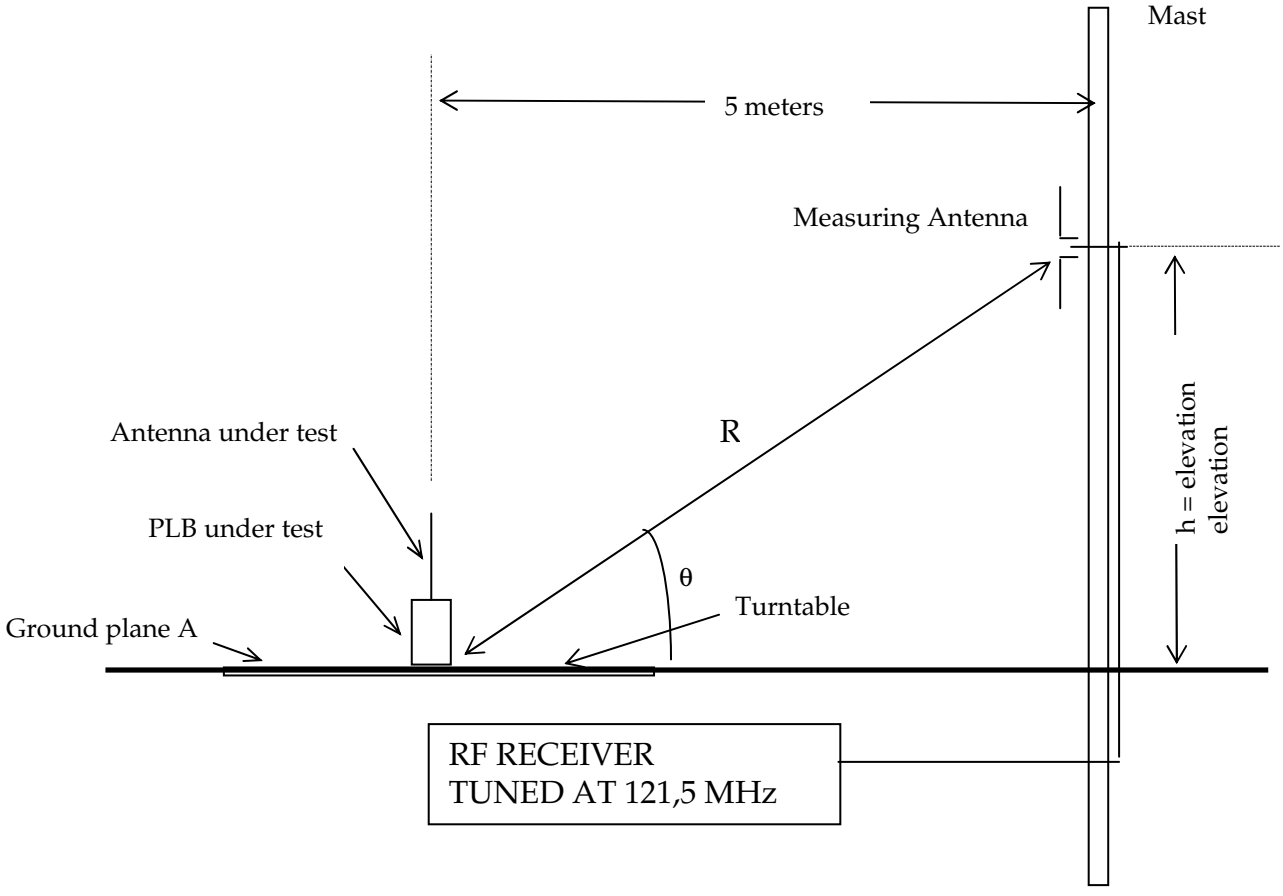



FIGURE B2a : Equipement Test Set-Up For BEACON Antenna Test .

**12.2.5 - TEST METHOD**

According Section A12.3 of RTCM Recommended Standards for 406 MHz Satellite PLBs (Version 1.1 Feb 4, 2003) :

1/ The elevation angle between 5° and 20° which produces a maximum gain is determined with the EUT at an arbitrary azimuth .

2/ The PEP is measured and the elevation angle is noted ( between 5° to 20° ) and is remain fixed for the remainder of the test .

3/ The remaining 12 measurements of PEIRP is obtained by rotating the EUT in increments of 30° ± 3°. For each measurements the EUT PEIRP is computed using the following equation :

$$PEIRP = LOG^{-1}\,[(P_{REC} - G_{REC} + L_C + L_P)/10] \qquad \text{(Equation A)}$$

Where :

$P_{rec}$ = Measured Power level from spectrum analyzer (dBm)
$G_{rec}$ = Antenna gain of search antenna (dB)
$L_c$ = Receive system attenuator and cable loss (dB)
$L_p$ = Free space propagation loss (dB)

4/ The median value of PEIRP is compared to the specified PEIRP to be in the range 25 mW to 100 mW ( 14 dBm to 20 dBm)

**12.2.6 - TEST MEASUREMENT EQUIPMENTS**

Search Antenna

- 121.5 MHz test : EMCO 3121C DB2 S/N 9904 1430

SPECTRUM ANALYSER

- R/S ESMI

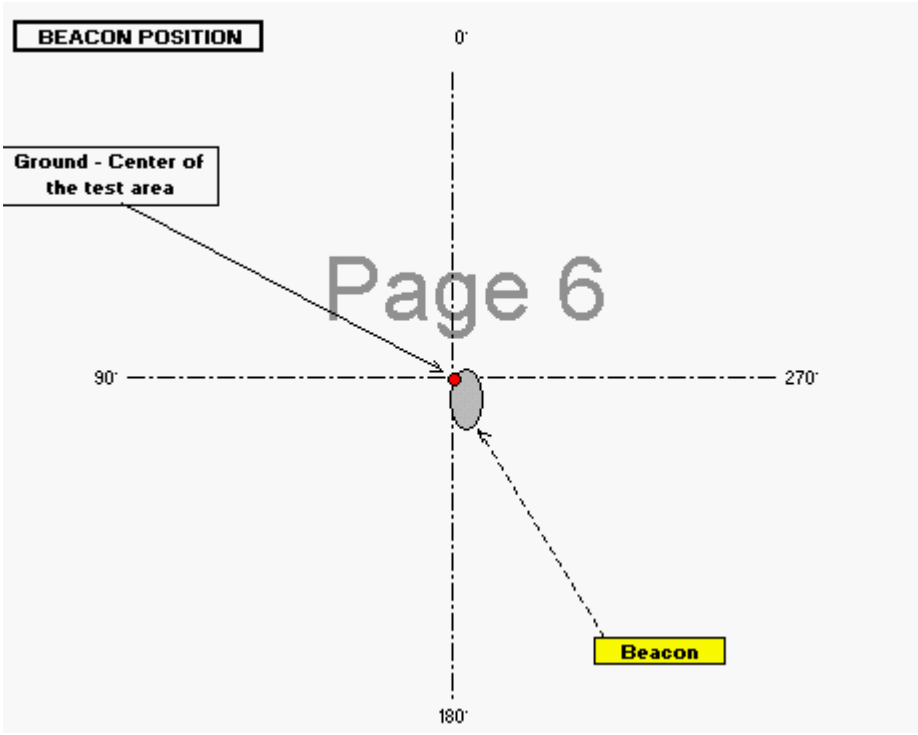
CABLES

- 20 m cable SUCOFLEX type 100 - cable loss at 121.5 MHz : 1.9 dB

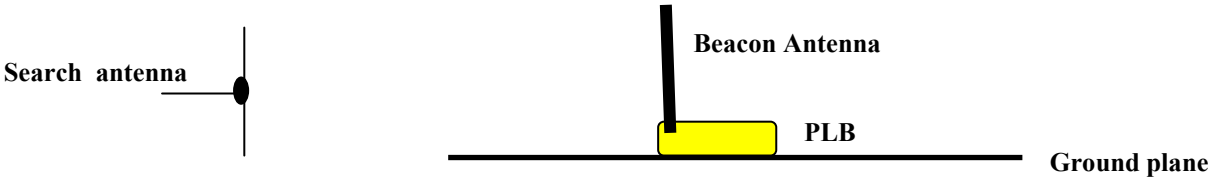
**12.2.7 - PLB MECHANICAL SET UP**

PLB 0° axisq identified by the antenna position (see figure ) is the rotation center of azimuth angle.

A conductive aluminium paper is used to assure a good conductivits between beacon float level and the ground plane.





**12.2.8- TESTS RESULTS**

Following the Equation (A), 12 value of EUT PERP are computed at 20 ° (maximum level) of elevation angle

| **Azimut Angle** | **PEIRP (dBm)** |
|---|---|
| 0 | 14,64 |
| 30 | 14,94 |
| 60 | 15,04 |
| 90 | 15,54 |
| 120 | 14,84 |
| 150 | 15,14 |
| 130 | 15,14 |
| 210 | 15,04 |
| 240 | 15,04 |
| 270 | 14,64 |
| 300 | 14,84 |
| 330 | 15,14 |
| **PEIRP variation** | **0.9dB** |
| **Mean value** | **14.99 dBm** |

The PERP measured and computed are in conformance with specification required :

**14 dBm ≤ PERP ≤ 20 dBm**
**and**
**PEIRP Azimuth Variation < 6 dB**