

CHAPTER 6

DROP TEST

6.1. DEFINITION OF TEST

Following section A5.0 of RTCM Recommended Standards for 406 MHz Satellite PLBs
(Version 1.1 Feb 4, 2003) :

The EUT is soaked at minimum stowage temperature (-40°C) for 2 hours .

- Before five minutes after removal from a temperature the EUT is dropped 6 times above the test surface :

- height : 1 meter (± 10 mm)
- orientation : following 6 faces
- hard surface : piece of oak (600 x 500 x 200 mm / weight : 50 Kg).

- Upon completion of drop tests, an exterior and interior mechanical inspection and aliveness test are performed .

6.2. EQUIPMENT UNDER TEST

Beacon Unit : 1/3
Name : ACR / TeraFixTM 406GPS I/O PLB
Type : PLB200
Number : 07

6.3. TEST SITE

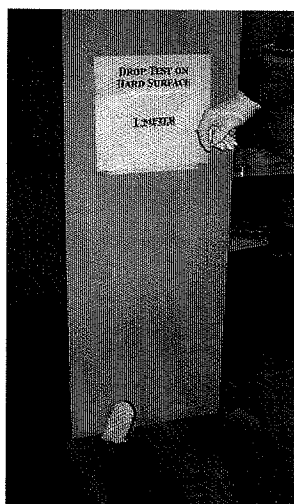
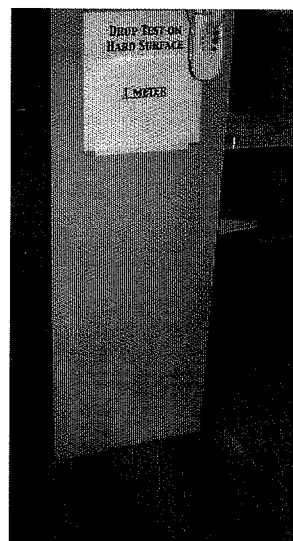
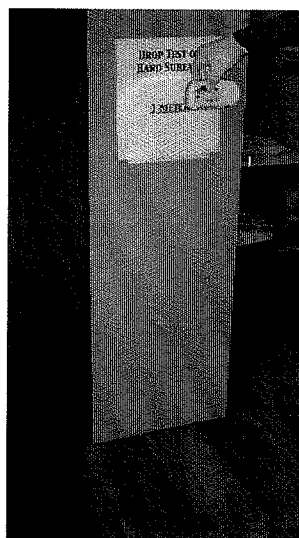
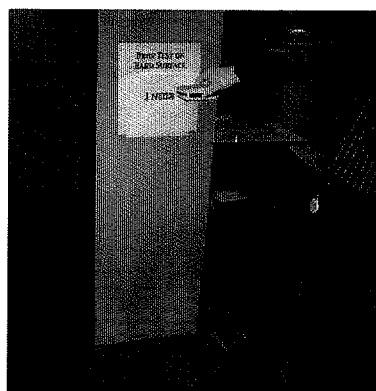
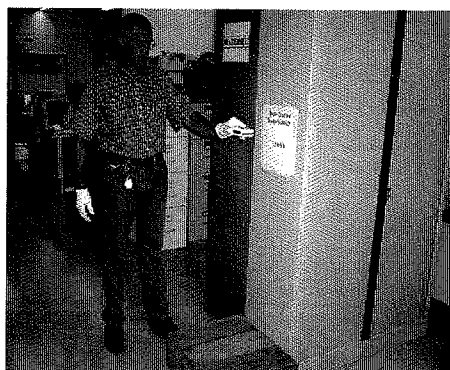
Toulouse Space Center (C.S.T.) - INTESPACE Metrological Laboratory.

6.4. TEST EQUIPMENT

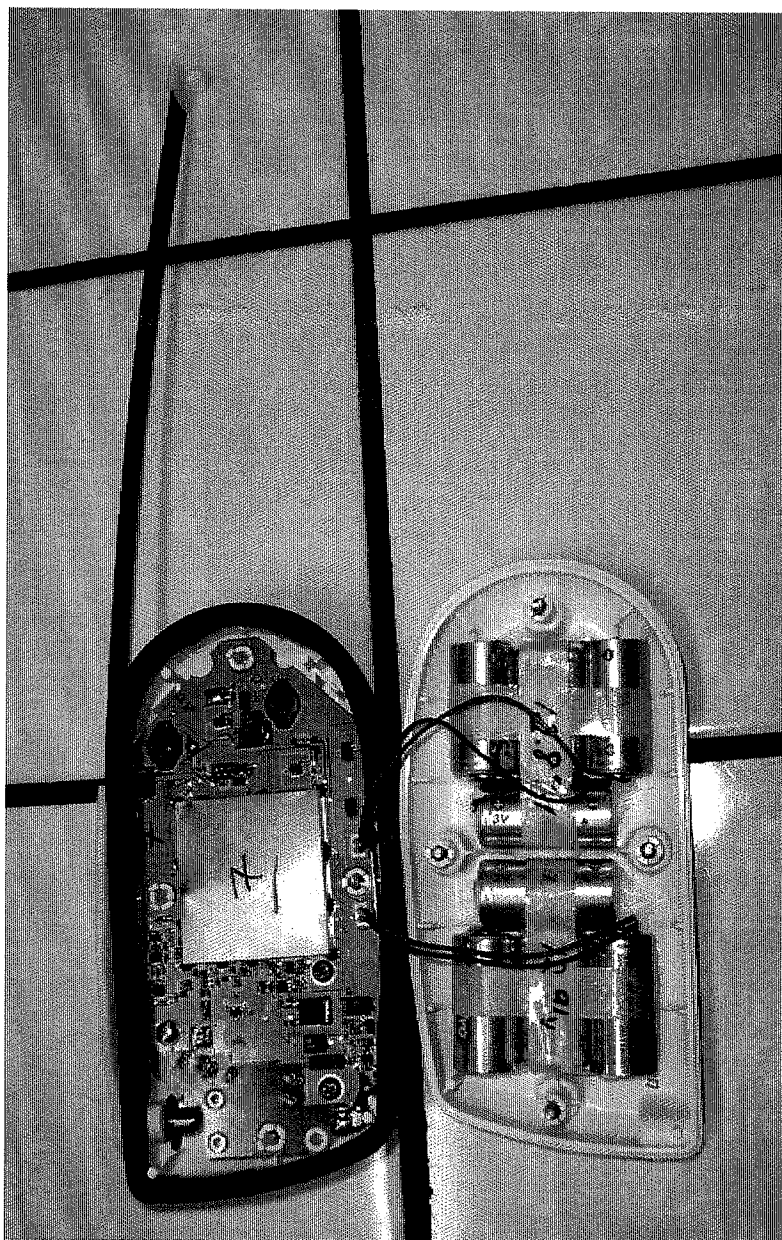
- Oven,
- Drop bench (see photos § 6.5),
- Argos-Cospas/Sarsat Certification test bench

6.5. PHOTOGRAPHS

6.5.1 During Drop Test



6.5.1 After Drop Test : Mechanical Inspection



6.6. TEST RESULTS

6.6.1 Test implementation

Place : INTESPACE Laboratory

Date	Hour	Events - Observations
July 7 th , 2004	9:00	Cooling the beacon to - 40° C in temperature controlled oven
	13:00	Beacon removed of oven.
	13:01	Beacon dropped on hard surface following 6 beacon orientations .(Photos)
	13:15	Exterior and Interior Mechanical inspection : OK .(Photo)
	13:50	Electrical checks : OK
		See result of aliveness test next page

6.6.2 ALIVENESS TEST RESULTS AFTER DROP TEST ON HARD SURFACE

Beacon Unit : 1/3
 Name : ACR / TeraFixTM 406GPS I/O PLB
 Type : PLB200
 Number : 07

Date : July 7th, 2004

406 MHZ MEASUREMENTS

1 - Environmental Temperature (° C)			+ 22° C
2 - POWER OUTPUT			
- Transmission power	dBm	37 ± 2	37.65
- Power risetime	ms	< 5	0.91
- Power falltime	ms	< 5	0.13
3 - SPURIOUS OUTPUT			
- In band	*		OK
- Carrier harmonics			
4 - DIGITAL MESSAGE GENERATOR			
- Repetition rate			OK
- Bit rate	bits/S	400 ± 4	398.33
- Transmission time	ms	440 ± 4.4 / 520 ± 5.2	522.45
- CW preamble	ms	160 ± 1.6	160.72
5 - DIGITAL MESSAGE			
- Bit and frame sync	bits	1-24	FFFE2F
- Format flag	bit	25	1
- Protocol flag	bit	26	0
- Country code	bits	27-36	0366
- Protocol	bits	37-40	1110
- Encoded Position Data Source	bits	111	1
- Homing	bits	112	1
- BCH 1 code read / calculated	bits	86-106 / 25-85	00B717 / 00B717
- BCH 2 code read / calculated	bits	133-144 / 107-132	1F0 / 1F0
6 - FREQUENCY			
- Nominal value	KHz	406 025 ± 2 or 406 028 ± 1	406 027.873
- Short term stability		< 210 ⁻⁹ /100 ms	2.3 x 10 ⁻¹⁰

* See data and graphs next pages .

Message balise

Message reçu (1-144): FFFR2F96ER3240072R80302DC5F7RE4141F0
 Format flag (25): 1
 Protocole flag (26): 0
 Code pays (27-36): 0366
 Pays : USA
 Code protocole (37-40): 1110
 Protocole utilise : Standard - Test
 Identification : F2DDC64800R5700
 Numero : 19
 RCH 1 lu/calculé (86-106/25-85): 00R717/00R717
 RCH 2 lu/calculé (133-144/107-132): 1F0/1F0
 Pos. Data Source (111): Internal
 121.5 MHz Homing (112): Yes
 Position GPS de reference lab : N 43°33'34'' E 1°28'42
 Position GPS : Yes
 Position GPS par default : No
 Latitude position : 43.5°3'36'' Nord
 Longitude position : -5°58'44'' Est
 Delta position : -0874589549626 km

Controle du message

160.720116
 160.723398
 160.723734
 160.719566
 160.721638
 160.720982
 160.718692
 160.724092
 160.721566
 160.722778
 160.719106
 160.72175
 160.720458
 160.720574
 160.721038
 160.718282
 160.72006
 160.721578

Duree de la porteuse pure	mS	158.4<	<162.6	160.72 +- 0.00
Duree minimale				160.72
Duree maximale				160.72
Duree de l'emission	mS	513.8<	<526.2	522.45

Frequence des bits

398.32474
 398.33155
 398.33688
 398.33328
 398.33212
 398.34347
 398.33247
 398.32265
 398.33059
 398.33182
 398.32901
 398.33522
 398.34329
 398.33719
 398.34029
 398.33965
 398.33948
 398.3345

Frequence de modulation	Hz	395.4<	<404.6	398.33 +- 0.00
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Mesures d'indice

Excursion de phase totale	rd	<= 2.48	2.19
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Excursion de phase positive	rd	0.96<	<1.24	1.09
Excursion de phase negative	rd	-1.24<	<-0.96	-1.10
Symetrie de l'excursion	%	<= 5		.58

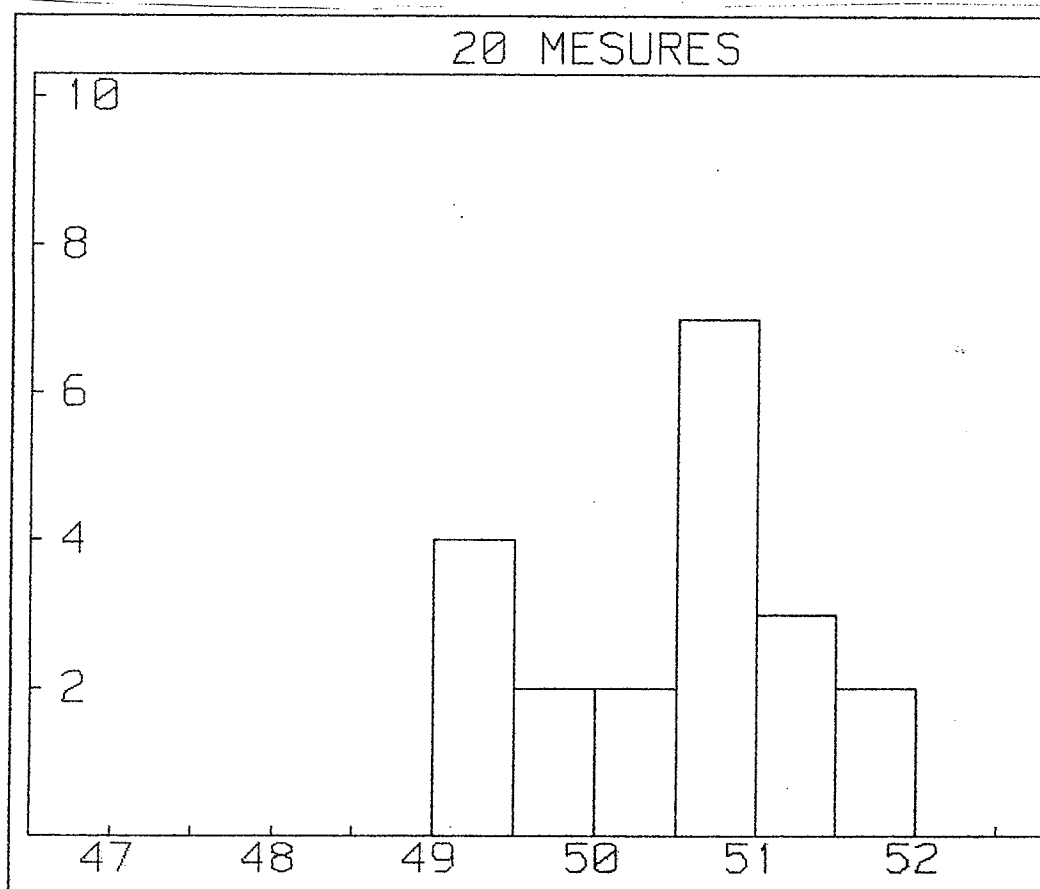
Stabilite de frequence

F1	F2	F3
49872.92	49873.02	49872.95
49872.91	49873.05	49872.94
49872.50	49872.28	49872.47
49872.39	49872.38	49872.33
49872.24	49872.43	49872.37
49872.64	49872.79	49872.82
49872.83	49873.01	49872.83
49872.71	49872.54	49872.78
49873.11	49873.01	49873.17
49873.88	49873.72	49873.85
49873.44	49873.46	49873.24
49873.37	49873.61	49873.41
49873.51	49873.67	49873.84
49873.07	49873.31	49873.25
49873.13	49873.30	49873.40
49873.46	49873.65	49873.70
49873.47	49873.71	49873.77
49873.22	49873.76	49873.66

Frequence moyenne	F2	Hz	406027873.15
SIGMA2	F2-F1		3.618E-10
SIGMA3	F3-F2		2.386E-10
Slope		min. -1E-9<	<1E-9
Residual frequency variation		<= 3E-9	7.663E-10

Recurrence des emissions

51.3740234375
50.992980957
50.5930175781
49.4209899902
50.483001709
50.7730102539
49.7009887695
51.9349975586
51.3739929199
50.9930114746
50.5929870605
49.4210205078
49.8219909668
50.2019958496
49.0400085449
51.7649841309
51.3740234375
50.9829711914
50.6030273438
49.4209899902



Mesures de puissance

-40.16
-12.87
-9.7
-7.89
-6.62
-6.55
-6.55
-6.55
-6.55
-6.55
-7.18
-8.64
-10.89
-15.83

Puissance

dBm

37.65

Mesures du 121.5

121499.947
121499.939
121499.908
121499.878
121499.929

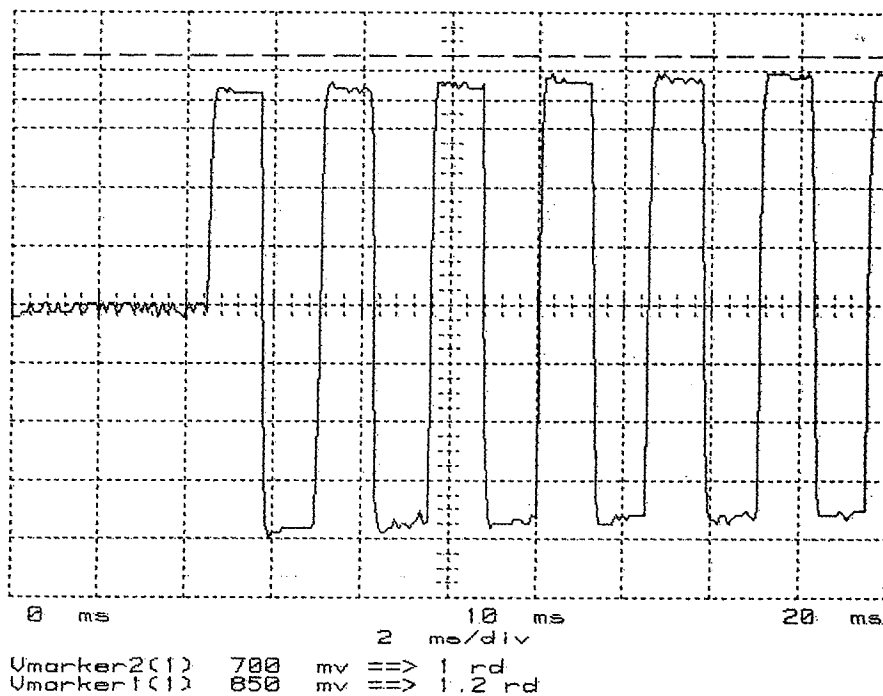
Frequence moy 121.5 MHz

121499.92

Puissance

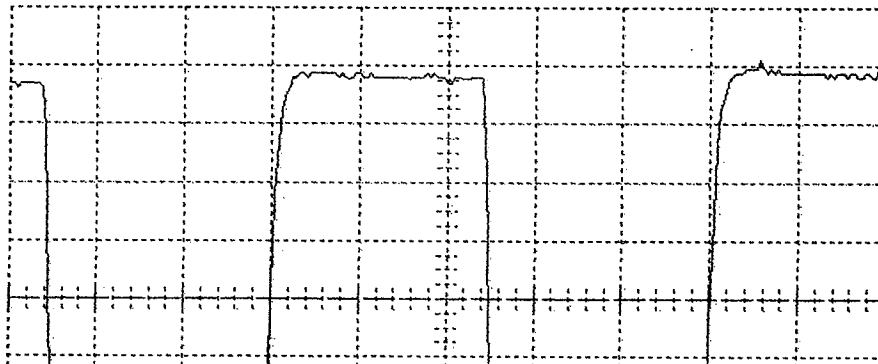
19.6

Oscilloscopes

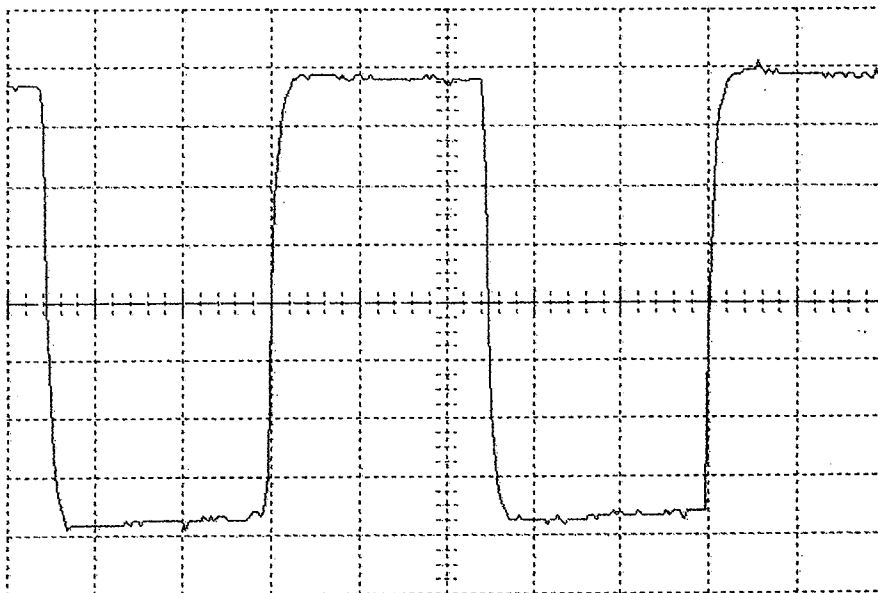


DUTY CYCLE : 1.2E-02

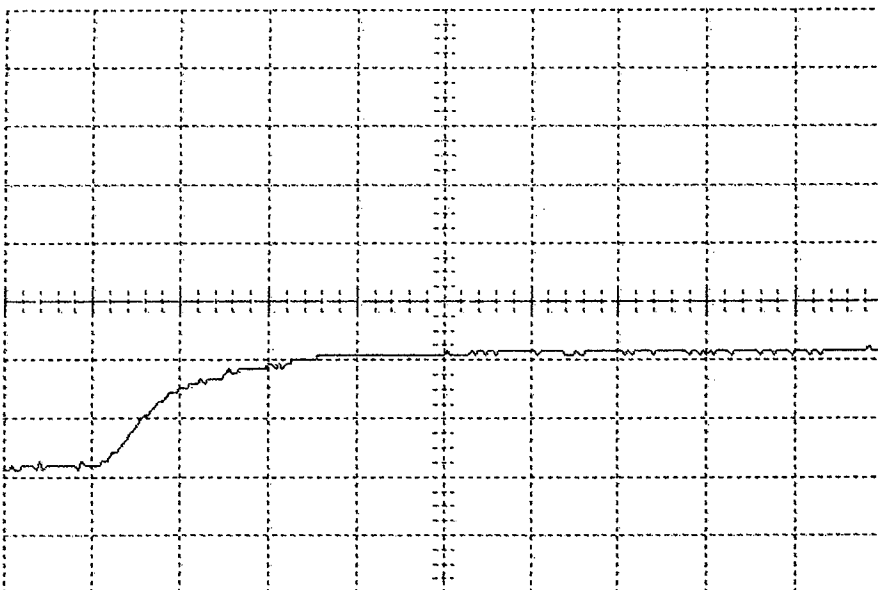
DUTY CYCLE : .0119521912351



DUTY CYCLE : .0119521912351



8 ms 6.5 ms 13 ms
.5 mV/div
falltime(1) <= 79.8404 us
+width(1) 1.23752 ms risetime(1) <= 79.8404 us
-width(1) 1.26746 ms



-1 ms 2 ms 4 ms
.5 mV/div
risetime(1) <= 908.184 us

ACR
PLB 200
7
6 Jul 2004
406 MHz
TEMP : 20°C

