Kourou FMO-FSL Calibration

September 2003

A. Herique
JP. Goutail

CHANGE RECORDS

ISSUE	DATE	EVOLUTION	AUTHOR
V0.1	24/9/03	Official test report	AH, JPG
V1.0	10/10/03	Data analysis	AH
V1.1	20/02/18	Translation in English	YR

Table of Contents

1 Introduction

This report describes the on-ground tests performed on Flight Model Orbiter (FMO) and Flight Spare Lander (FSL) on-board Rosetta spacecraft in September 2003. It includes the report as distributed at the end of the test operations and the data analysis report.

It has been translated into English language in 2018 to be published in the Planetary Science Archive (PSA).

Applicable documents

[AD 1] CONSERT Request for Calibration RO-OCN-TN-3064

Reference documents

[RD 1]	FM0 integration Calibration	V 3.0	06/09/2003	RO-OCN-TR-3801
[RD 2]	FSL integration Calibration	V 8.2	01/07/2003	RO-OCN-TR-3802
[RD 3]	CONSERT bench characterization			RO-OCN-TN-3818

2 Test report

2.1 Abstract

The two tests described in :
"CONSERT Request for Calibration", Reference RO-OCN-TN-3064, Issue 3, Date 28/04/03
were performed September 22nd and 24th, 2003.
The objective of these tests were to calibrate the emission frequency of the two instruments (Orbiter and Lander) by direct measurement of the transmit signal.

The Calibration GSE was installed and setup September 17th. A Quiet Mode Test Performed on September 19th was used as a rehearsal for the configuration.

Both tests are successful.

Note :

During both tests, a perturbating signal has been noticed.
The observed interference figure shows that this signal is characterized by a frequency stability equal or higher than Consert's clock accuracy.
The induced noise level at the instrument output varies drastically (10 dB) as a function of the setting of Consert's internal clock.

The origin of this perturbation is not identified and may correspond to ground or flight equipment including flight 162 preparation on the site.
The observed frequency stability leads to suspect radio-wave activities (?).

2.2 Detailed report

16/9/03:

Unpacking the bench and antennas after transportation.

17/9/03:

Security training
Setup of the system in the clean room
Bench start-up :
- first auto-test with 20 dB attenuation in the loop. No-triggering error.
- Next test with correct loop
- 17:23 UT the bench outputs correct values banc17-9-3_3 et 4

Test operation with test model.
Config:
EqmT – compact attenuator – antenna AH (without visibility)
Antenna RS – Att R/S - Bench

Compact att	RS att.	Bench	Result	File
20 dB + abs visi	0+0	0	OK	Kourou_test_4.bin
30 dB "	0+0	0	OK	Kourou_test_5.bin
30 dB "	0+0	0	OK	Kourou_test_6.bin
30 dB "	0+0	10	Time out	Kourou_test_7.bin
30 dB visi	0+0	0	ok	Kourou_test_8.bin
30 dB visi	0+0	10	ok	Kourou_test_9.bin
30 dB visi + HV	0+0	10	Time out	Kourou_test_10.bin
30 dB visi	0+0	20	Time out	Kourou_test_11.bin

Files Kourou_test_10.bin and Kourou_test_11.bin corrupted

Test raie H4
L030917-210411.cdmsbin
Cable kx15 3M + att 20 dB on bench
Start around sounding 24
Stop at -93 dBm

18/9/3

9h shutdown of the bench after 4 conclusive autotests.

19/9/3

9h30 bench startup
9h45 autotest banc19-9-3_1.txt to 9-9-3_3.txt

test H4
10h02 start - emission bench around sounding 76.
10h36 restart after crash and 10 minutes without data

Start again from the beginning on a new file
11h45 Crash egse and following on next file. 25 seconds lost…
11h48 stop H4 line around sounding 1175
Experiment with terminator
11h53 New file with terminator
then H4 -110dB to +10 dB with step 2dB every 5 seconds
12h10 autotest bench n°4 ok

File L030919-150336.cdmsbin
L030919-153343.cdmsbin
L030919-164449.cdmsbin
L030919-165154.cdmsbin
L030919-170329.cdmsbin

<u>Lander Quiet mode - test training</u>
13h50 autotest bench n°5 ok 106.2 / 103.3 dB - banc19-9-3_5.txt
setup : antenna R/S on bench without attenuator - cable KX4 10M VT

lander in quiet mode data file 030918164338.dat
tests without signal

File	Attenuation ext	Att bench		
FSL_19Kourou_01.bin	0	20dB	Time out	
FSL_19Kourou_02.bin	0	0dB	Triggered	Noise only
FSL_19Kourou_03.bin	0	10dB	Time out	
FSL_19Kourou_04.bin	0	10dB	Time out	

Test with signal

File	Att ext	Bench	Result	D max
FSL_19Kourou_05.bin	0	10dB	Ok	0.04
FSL_19Kourou_06.bin	0	10dB	Ok	0.04
FSL_19Kourou_07.bin	0	20dB	Ok	0.02
FSL_19Kourou_08.bin	0	20dB	Ok	0.02

Test ok - Advisable position : -10 dB

<u>Test H4</u>
15h00 restart of the experiment for H4 line - H4 start from beginning
~15h30 end at -91 dB
Filie L0309-19-195812.cdmsbin
L0309-19-200304.cdmsbin

The H4 signal seems very perturbated by the CDMS simulator (noise observable on the oscilloscope)
It is not possible to observe the dynamic zone of interest.

17h00 bench restart - banc19-9-3_6.txt

22/9/03 Orbiter test

11h46 TU Bench is ON since 19/9 17h.
auto test banc22-9-3_1, 2 et 3 result ok. (bench date is given as a France time zone).

11H52 test bench in R8 : noise only FMO_Kourou_00.bin

Test configuration:

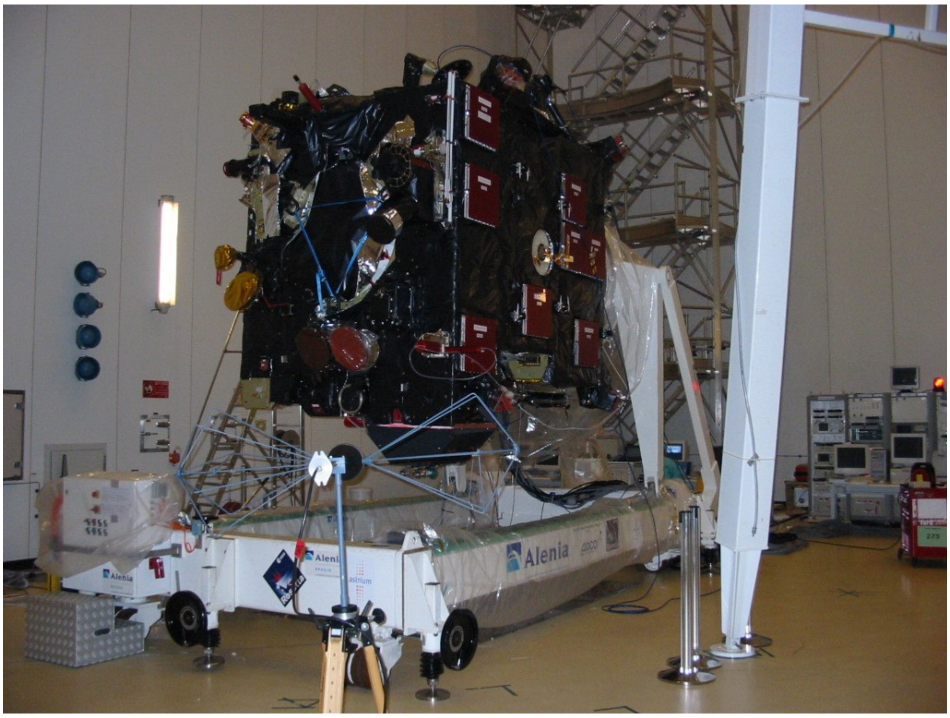
Antenne R/S Horizontal pointed toward the S/C
Directly connected to the bench with a Kx4 – 10 M VT cable
Bench attenuator = 0dB
In the table, (b) indicates the noise triggering
No remarquable variation of the dynamix between V and H polarizations cf 19 et 20

~12h03 CONSERT start.
12h19 restart and MT
file 030921140001.dat and 030921143731.dat
lost 30 soundings between the two files

18h00 end and bench auto test 4, 5 et 6.

Test successful

Th measured noise power by CONSERT orbiter varies up to 10 dB depending on OCXO when the Lander PTF if OFF during the test.



step	Time	OCXO	ATT bench	Antenna	File
2	12h25	Apres tuning OCXO=221	10	H	FMO_Kourou_01.bin
3-4	12h28 / 31 / 34	DAC90 = 126			02 / 03 / 04
5	12h38 / 40 / 42	6E / 110			05 / 06 / 07
6	12h47 / 50 / 52	58 / 88			08 / 09 /10
7	12h57 / 59 / 13h01	42 / 66			11 / 12 / 13
8	13h07 / 10 / 12	2C / 44			14 / 15 (b) / 16
9	13h17 / 20 / 23 / 25	16 / 22		H/H/V/H	17 / 18 (b) / 19 / 20
10	13h27 / 29 / 32	00 / 00		H	21 (b) / 22 / 23
11	13h37 / 40 / 42	0B / 11			24 / 25 / 26
12	13h47 / 50 / 52	21 / 33			27 / 28 / 29
13	13h57 / 14h00 / 02	37 / 55			30 / 31(b) / 32
14	14h07 / 09 / 11	4D / 77			33 / 34 / 35 (b)
15	14h17 / 20 / 22	63 / 99			36 / 37 / 38
16	14h27 / 29 / 31	79 / 121			39 / 40 / 41
17	14h37 / 44 / 45	8F / 143			(C:) 42 / 43b / 44b / 45
18	14h47 / 49 / 50	A5 / 165			46 / 47 / 48
19	14h57 / 15h00 / 01	BB / 187			49 / 50 / 51
20	15h08 / 09 / 11	D1 / 209			52 / 53 / 54
21	15h17 / 19 / 21	E7 / 231			55 / 56 / 57
22	15h27 / 29 / 30	FD / 253			58 / 59 / 60
23	15h37 / 40 / 42	FF / 255			61 / 62 / 63
24	15h47 / 50 / 51	F2 / 242			64 / 65 / 66
25	15h57 / 59 / 16h01	DC / 220			67 / 68 / 69
26	16h07 / 09 / 10	C6 / 198			70 / 71(b) / 72
27	16h17 / 19 / 21	B0 / 176			73 / 74 / 75
28	16h27 / 29 / 31	9A / 154			76 / 77 / 78
29	16h37 / 39 / 41	84 / 132			79 / 80 / 81
30	16h47 / 49 / 51	80 / 128			82 / 83 / 84
31	16h57 / 59 / 17h01	7E / 126			85 / 86 / 87

24/9/03 Lander test

This test has been modified by regard to the test procedure [AD 1] : the Orbiter is OFF at the beginning of the ping-pong. The measurement is performed directly by the bench.

12h01 TU the bench is ON since the 23/9 17h30.
auto test banc24-9-3_1 et 2 ok. (date in French time zone- not stored file ?).

12h04 test bench in R8 : noise only FSL_24Kourou_00.bin with att 0 dB

Test configuration:
Antenna R/S Horizontal pointed toward the S/C (idem 22/9)
Directly connected with Kx4 – 10 M VT cable
Bench attenuator = 0dB
In the table, (b) = noise triggering
Files 030923140501.dat and 030923143702.dat

12h 10 CONSERT start
around 12h30 very strong noise (_02) then weaker after 12h31 ?
Be careful : launch campaign on A5: high EMC perturbation risk
Lander with DAC 131 – Orbiter tune on DAC 127

12h44 orbiter stopped – lander only

In this measurement configuration, with 2 antennas folded, the S/C is horizontal with the lander facing to the bottom, for the antenna bench positioning, the lander is slightly more powerful than the orbiter on the oscilloscope and the bench data (7 dB).

16h Brief noise burst (a few µs) triggered the oscilloscope
16h30 High peaks…

16h20 Error on the mission timeline at step 198: 7 minutes instead of 10 minutes.
Induces a de-synchronization of the measurements
No impact on measurements 198 and 176
No acquisition with ocxo =154 : 1 noise file and 2 files with ocxo 132
Acquisition step 33: OCXO 132 in fact, after checking the dates

17h00 131 done just next
154 redone afterwards

17h 25 noise only test just next with consert off
S/C and lander in test configuration.
17h50 Then for the next lander test configuration config (batteries loading)

Auto test of the bench banc24-9-3_3.txt et _4 ok

Test successful

step		OCXO	ATT bench	Antenna	File
5	12h28	tuning	10 dB	H	FSL_24Kourou_01.bin
8	12h30 / 33 / 35	Orbiter			02 (b) / 03 / 04
8	12h40 / 45	Lander 127			05 / 06
9	12h50 / 52 / 53	6E / 110			07 / 08 / 09 (b)
10	13h00 / 02 / 03	58 / 88			FSL_Kourou_10 / 11(b) / 12
11	13h10 / 11 / 13	42 / 66			13 / 14 / 15
12	13h19 / 21 / 22 / 25	2C / 44			16 (b) / 17 / 18 (b) / 19
13	13h30 / 31 / 33	16 / 22			20 / 21 / 22
14	13h39 / 41 / 43	00 / 00			23 / 24 / 25
15	13h50 / 51 / 53	0B / 11			26 / 27 / 28
16	14h00 / 02 / 04	21 / 33			29 / 30 / 31
17	14h09 / 11 / 13	37 / 55			32 / 33 / 34
18	14h19 / 22 / 24	4D / 77			35 (b) / 36 / 37
19	14h29 / 31 / 33	63 / 99			38 / 39 / 40
20	14h40 / 42 / 44	79 / 121			41 / 42 / 43
21	14h50 / 51 / 53	8F / 143			44 / 45 / 46 (b)
22	15h00 / 02 / 03	A5 / 165			47(b) / 48 / 49
23	15h10 / 12 / 14	BB / 187			50 / 51 / 52 (b)
24	15h20 / 22 / 24	D1 / 209			53 / 54 (b) / 55
25	15h30 / 32 / 34	E7 / 231			56 / 57 / 58 (b)
26	15h40 / 42 / 43	FD / 253			59 / 60 / 61
27	15h50 / 52 / 53	FF / 255			62 / 63 (b) / 64
28	16h00 / 02 / 04	F2 / 242			65 / 66 / 67 (b)
29	16h10 / 12 / 13	DC / 220			68 / 69 / 70
30	16h20 / 22 / 24	C6 / 198 pb			71 / 72 / 73
31	16h29 / 31 / 33	B0 / 176			74 / 75 / 76
32	16h40 / 46 / 47	9A / 154			77 (b) /
		132			78 / 79
33	16h50 / 52 / 54	84 / 132 tbc			80 / 81 / 82
34	16h58 / 17h00 / 02	83 / 131			83 / 84 / 85
+1	17h17 / 18 20	9A /154			86 / 87 / 88
+2	17h25 / 27 / 29	Consert OFF	0 dB		89 / 90 / 91
+3	17h53 / 54 / 55	Consert OFF	0 dB		92 / 93 / 94

Error in file names. The files 0 to 9 are renamed FSL_24Kourou_01.bin etc to avoid any confusion with files taken on Friday 19/9.

3 Analysis

3.1 OCXO Orbiter

The frequency measurement is performed on the first harmonic of the modulated code at 90 MHz. The computed difference is then the difference on the carrier at the bench 90 MHz. The whole detailed measurements are given in appendix and summarized in Figure 1 and Table 1.

For the temperatures of intereset (20°), it appears a 4.5 Hz offset on the main part of the setting range of the OCXO. This offset is slightly higher for the low set points (DAC = 0 to 11)

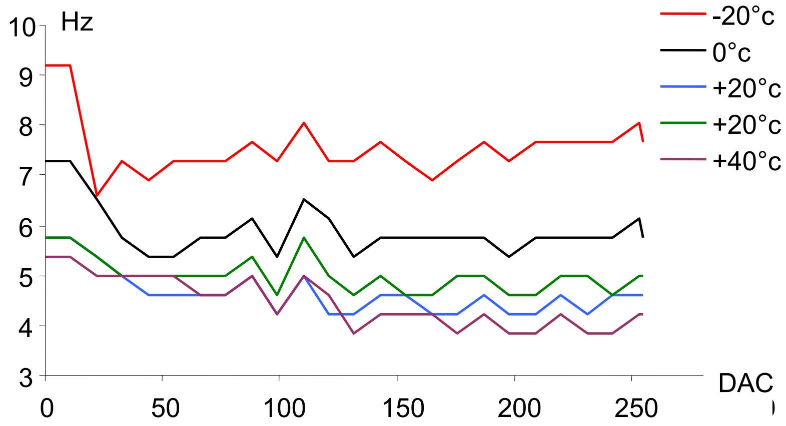


Figure 1 FMO – Offset between 2001 and 2003 (in Hz / 90 MHz)

Regarding the DAC setpoint for a 90 MHz transmission. This value has been measured at 126 in 2001 at 20°, this measurement sets the DAC90 of the FMO. Today we found an offset of -4.6 Hz for the DAC126 and +2.3 Hz for DAC128. This gives us a DAC=127 for the 90 MHz.

This offset of 4.5 Hz gives us the drift of the OCXO during 30 months. Soo it is -0.2 Hz per year on the clock's 10 MHz and 1.8 Hz on the carrier. This value is far lower than the control capability of the VCO for 12 years aging, assuming an aging comparable on Earth and in flight.

3.2 OCXO Lander

The results of the FSL are presented on Figure 2 and Table 2. These data are comparable to the FMO ones and give a drift of 1.5 Hz on the 90 MHz during 24 months, so a drift lower than -*0.1 Hz on the 10 Mhz. In both cases, it is a decrease of the frequency.

The DAC90 FSL of 131 gives an offset of -3.45 Hz while the DAC132 gives only 1.15 Hz. This is completely consistent with the DAC127 of the FMO after tuning.

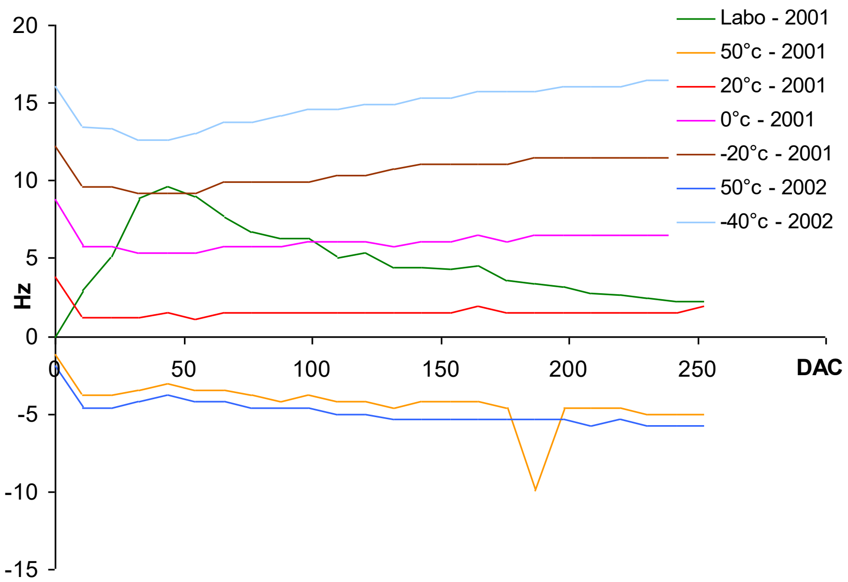


Figure 2 FSL –Offset between 2001 and 2003 (in Hz / 90 MHz)

FMO		measure in calibration (VT)					offset calibration minus kourou				
dac OCXO	kourou 22/09/2003	-20°c 19/04/01	0°c 13/04/01	20°c 04/04/01	20°c 19/04/01	40°c 11/04/01	-20°c 19/04/01	0°c 13/04/01	20°c 04/04/01	20°c 19/04/01	40°c 11/04/01
0	-619.26	-610.06	-611.98	-613.51	-613.51	-613.89	9.2	7.28	5.75	5.75	5.37
11	-592.83	-583.64	-585.55	-587.09	-587.09	-587.47	9.19	7.28	5.74	5.74	5.36
22	-557.6	-551	-551.09	-552.24	-552.24	-552.62	6.6	6.51	5.36	5.36	4.98
33	-502.07	-494.79	-496.32		-497.09	-497.09	7.28	5.75		4.98	4.98
44	-420.88	-413.99	-415.52	-416.28	-415.9	-415.9	6.89	5.36	4.6	4.98	4.98
55	-344.29	-337.01	-338.92	-339.69	-339.31	-339.31	7.28	5.37	4.6	4.98	4.98
66	-277.27	-269.99	-271.52	-272.67	-272.29	-272.67	7.28	5.75	4.6	4.98	4.6
77	-217.52	-210.25	-211.78	-212.93	-212.55	-212.93	7.27	5.74	4.59	4.97	4.59
88	-163.91	-156.25	-157.78	-158.93	-158.55	-158.93	7.66	6.13	4.98	5.36	4.98
99	-113.74	-106.46	-108.38	-109.53	-109.15	-109.53	7.28	5.36	4.21	4.59	4.21
110	-68.17	-60.13	-61.66	-63.19	-62.42	-63.19	8.04	6.51	4.98	5.75	4.98
121	-24.13	-16.85	-18	-19.91	-19.15	-19.53	7.28	6.13	4.22	4.98	4.6
132	17.23	24.51	22.59	21.45	21.83	21.06	7.28	5.36	4.22	4.6	3.83
143	55.53	63.19	61.27	60.13	60.51	59.74	7.66	5.74	4.6	4.98	4.21
154	92.29	99.57	98.04	96.89	96.89	96.51	7.28	5.75	4.6	4.6	4.22
165	127.14	134.04	132.89	131.36	131.74	131.36	6.9	5.75	4.22	4.6	4.22
176	160.08	167.36	165.82	164.29	165.06	163.91	7.28	5.74	4.21	4.98	3.83
187	190.72	198.38	196.46	195.31	195.7	194.93	7.66	5.74	4.59	4.98	4.21
198	220.59	227.86	225.95	224.8	225.18	224.42	7.27	5.36	4.21	4.59	3.83
209	247.78	255.44	253.52	251.99	252.37	251.61	7.66	5.74	4.21	4.59	3.83
220	273.44	281.1	279.18	278.03	278.42	277.65	7.66	5.74	4.59	4.98	4.21
231	297.56	305.22	303.31	301.78	302.54	301.39	7.66	5.75	4.22	4.98	3.83
242	320.16	327.82	325.9	324.75	324.75	323.99	7.66	5.74	4.59	4.59	3.83
253	341.22	349.26	347.35	345.82	346.2	345.44	8.04	6.13	4.6	4.98	4.22
255	345.05	352.71	350.8	349.65	350.03	349.26	7.66	5.75	4.6	4.98	4.21

Table 1: FMO comparison of 2001 and 2003 measurements (Offset in Hz to the 90 MHz)

FSL		Meas.							ecart						
		july01	VT oct	2001			VT	april 02	july01	VT	oct	2001		VT	april 02
DAC	Kourou	+25°c	+50°c	+20°c	0°c	-20°c	+50°c	-40°c	+25°c	+50°c	+20°c	0°c	-20°c	+50°c	-40°c
0	-783.93	-784	-785.08	-780.1	-775.12	-771.68	-785.85	-767.85	-0.07	-1.15	3.83	8.81	12.25	-1.92	16.08
11	-751	-748	-754.83	-749.85	-745.25	-741.42	-755.59	-737.59	3	-3.83	1.15	5.75	9.58	-4.59	13.41
22	-708.1	-703	-711.93	-706.95	-702.36	-698.53	-712.7	-694.7	5.1	-3.83	1.15	5.74	9.57	-4.6	13.4
33	-641.85	-633	-645.3	-640.7	-636.49	-632.66	-646.06	-629.21	8.85	-3.45	1.15	5.36	9.19	-4.21	12.64
44	-544.58	-535	-547.64	-543.05	-539.22	-535.39	-548.41	-531.94	9.58	-3.06	1.53	5.36	9.19	-3.83	12.64
55	-449.98	-441	-453.43	-448.84	-444.62	-440.79	-454.2	-436.96	8.98	-3.45	1.14	5.36	9.19	-4.22	13.02
66	-367.65	-360	-371.09	-366.12	-361.9	-357.69	-371.86	-353.86	7.65	-3.44	1.53	5.75	9.96	-4.21	13.79
77	-293.73	-287	-297.56	-292.2	-287.99	-283.78	-298.33	-279.95	6.73	-3.83	1.53	5.74	9.95	-4.6	13.78
88	-226.33	-220	-230.55	-224.8	-220.59	-216.38	-230.93	-212.16	6.33	-4.22	1.53	5.74	9.95	-4.6	14.17
99	-164.29	-158	-168.12	-162.76	-158.16		-168.89	-149.74	6.29	-3.83	1.53	6.13		-4.6	14.55
110	-106.08	-101	-110.29	-104.55	-99.95	-95.74	-111.06	-91.53	5.08	-4.21	1.53	6.13	10.34	-4.98	14.55
121	-51.32	-46	-55.53	-49.79	-45.19		-56.3	-36.38	5.32	-4.21	1.53	6.13		-4.98	14.94
132	1.53	6	-3.06	3.06	7.28	12.25	-3.83	16.47	4.47	-4.59	1.53	5.75	10.72	-5.36	14.94
143	50.55	55	46.34	52.08	56.68	61.66	45.19	65.87	4.45	-4.21	1.53	6.13	11.11	-5.36	15.32
154	97.66	102	93.44	99.19	103.78	108.76	92.29	112.97	4.34	-4.22	1.53	6.12	11.1	-5.37	15.31
165	142.46	147	138.25	144.38	148.97	153.57	137.1	158.16	4.54	-4.21	1.92	6.51	11.11	-5.36	15.7
176	185.36	189	180.76	186.89	191.48	196.46	179.99	201.06	3.64	-4.6	1.53	6.12	11.1	-5.37	15.7
187	225.57	229	215.61	227.1	232.08	237.06	220.21	241.27	3.43	-9.96	1.53	6.51	11.49	-5.36	15.7
198	263.86	267	259.27	265.4	270.37	275.35	258.5	279.95	3.14	-4.59	1.54	6.51	11.49	-5.36	16.09
209	300.25	303	295.65	301.78	306.76	311.73	294.5	316.33	2.75	-4.6	1.53	6.51	11.48	-5.75	16.08
220	334.33	337	329.73	335.86	340.84	345.82	328.97	350.41	2.67	-4.6	1.53	6.51	11.49	-5.36	16.08
231	366.5	369	361.52	368.03	373.01	377.99	360.75	382.97	2.5	-4.98	1.53	6.51	11.49	-5.75	16.47
242	396.75	399	391.77	398.28	403.26	408.24	391.01	413.22	2.25	-4.98	1.53	6.51	11.49	-5.74	16.47
253	424.71	427	419.73	426.62	431.22	436.58	418.96	441.18	2.29	-4.98	1.91	6.51	11.87	-5.75	16.47

Table 2: FSL comparison between 2001 and 2003 measurements (Offset in Hz to the 90 MHz)

3.3 Transmit power

The transmitted power measurement does not give very relevant results. We observe the same tendencies as in calibration, opposed for the FMO and FSL [RD 1], [RD 2]. We notice also the increase of the precise variance of the measurements around 90 MHz [RD 3].

The received signal is also more powerful of about 7 dB for the lander than for the orbiter while the transmission is weaker of 3 dB. This difference of 10 dB comes probably from the antenna configuration: completely folded for the orbiter, and defining a “bad” dipole for the lander.

The polarization seems to have no impact on the lik budget, which can be explained by the numerous couplings: satellite support structure, etc…

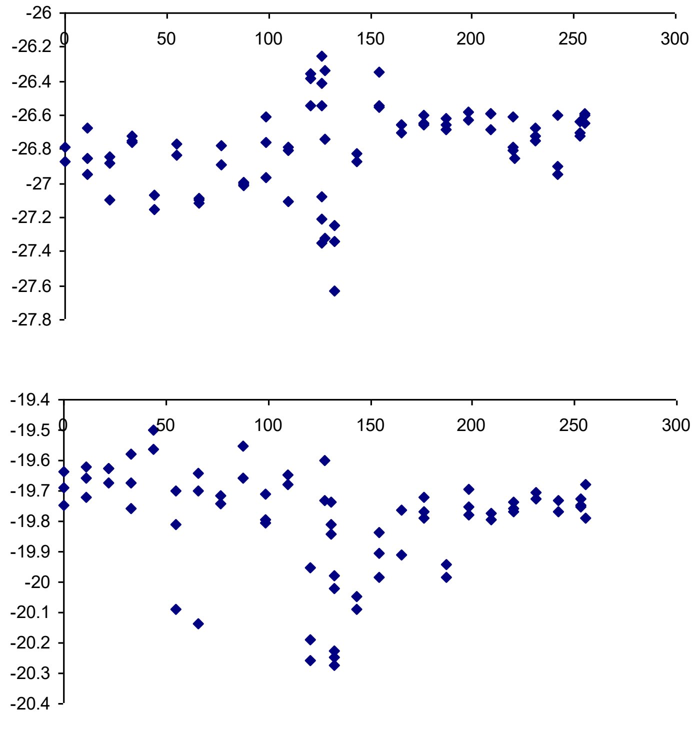


Figure 3 Power variation measured on FMO (above) and FSL (below) in dB

3.4 Noise measurement

3.4.1 CONSERT telemetry

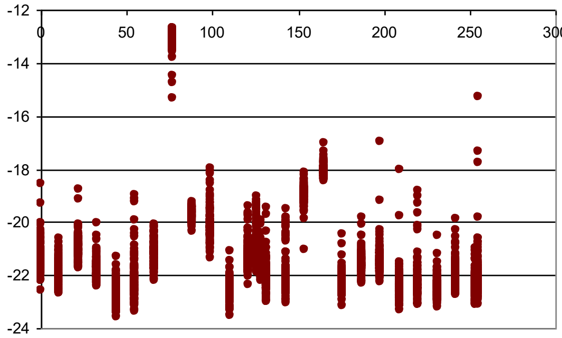
During the receiving phase of the experiment we measure the noise received by CONSERT and its impact depending on the DAC.

For the FMO, this noise varies strongly by regard to the DAC while the GCW stay constant (0). As soon as it is powerful, this noise is dominated by a frequency line (Figure 4 - c).

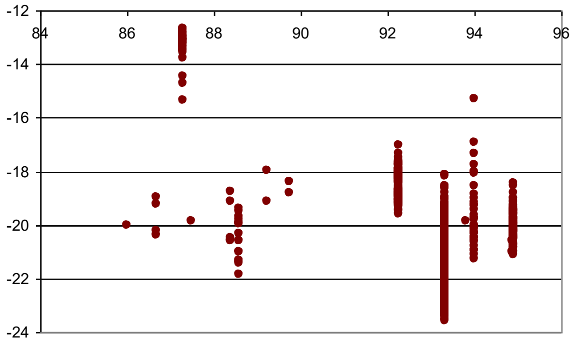
The Figure (d) shows the appearing of a frequency line dominating by regard to the DAC value. Each line corresponds to a unique value of the DAC (rarely both) except:

- The 93.3 MHz line is an internal noise which dominates in absence of any other noise source
- The 94 Mhz which can be quite powerful and is not explained at the moment.

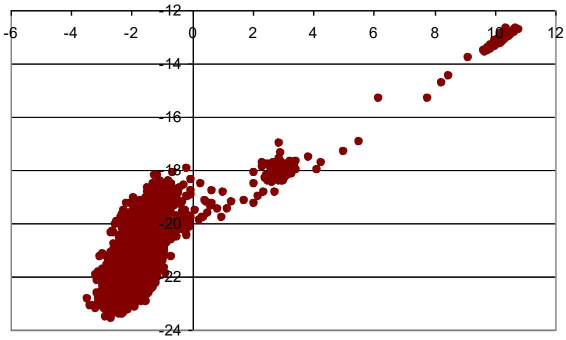
The effect of the coherence is thus the dominating effect with a main line at 87.29 MHz for the DAC77.



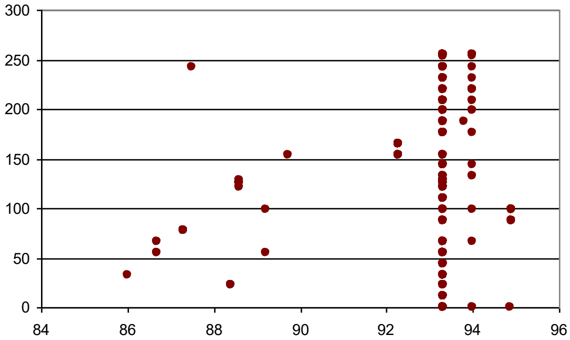
a- Noise mean power as a function of the DAC



b – Noise mean power as a function of the frequency of the main line



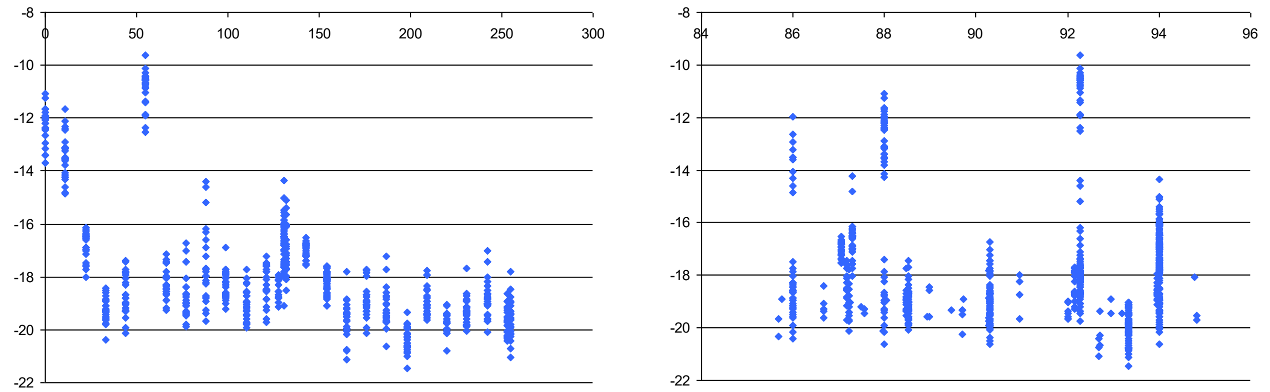
c – Noise mean power as a function of the power of the dominating spectral line



d - DAC as a function of the main frequency line

Figure 4: FMO – Noise level

The measurement is comparable for the FSL. The set points and the DAC lines are different. This is firstly explained by a different in the setting law of the VCO and the two OCXO. These peaks are located at 86 MHz (DAC=11), 88 MHz (DAC=0) and 92.27 MHz (DAC=55).



a- Noise mean power puissance as a function of the DAC

b - Noise power as a function of the frequency of the main line

Figure 5: FSL – Noise level

3.4.2 Bench measurements

The frequency lines observed are recognizable on the measured noise spectrum by the bench Figure 6 and Figure 7 (spectrogram on 255 µs averaged 127 times), in particular:

- The “wide” line at 94 MHz which is coherent on several values of the DAC and can be an harmonics, as well as the 99.5 MHz
- The lines at 88 and 87.3 MHz.

The line at 86 MHz does not appear clearly.
Other lines appear on the spectrum and are not visible on the data. This comes from the fact that we don”t have swept all the DAC values but only with a step of 11.

The good stability of the noise between the two days of experiment seems avoiding the interfernces with the current launch campaign (Figure 8). The observed sources have a frequency stability comparable the CONSERT ones.

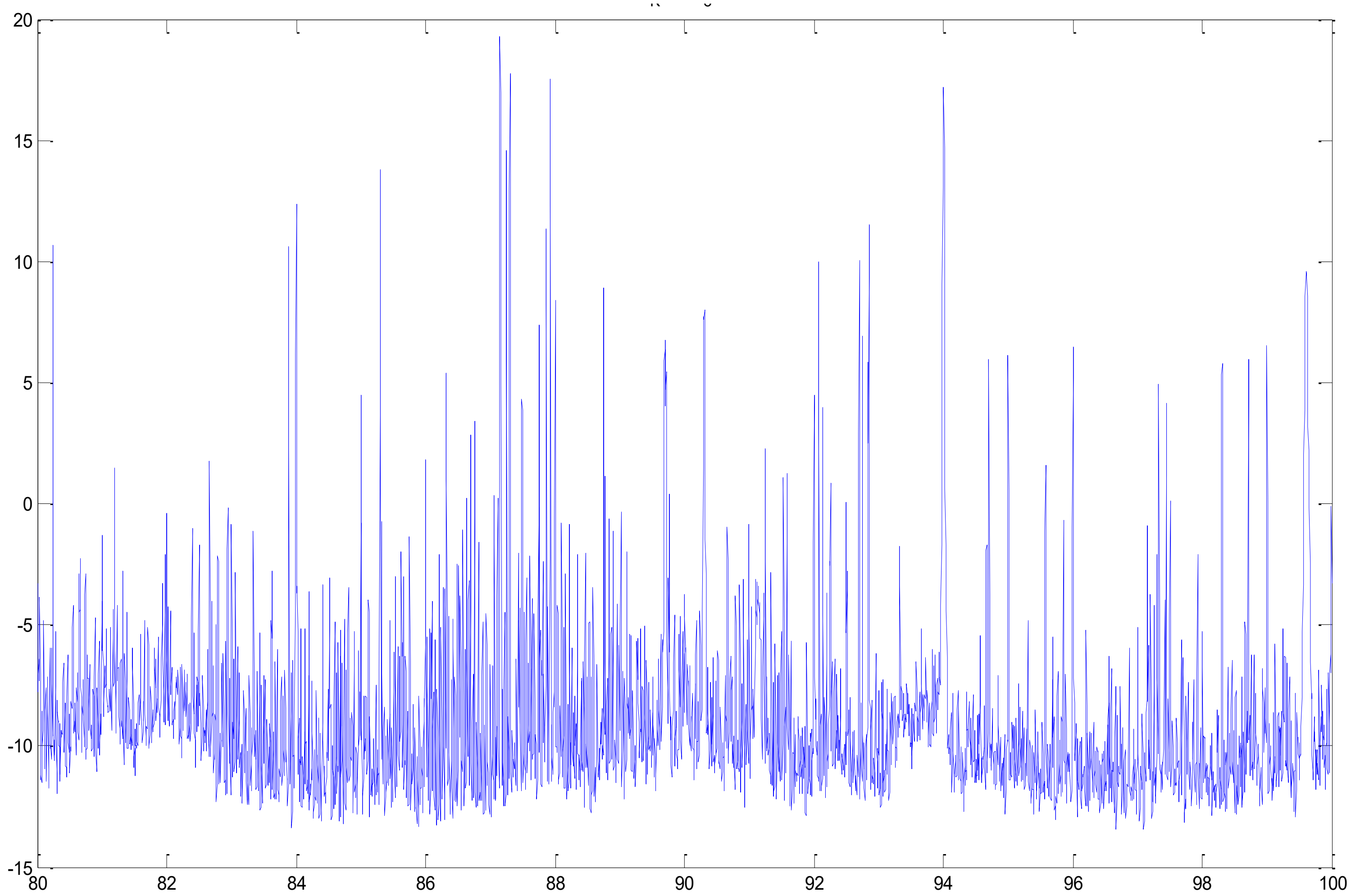


Figure 6: Noise spectrum on the bench (dB – MHz) FSL_Kourou_89

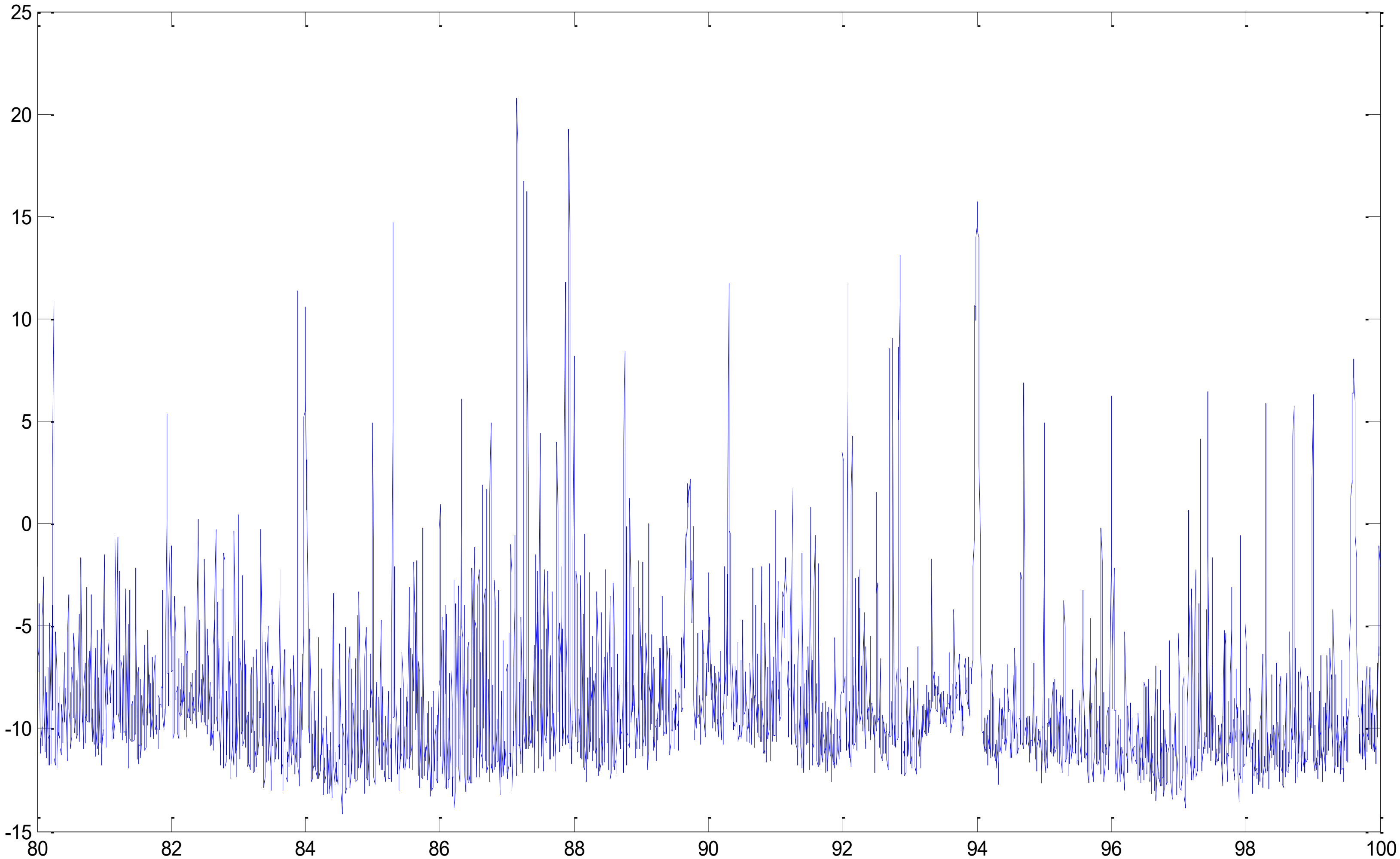


Figure 7: Noise spectrum on the bench (dB – MHz) FSL_Kourou92

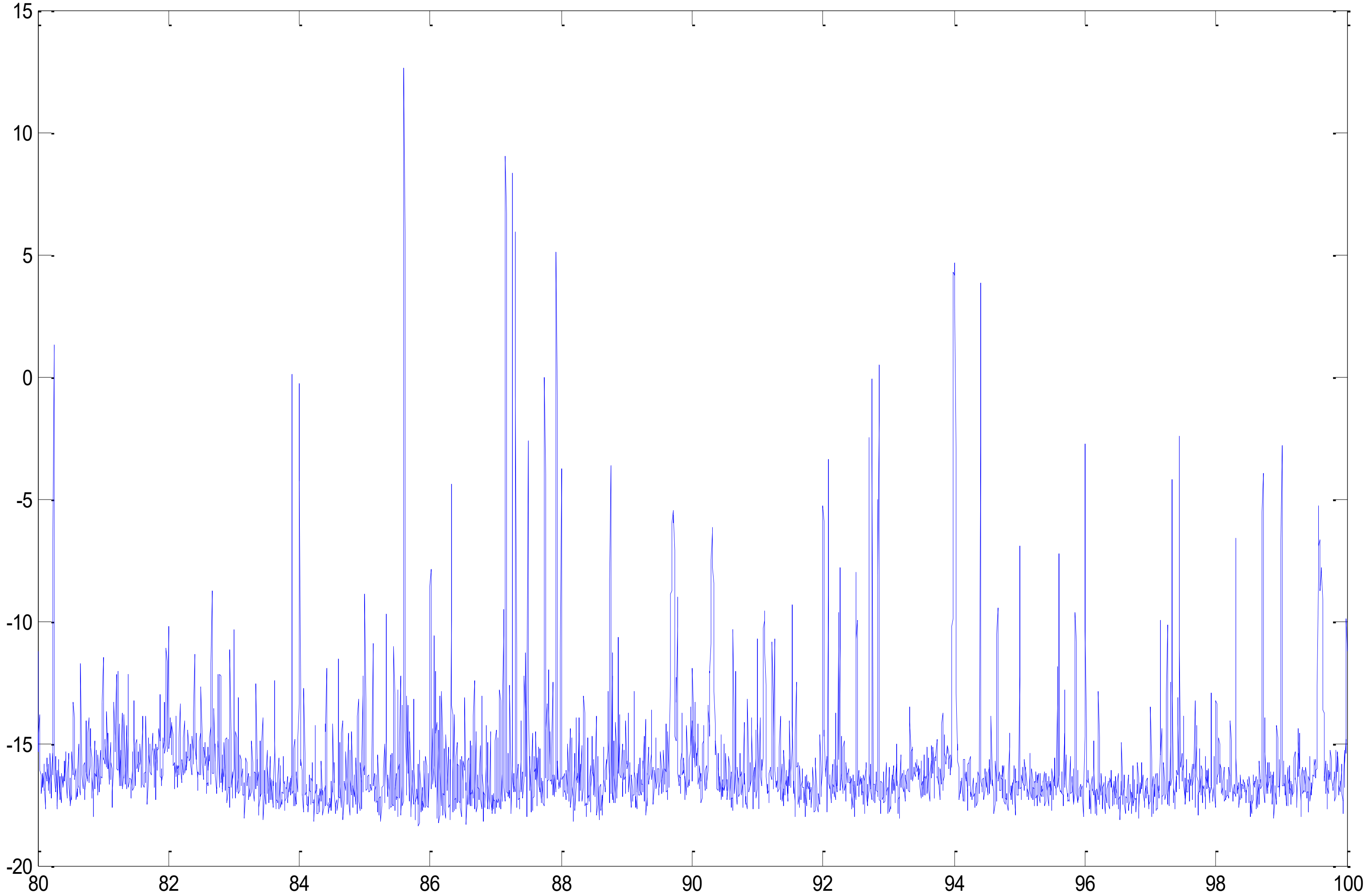


Figure 8: Noise spectrum on the bench (dB – MHz) FMO_Kourou35

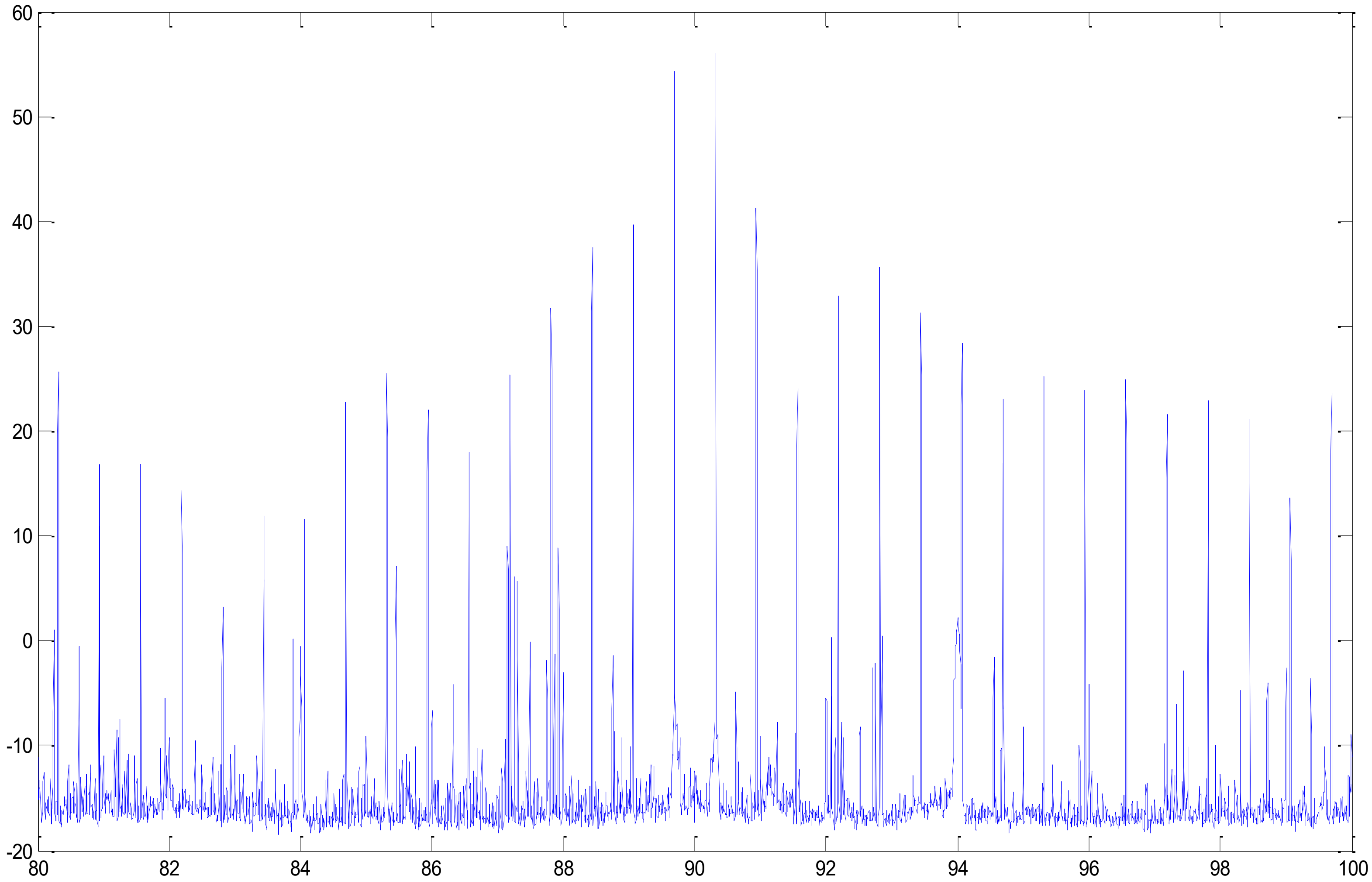


Figure 9: FSL tuning signal (dB – MHz) FSL_24Kourou00

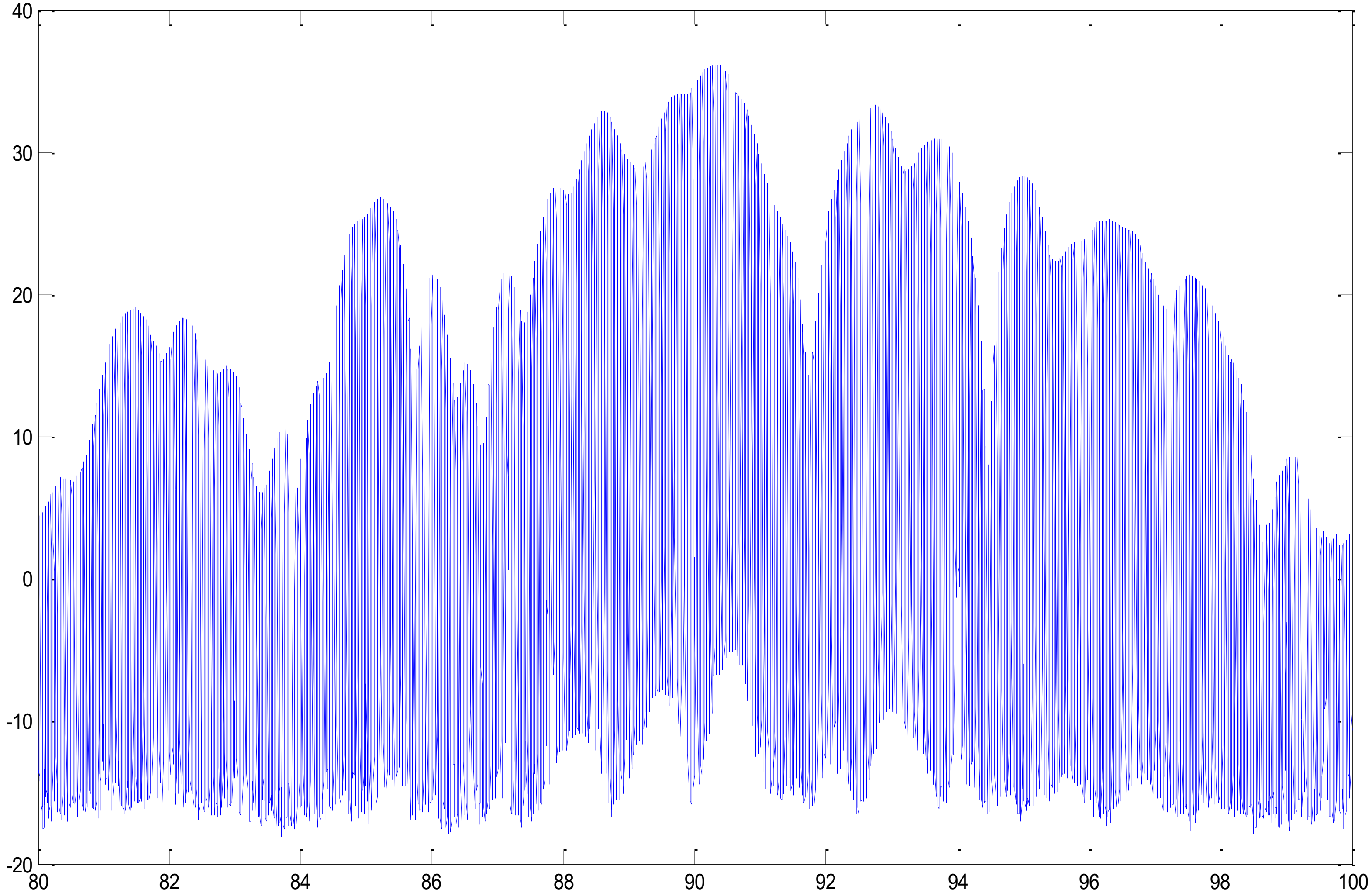


Figure 10: FSL signal spectrum (dB – MHz) FSL_Kourou38

4 Conclusions

The frequency measurement shows a slight offset between the two clocks. This offset is:

- In the same direction for both OCXO (decreasing)
- Largely lower than correction capability for CONSERT during 12 years

The measurement of the ambient noise shows again the importance of the EMC for CONSERT. The impact on interference lines shall be studied as a function of the clock control.

5 Appendices Measured frequencies, by file

5.1 Orbiter

File	F1 (Hz)	Width	Power	OCXO
FMO_Kourou_00.bin	4438.96	663.01	-39.9608	noise
FMO_Kourou_01.bin	274.97	0.84	-26.8518	221
FMO_Kourou_02.bin	-5.74	0.84	-27.3505	126
FMO_Kourou_03.bin	-5.74	0.84	-27.079	126
FMO_Kourou_04.bin	-5.74	0.84	-26.5403	126
FMO_Kourou_05.bin	-67.78	0.84	-26.7912	110
FMO_Kourou_06.bin	-68.17	0.84	-26.8016	110
FMO_Kourou_07.bin	-68.17	0.84	-27.1054	110
FMO_Kourou_08.bin	-163.91	0.84	-27.0008	88
FMO_Kourou_09.bin	-163.91	0.84	-26.9915	88
FMO_Kourou_10.bin	-163.91	0.84	-27.0142	88
FMO_Kourou_11.bin	-277.27	0.84	-27.1171	66
FMO_Kourou_12.bin	-277.27	0.84	-27.0938	66
FMO_Kourou_13.bin	-277.27	0.84	-27.0903	66
FMO_Kourou_14.bin	-420.88	0.84	-27.0674	44
FMO_Kourou_15.bin	5984.99	455.84	-43.3766	noise
FMO_Kourou_16.bin	-420.88	0.84	-27.1561	44
FMO_Kourou_17.bin	-557.6	0.84	-27.0939	22
FMO_Kourou_18.bin	-19383.43	0.72	-43.5666	failure
FMO_Kourou_19.bin	-557.6	0.84	-26.8395	22
FMO_Kourou_20.bin	-557.6	0.84	-26.8851	22
FMO_Kourou_21.bin	4417.13	622.33	-43.6371	noise
FMO_Kourou_22.bin	-619.26	0.84	-26.8673	0
FMO_Kourou_23.bin	-619.26	0.84	-26.7906	0
FMO_Kourou_24.bin	-592.45	0.84	-26.9487	11
FMO_Kourou_25.bin	-592.83	0.84	-26.6785	11
FMO_Kourou_26.bin	-592.83	0.84	-26.8485	11
FMO_Kourou_27.bin	-502.07	0.84	-26.7553	33
FMO_Kourou_28.bin	-502.07	0.84	-26.7238	33
FMO_Kourou_29.bin	-502.07	0.84	-26.7517	33
FMO_Kourou_30.bin	-343.9	0.84	-26.8307	55
FMO_Kourou_31.bin	4414.45	622.29	-43.5371	noise
FMO_Kourou_32.bin	-344.29	0.84	-26.7698	55
FMO_Kourou_33.bin	-217.52	0.84	-26.7819	77
FMO_Kourou_34.bin	-217.52	0.84	-26.8938	77
FMO_Kourou_35.bin	4413.3	622.06	-43.5674	noise
FMO_Kourou_36.bin	-113.74	0.84	-26.7619	99
FMO_Kourou_37.bin	-113.74	0.84	-26.9663	99
FMO_Kourou_38.bin	-113.74	0.84	-26.6073	99
FMO_Kourou_39.bin	-24.13	0.84	-26.3876	121
FMO_Kourou_40.bin	-24.13	0.84	-26.3544	121
FMO_Kourou_41.bin	-24.13	0.84	-26.5472	121
FMO_Kourou_42.bin	55.53	0.84	-26.8713	143
FMO_Kourou_43.bin	1426.55	970.96	-42.0958	noise
FMO_Kourou_44.bin	4410.62	621.59	-43.6851	noise
FMO_Kourou_45.bin	55.53	0.84	-26.8272	143

FMO_Kourou_46.bin	127.14	0.84	-26.7048	165
FMO_Kourou_47.bin	126.76	0.84	-26.6537	165
FMO_Kourou_48.bin	127.14	0.84	-26.6539	165
FMO_Kourou_49.bin	191.1	0.84	-26.6554	187
FMO_Kourou_50.bin	190.72	0.84	-26.6199	187
FMO_Kourou_51.bin	190.72	0.84	-26.6844	187
FMO_Kourou_52.bin	247.78	0.84	-26.5915	209
FMO_Kourou_53.bin	247.78	0.84	-26.5912	209
FMO_Kourou_54.bin	247.78	0.84	-26.6885	209
FMO_Kourou_55.bin	297.56	0.84	-26.6788	231
FMO_Kourou_56.bin	297.56	0.84	-26.7187	231
FMO_Kourou_57.bin	297.56	0.84	-26.7517	231
FMO_Kourou_58.bin	341.22	0.85	-26.7226	253
FMO_Kourou_59.bin	341.61	0.84	-26.6386	253
FMO_Kourou_60.bin	341.22	0.84	-26.7027	253
FMO_Kourou_61.bin	345.05	0.84	-26.604	255
FMO_Kourou_62.bin	345.05	0.84	-26.6434	255
FMO_Kourou_63.bin	345.05	0.84	-26.5918	255
FMO_Kourou_64.bin	320.16	0.84	-26.9485	242
FMO_Kourou_65.bin	320.16	0.84	-26.5993	242
FMO_Kourou_66.bin	320.16	0.84	-26.8984	242
FMO_Kourou_67.bin	273.44	0.84	-26.8044	220
FMO_Kourou_68.bin	273.44	0.84	-26.785	220
FMO_Kourou_69.bin	273.44	0.84	-26.6116	220
FMO_Kourou_70.bin	220.59	0.84	-26.6244	198
FMO_Kourou_71.bin	-19393.77	663.7	-43.6297	noise
FMO_Kourou_72.bin	220.21	0.84	-26.5779	198
FMO_Kourou_73.bin	160.08	0.84	-26.6554	176
FMO_Kourou_74.bin	160.08	0.84	-26.6423	176
FMO_Kourou_75.bin	160.08	0.84	-26.604	176
FMO_Kourou_76.bin	92.29	0.84	-26.5481	154
FMO_Kourou_77.bin	92.68	0.84	-26.3466	154
FMO_Kourou_78.bin	92.29	0.84	-26.5566	154
FMO_Kourou_79.bin	17.23	0.84	-27.3417	132
FMO_Kourou_80.bin	17.23	0.84	-27.6342	132
FMO_Kourou_81.bin	17.23	0.84	-27.2497	132
FMO_Kourou_82.bin	2.3	0.84	-26.7417	128
FMO_Kourou_83.bin	2.3	0.84	-26.3408	128
FMO_Kourou_84.bin	2.3	0.84	-27.3207	128
FMO_Kourou_85.bin	-4.98	0.84	-26.417	126
FMO_Kourou_86.bin	-4.6	0.84	-27.2054	126
FMO_Kourou_87.bin	-4.6	0.84	-26.2572	126

5.2 Lander

File	F1 (Hz)	Width	Power	OCXO
FSL_19Kourou_01.bin	-19607.46			failure
FSL_19Kourou_02.bin	5963.16	663.28	-39.1593	noise
FSL_19Kourou_03.bin	-19607.46			failure
FSL_19Kourou_04.bin	-19607.46			failure
FSL_19Kourou_05.bin	-2.68	0.84	-18.7466	131
FSL_19Kourou_06.bin	-2.3	0.84	-18.6888	131
FSL_19Kourou_07.bin	-2.3	0.84	-28.4778	131
FSL_19Kourou_08.bin	-2.68	0.84	-28.5995	131
FSL_24Kourou_00.bin	5985.75	238.53	-54.3039	failure
FSL_24Kourou_01.bin	-11436.12	144.51	-15.8073	tunning
FSL_24Kourou_02.bin	-14233.69	135.03	-43.8789	noise
FSL_24Kourou_03.bin	-2.68	0.84	-26.058	orbiter 127
FSL_24Kourou_04.bin	-2.68	0.84	-26.8903	orbiter 127
FSL_24Kourou_05.bin	-16.08	0.84	-19.5999	128
FSL_24Kourou_06.bin	-16.47	0.84	-19.729	128
FSL_24Kourou_07.bin	-106.08	0.84	-19.6801	110
FSL_24Kourou_08.bin	-105.7	0.84	-19.6466	110
FSL_24Kourou_09.bin	-19375.77	622.09	-43.9281	noise
FSL_Kourou_10.bin	-226.33	0.84	-19.6563	88
FSL_Kourou_11.bin	-14234.45	662.99	-43.7252	noise
FSL_Kourou_12.bin	-226.33	0.84	-19.555	88
FSL_Kourou_13.bin	-367.65	0.84	-19.6399	66
FSL_Kourou_14.bin	-367.26	0.84	-19.7025	66
FSL_Kourou_15.bin	-367.26	0.84	-20.1392	66
FSL_Kourou_16.bin	-11451.82	662.49	-43.8067	noise
FSL_Kourou_17.bin	-544.58	0.84	-19.5622	44
FSL_Kourou_18.bin	-11454.5	487.3	-43.9504	noise
FSL_Kourou_19.bin	-544.58	0.84	-19.4977	44
FSL_Kourou_20.bin	-708.1	0.84	-19.6237	22
FSL_Kourou_21.bin	-708.1	0.84	-19.6281	22
FSL_Kourou_22.bin	-708.1	0.84	-19.6724	22
FSL_Kourou_23.bin	-783.93	0.84	-19.7488	0
FSL_Kourou_24.bin	-783.93	0.84	-19.6381	0
FSL_Kourou_25.bin	-783.93	0.84	-19.6906	0
FSL_Kourou_26.bin	-751	0.84	-19.621	11
FSL_Kourou_27.bin	-751	0.84	-19.6555	11
FSL_Kourou_28.bin	-751	0.84	-19.7234	11
FSL_Kourou_29.bin	-641.85	0.84	-19.7565	33
FSL_Kourou_30.bin	-641.85	0.84	-19.5794	33
FSL_Kourou_31.bin	-641.85	0.84	-19.6725	33
FSL_Kourou_32.bin	-449.98	0.84	-20.0894	55
FSL_Kourou_33.bin	-449.98	0.84	-19.7019	55
FSL_Kourou_34.bin	-449.98	0.84	-19.8123	55
FSL_Kourou_35.bin	-19392.62	0.69	-43.7268	noise
FSL_Kourou_36.bin	-293.73	0.84	-19.7174	77
FSL_Kourou_37.bin	-293.73	0.84	-19.7405	77
FSL_Kourou_38.bin	-164.29	0.84	-19.8044	99

FSL_Kourou_39.bin	-164.29	0.84	-19.7106	99
FSL_Kourou_40.bin	-164.29	0.84	-19.7937	99
FSL_Kourou_41.bin	-51.32	0.84	-20.2604	121
FSL_Kourou_42.bin	-51.32	0.84	-19.9523	121
FSL_Kourou_43.bin	-51.32	0.84	-20.1921	121
FSL_Kourou_44.bin	50.55	0.84	-20.0465	143
FSL_Kourou_45.bin	50.55	0.84	-20.0878	143
FSL_Kourou_46.bin	-11468.29	0.85	-44.5253	noise
FSL_Kourou_47.bin	-11468.29	207.62	-44.4138	noise
FSL_Kourou_48.bin	142.46	0.84	-19.7608	165
FSL_Kourou_49.bin	142.46	0.84	-19.9112	165
FSL_Kourou_50.bin	225.57	0.84	-19.9833	187
FSL_Kourou_51.bin	225.57	0.84	-19.9422	187
FSL_Kourou_52.bin	-11472.12	207.67	-44.2185	noise
FSL_Kourou_53.bin	300.25	0.84	-19.7722	209
FSL_Kourou_54.bin	-14235.6	208.06	-43.9748	noise
FSL_Kourou_55.bin	300.25	0.84	-19.7937	209
FSL_Kourou_56.bin	366.5	0.84	-19.7268	231
FSL_Kourou_57.bin	366.5	0.84	-19.7048	231
FSL_Kourou_58.bin	-19398.36	662.94	-43.9931	noise
FSL_Kourou_59.bin	424.71	0.84	-19.7269	253
FSL_Kourou_60.bin	424.71	0.84	-19.7552	253
FSL_Kourou_61.bin	424.71	0.84	-19.7475	253
FSL_Kourou_62.bin	429.69	0.84	-19.6768	255
FSL_Kourou_63.bin	-11473.27	0.87	-44.0778	noise
FSL_Kourou_64.bin	429.69	0.84	-19.7872	255
FSL_Kourou_65.bin	396.75	0.84	-19.7308	242
FSL_Kourou_66.bin	396.75	0.84	-19.7686	242
FSL_Kourou_67.bin	-11471.74	72.89	-44.0647	noise
FSL_Kourou_68.bin	334.33	0.84	-19.7563	220
FSL_Kourou_69.bin	334.33	0.84	-19.7343	220
FSL_Kourou_70.bin	334.33	0.84	-19.7708	220
FSL_Kourou_71.bin	263.86	0.84	-19.7801	198
FSL_Kourou_72.bin	263.86	0.84	-19.6946	198
FSL_Kourou_73.bin	263.86	0.84	-19.7529	198
FSL_Kourou_74.bin	185.36	0.84	-19.7191	176
FSL_Kourou_75.bin	185.36	0.84	-19.7885	176
FSL_Kourou_76.bin	185.36	0.84	-19.7662	176
FSL_Kourou_77.bin	-11473.65	0.78	-44.0079	154
FSL_Kourou_78.bin	1.53	0.84	-20.2463	132
FSL_Kourou_79.bin	1.53	0.84	-20.275	132
FSL_Kourou_80.bin	1.53	0.84	-20.2257	132
FSL_Kourou_81.bin	1.15	0.84	-20.0231	132
FSL_Kourou_82.bin	1.53	0.84	-19.9815	132
FSL_Kourou_83.bin	-3.45	0.84	-19.8401	131
FSL_Kourou_84.bin	-3.45	0.84	-19.7356	131
FSL_Kourou_85.bin	-3.45	0.84	-19.8098	131
FSL_Kourou_86.bin	97.66	0.84	-19.9817	154
FSL_Kourou_87.bin	97.66	0.84	-19.9051	154
FSL_Kourou_88.bin	97.66	0.84	-19.8351	154
FSL_Kourou_89.bin	-19399.89	207.81	-39.414	noise

FSL_Kourou_90.bin	-11475.57	0.74	-39.5442	noise
FSL_Kourou_91.bin	-11473.27	207.97	-39.678	noise
FSL_Kourou_92.bin	-11476.33	207.6	-39.1394	noise
FSL_Kourou_93.bin	10564.87	802.16	-39.3599	noise
FSL_Kourou_94.bin	-11473.65	455.62	-39.2205	noise

End of document