LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO Laboratory / LIGO Scientific Collaboration

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Test Procedure for Test Oscillator Boxes.

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1 Introduction

The following Test Procedure descrbes the test of proper operation of the Test Oscillator Boxes.

s/n __S1106453_____ Tested by ____PBS_____

2 Test Equipment

- Voltmeter
- Oscilloscope
- Stanford Research SR785 analyzer
- RF Power Meter HP E4418A or Agilent N1914A
- Board Schematics—D1100663

3 Tests

The Test Oscillators use the Low Noise Power Module (D0901846-D).

1) **Verify the proper current draw.** Using a bench DC supply apply +- 24Volts to P7 and +-17 Volts to P6 of the low noise power Module (D0901846-D). Measure the current draw of the board.

+24 Volt current __0.02A_____0.1 A Nom. -24 Volt current _0.02A__0.0 A Nom.

+17 Volt current ____0.57A_____ less than 1.1 A

-17 Volt current ___0.03A_____ less than 0.01 A

2) **On the low noise power module check the voltage on TP 1-13.**

TP1 (+17V) ___17.474_____ TP2 (-17V) ____-17.55_____

TP3 , 4 (GND) TP5 (+ 5V)_____5.05_____

TP6 (-15V) __-15.001___ TP7 (+24V) ___23.60_____

TP8 (GND) TP9 (-24V) ___-23.59_____

TP10 (GND) TP11 (+15V) ____15.003_____

TP12 (+VREF) __9.999_____ TP13 (-VREF) ____-10.000_____

3) If TP 1 , 2, 7 , 9 and 8 are correct then TP14 (OK) should be Logic high ~3Volts. Confirm._____X_____

4) The noise on TP 12, 13, 11 and 6 should be measured with a SR785 using an rms power spectrum.

TP12 noise __4.217 nVrms/sqrt Hz____ less than 20 nVrms/sqrt Hz at 140 Hz

TP13 noise _ 4.478 nVrms/sqrt Hz_____ less than 20 nVrms/sqrt Hz at 140 Hz

TP11 noise _8.8 nVrms/sqrt Hz_____ less than 20 nVrms/sqrt Hz at 140 Hz

TP6 noise __13.91 nVrms/sqrt Hz_____ less than 30 nVrms/sqrt Hz at 140 Hz.

This concludes the test of the power supply. Now test the crystal oscillators.

5) With the frequency control input grounded measure the RF output with a RF Power meter. The nominal output level is 12 dBm +/- 2dBm.

RF Output levels (dBm)

OSC1	OSC2	OSC3	OSC4
10.28	10.37	10.97	10.89

5) **Apply a dc voltage to the frequency control input.** Measure the output frequency as a function of input voltage. The frequency change is typically 50 ppm for +/- 10 volt input.

Oscillator 1 frequency change for 10 Volt input change _____ ppm

Oscillator 2 frequency change for 10 Volt input change _____ ppm.

Oscillator 3 frequency change for 10 Volt input change _____ ppm.

Oscillator 4 frequency change for 10 Volt input change _____ ppm

Oscillator 1, Center Frequency = 21.500 663 MHz

Frequency	8 506	8 797	9 071	9 329	9 571
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	0 526	0 370	0 197	0 005	9 796
Frequency	0 784	0 889	0 978	1 053	1 117
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	1 309	1 282	1 250	1 213	1 169

Oscillator 2, Center Frequency = 35.500 975 MHz

Frequency	8 035	8 469	8 860	9 215	9 537
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	0 790	0 581	0 353	0 103	9 832
Frequency	1 142	1 288	1 414	1 522	1 613
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	1 900	1 859	1 811	1 756	1 691

Oscillator 3, Center Frequency = 71.000 077 MHz

Frequency	5 524	5 947	6 377	6 815	7 260
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	9 600	9 123	8 649	8 179	7 716
Frequency	0 553	1 025	1 489	1 946	2 392
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	4 424	4 047	3 654	3 246	2 826

Oscillator 4, Center Frequency = 80.000 057 MHz

Frequency	5 872	6 205	6 551	6 910	7 287
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	9 523	9 019	8 547	8 103	7 684
Frequency	0 626	1 228	1 859	2 519	3 203
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	6 913	6 141	5 383	4 638	3 911