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 __S1103737_____ 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 _____0.1 A Nom. -24 Volt current _____0.0 A Nom.

+17 Volt current ___0.993A_____ less than 1.1 A

-17 Volt current __0.055A_____ less than 0.01 A

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

TP1 (+17V) ___22.99V_____ TP2 (-17V) ____-23.17V_____

TP3 , 4 (GND) TP5 (+ 5V)____5.03V_____

TP6 (-15V) ___-14.996V__ TP7 (+24V) ___23.17V_____

TP8 (GND) TP9 (-24V) __-23.17V_____

TP10 (GND) TP11 (+15V) __15.000V_____

TP12 (+VREF) __9.999V_____ TP13 (-VREF) _-9.999V_____

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 __5.989 nVrms/sqrt Hz____ less than 20 nVrms/sqrt Hz at 140 Hz

TP13 noise __8.837 nVrms/sqrt Hz_____ less than 20 nVrms/sqrt Hz at 140 Hz

TP11 noise __9.168 nVrms/sqrt Hz_____ less than 20 nVrms/sqrt Hz at 140 Hz

TP6 noise ___18.47 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
11.54	11.06	11.12	10.70

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 = 21.500 690 MHz

Frequency	8842	9083	9311	9529	9739
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	0578	0445	0294	0124	9938
Frequency	0786	0866	0933	0988	1034
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	1175	1154	1131	1104	1072

Oscillator 2, Center Frequency = 35.501 219 MHz

Frequency	7474	8072	8598	9061	9475
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	1010	0768	0493	0187	9848
Frequency	1396	1544	1667	1769	1854
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	2110	2073	2031	1981	1923

Oscillator 3, Center Frequency = 70.999 626 MHz

Frequency	6740	6992	7249	7511	7780
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	9282	8955	8643	8345	8057
Frequency	9988	0373	0779	1210	1666
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	4262	3710	3170	2649	2146

Oscillator 4, Center Frequency = 79.999 862 MHz

Frequency	6039	6353	6678	7015	7365
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	9391	8943	8518	8115	7731
Frequency	0360	0882	1430	2000	2591
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	5795	5128	4471	3830	3202