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 __S1103738_____ 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 ___1.41A_____ 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) ___22.4V_____ TP2 (-17V) ____-23V_____

TP3 , 4 (GND) TP5 (+ 5V)____5.04V_____

TP6 (-15V) ___-14.98V__ TP7 (+24V) ___22.41V_____

TP8 (GND) TP9 (-24V) __-23.0V_____

TP10 (GND) TP11 (+15V) __14.98V_____

TP12 (+VREF) __9.988V_____ TP13 (-VREF) _-9.988V_____

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 __6.229 nVrms/sqrt Hz____ less than 20 nVrms/sqrt Hz at 140 Hz

TP13 noise __11.6 nVrms/sqrt Hz_____ less than 20 nVrms/sqrt Hz at 140 Hz

TP11 noise __11.43 nVrms/sqrt Hz_____ less than 20 nVrms/sqrt Hz at 140 Hz

TP6 noise ___16.44 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
11.71	11.44	11.50	11.48

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 = 9.099 476 MHz

Frequency	9471	9472	9472	9473	9473
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	9476	9475	9475	9474	9474
Frequency	9477	9477	9478	9478	9479
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	9481	9481	9480	9480	9479

Oscillator 2, Center Frequency = 24.078 817 MHz

Frequency	6295	6697	7059	7380	7658
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	8666	8487	8278	8045	7872
Frequency	8945	9053	9144	9221	9285
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	9491	9461	9426	9386	9340

Oscillator 3, Center Frequency = 24.407 630MHz

Frequency	5814	6047	6271	6486	6692
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	7516	7384	7234	7068	6887
Frequency	7728	7810	7878	7933	7980
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	8187	8154	8117	8074	8027

Oscillator 4, Center Frequency = 24.441 427 MHz

Frequency	9240	9529	9794	0049	0299
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	1301	1153	0976	0770	0541
Frequency	1545	1648	1731	1798	1852
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	2019	1994	1966	1934	1896