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 __S1103743_____ 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 ___1.016A_____ 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) ____-23.18V_____

TP3 , 4 (GND) TP5 (+ 5V)____5.032V_____

TP6 (-15V) ___-14.98V__ TP7 (+24V) ___23.04V_____

TP8 (GND) TP9 (-24V) __-23.16V_____

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

TP12 (+VREF) __9.987V_____ TP13 (-VREF) _-9.987V_____

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 __9.776 nVrms/sqrt Hz____ less than 20 nVrms/sqrt Hz at 140 Hz

TP13 noise __15.5 nVrms/sqrt Hz_____ less than 20 nVrms/sqrt Hz at 140 Hz

TP11 noise __10.44 nVrms/sqrt Hz_____ less than 20 nVrms/sqrt Hz at 140 Hz

TP6 noise ___20.6 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
11.56	10.29	10.66	11.72

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 = 21.500 678 MHz

Frequency	8614	8895	9156	9403	9637
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	0554	0410	0245	0060	9857
Frequency	0783	0873	0947	1010	1062
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	1226	1202	1175	1143	1106

Oscillator 2, Center Frequency = 35.500 978 MHz

Frequency	7857	8338	8768	9149	9181
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	0790	0578	0343	0085	9803
Frequency	1143	1285	1405	1506	1589
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	1844	1807	1766	1717	1659

Oscillator 3, Center Frequency = 70.999 886 MHz

Frequency	6555	6858	7162	7469	7783
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	9501	9131	8777	8435	8104
Frequency	0289	0709	1145	1599	2068
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	4534	4034	3534	3038	2548

Oscillator 4, Center Frequency = 79.999 793 MHz

Frequency	5480	5824	6181	6554	6944
Voltage	10	9	8	7	6
Voltage	1	2	3	4	5
Frequency	9251	8736	8249	7790	7355
Frequency	0364	0959	1577	2215	2872
Voltage	-1	-2	-3	-4	-5
Voltage	-10	-9	-8	-7	-6
Frequency	6351	5636	4929	4231	3545