LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

-LIGO-

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aLIGO L4C Interface Chassis Test Plan

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Chassis S/N: _____ Date: _____

Tech: _____

1. Introduction

The tests described below are required to verify the correct operation of the aLIGO L4C Interface Chassis electronics. These tests should verify the correct operation of all four boards internal to this chassis. There are three L4C interface boards, and a Back Board in each chassis.

2. Test Equipment

Network Analyzer
Oscilloscope
Digital Multimeter (DMM)
Triple Power Supply (+/- 18V, 5V Fixed)
One 25-pin Dsub Breakout
One 9-pin Dsub Breakout

3. Serial Numbers

Input the internal board serial numbers below:

L4C Interface Board (1)	L4C Interface Board (2)	L4C Interface Board (3)	Back Board

4. Tests

4.1. Input Power

Hook up power to the back panel of the chassis with +18V going to pin 1, -18V to pin 3, and GND going to pin 2. Turn on all of the power switches, and record the current being drawn. The nominal current is ~320mA +/- 10mA.

+18V_____mA -18V_____mA

At this point, all of the front and back panel power LEDs should be lit.
LEDs Lit?_____

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4.2. Voltage Output

The following tests make sure that the chassis is supplying the correct voltages to the L4Cs. On the appropriate connector, verify that the correct voltages are present in the table below. Use the appropriate switch on the back panel to turn on and off the power to the specific device to verify switch operation. Watch the front panel LEDs to verify the correct switch operation.

Connector	Pin	Voltage expected	Present and switchable?
L4Cs 1&2	Pin 3(+) to Pin 16(GND)	+15V	
L4Cs 1&2	Pin 4(-) to Pin 17(GND)	-15V	
L4Cs 1&2	Pin11(+) to Pin 24(GND)	+15V	
L4Cs 1&2	Pin 12(-) to Pin 25(GND)	-15V	
L4Cs 3&4	Pin 3(+) to Pin 16(GND)	+15V	
L4Cs 3&4	Pin 4(-) to Pin 17(GND)	-15V	
L4Cs 3&4	Pin11(+) to Pin 24(GND)	+15V	
L4Cs 3&4	Pin 12(-) to Pin 25(GND)	-15V	
L4Cs 5&6	Pin 3(+) to Pin 16(GND)	+15V	
L4Cs 5&6	Pin 4(-) to Pin 17(GND)	-15V	
L4Cs 5&6	Pin11(+) to Pin 24(GND)	+15V	
L4Cs 5&6	Pin 12(-) to Pin 25(GND)	-15V	

4.3. Channel Tests

4.3.1. L4C Channel Tests

To test the gain of the L4C channels, float channel 1 and 2 and input a 50mV p-p signal from 1Hz to 10kHz in the pins specified below, and read the appropriate outputs.

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4.3.2.1 No Binary In pins Grounded

Input Connector	Signal Out	Expected transfer function	Function correct?
L4Cs 1&2 pins 1(+) and 14(-)	AA Out 1 pins 1(+) and 6(-)	DC Gain of 23.5 dB	
L4Cs 1&2 pins 9(+) and 22(-)	AA Out 1 pins 2(+) and 7(-)	DC Gain of 23.5 dB	
L4Cs 3&4 pins 1(+) and 14(-)	AA Out 2 pins 1(+) and 6(-)	DC Gain of 23.5 dB	
L4Cs 3&4 pins 9(+) and 22(-)	AA Out 2 pins 2(+) and 7(-)	DC Gain of 23.5 dB	
L4Cs 5&6 pins 1(+) and 14(-)	AA Out 3 pins 1(+) and 6(-)	DC Gain of 23.5 dB	
L4Cs 5&6 pins 9(+) and 22(-)	AA Out 3 pins 2(+) and 7(-)	DC Gain of 23.5 dB	

4.3.2.2 Ground "From Binary Out" connector pins listed in the "Ground" column to "From Binary Out" pin 5.

Input Connector	Ground	Signal Out	Expected transfer function	Function correct?
L4Cs 1&2 pins 1(+) and 14(-)	Pin 1	AA Out 1 pins 1(+) and 6(-)	DC Gain of 12.5 dB	
L4Cs 1&2 pins 9(+) and 22(-)	Pin 6	AA Out 1 pins 2(+) and 7(-)	DC Gain of 12.5 dB	
L4Cs 3&4 pins 1(+) and 14(-)	Pin 2	AA Out 2 pins 1(+) and 6(-)	DC Gain of 12.5 dB	
L4Cs 3&4 pins 9(+) and 22(-)	Pin 7	AA Out 2 pins 2(+) and 7(-)	DC Gain of 12.5 dB	
L4Cs 3&4 pins 1(+) and 14(-)	Pin 3	AA Out 3 pins 1(+) and 6(-)	DC Gain of 12.5 dB	
L4Cs 3&4 pins 9(+) and 22(-)	Pin 8	AA Out 3 pins 2(+) and 7(-)	DC Gain of 12.5 dB	

Unground "From Binary Out" connector pins from pin 5.

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4.3.2. L4C Channel Noise Tests

To test the noise of the L4C channels, ground the appropriate pins on the input connector, and do a noise measurement from 0.1 Hz to 10KHz on the output connector pins specified below. Read the noise at 1Hz and 10Hz. Ground the appropriate pins on the From Binary Out connector. The observed numbers should be below the specification to pass this test.

L4C Channel	Ground the following	Expected Noise @1Hz	Actual Noise @1Hz	Expected Noise @10Hz	Actual Noise @10Hz
L4C 1 GND pins 1 and 14 Measure AA Out 1 pins 1 and 6	Nothing	270nV		157nV	
	Pin 1 (Gain)	190nV		88nV	
L4C 2 GND pins 9 and 22 Measure AA Out 1 pins 2 and 7	Nothing	270nV		157nV	
	Pin 6 (Gain)	190nV		88nV	
L4C 3 GND pins 1 and 14 Measure AA Out 2 pins 1 and 6	Nothing	270nV		157nV	
	Pin 2 (Gain)	190nV		88nV	
L4C 4 GND pins 9 and 22 Measure AA Out 2 pins 2 and 7	Nothing	270nV		157nV	
	Pin 7 (Gain)	190nV		88nV	
L4C 5 GND pins 1 and 14 Measure AA Out 3 pins 1 and 6	Nothing	270nV		157nV	
	Pin 3 (Gain)	190nV		88nV	
L4C 6 GND pins 9 and 22 Measure AA Out 3 pins 2 and 7	Nothing	270nV		157nV	
	Pin 8 (Gain)	190nV		88nV	

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Reference L4C Channel Transfer Functions