



*LIGO Laboratory / LIGO Scientific Collaboration*

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**aLIGO 4 Ch. LSC RFPD Interface Chassis Test Procedure**

R. Abbott

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**California Institute of Technology**  
**LIGO Project – MS 18-34**  
**1200 E. California Blvd.**  
**Pasadena, CA 91125**  
Phone (626) 395-2129  
Fax (626) 304-9834  
E-mail: info@ligo.caltech.edu

**Massachusetts Institute of Technology**  
**LIGO Project – NW22-295**  
**185 Albany St**  
**Cambridge, MA 02139**  
Phone (617) 253-4824  
Fax (617) 253-7014  
E-mail: info@ligo.mit.edu

**LIGO Hanford Observatory**  
**P.O. Box 1970**  
**Richland WA 99352**  
Phone 509-372-8106  
Fax 509-372-8137

**LIGO Livingston Observatory**  
**P.O. Box 940**  
**Livingston, LA 70754**  
Phone 225-686-3100  
Fax 225-686-7189

## 1 Overview

This procedure documents the testing of D1102079-v1, the aLIGO LSC Interface Chassis. This chassis supports up to 4 aLIGO LSC RFPD heads. The chassis houses 1 PD Interface boards (D1102060-v1), 1 Power Protection board (D1101816-v2), and an internal voltage regulator board

## 2 Testing

Each production chassis must be functionally tested and the results recorded in Section 4. It is assumed that the person using this procedure is familiar with Dynamic Signal Analyzers, and rudimentary test equipment including oscilloscopes and multimeters.

### Serial Number Data

#### 2.1 Record all serial number data in

Table 1 General Data

Tested By	Date

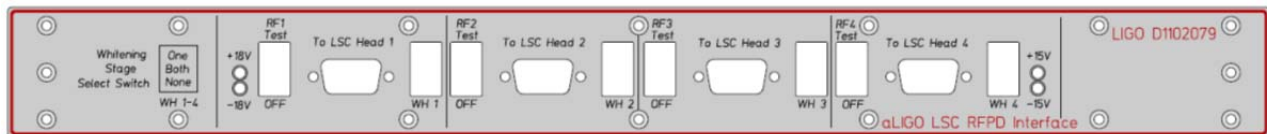
- Table 2

### DC Tests

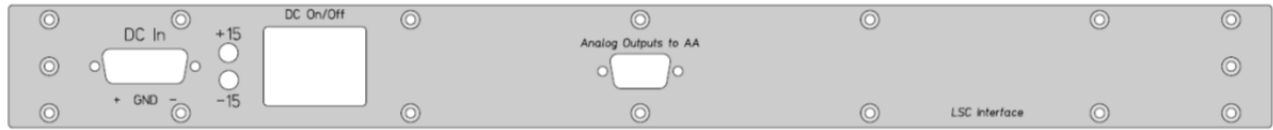
- Apply +/- 18, +/-200 mV Volts DC to the chassis under test and record front panel LED operation, total positive and negative power supply current, internal regulator output voltage and individual circuit board power supply currents as required in Table 3.

## 3 Reference for chassis front and rear panel layout

Figure 1: ISC LSC RFPD Interface Chassis Front Panel



**Figure 2: ISC LSC RFPD Interface Chassis Rear Panel**



## 4 Test Data Tables

### 4.1 General Information

**Table 1 General Data**

Tested By	Date

**Table 2 Serial Number Data**

Chassis Serial Number	DC PWR Board PCB Serial #	Head 1-4 PCB Serial #	Power Protection Board Serial #

### 4.2 DC Power Supply Data

Total chassis and individual circuit board quiescent current draw is recorded in Table 3. Use caution in believing the digital readouts of laboratory triple output power supplies. Their meters are not highly accurate. When in doubt, use a multimeter on the appropriate scale in series with the supply to be measured.

**Table 3, Record of DC Test Data**

Parameter	Typical Value	Allowable Range	Measured Value
Front Panel +/- 15VDC Power LEDs	All Lit	N/A	
Front Panel +/- 18VDC Power LEDs	All Lit	N/A	
Rear Panel +/- 15VDC Power LEDs	All Lit	N/A	
+18VDC, +/-0.2VDC TOTAL supply current	190 mA	+/- 20mA	

-18VDC, +/-0.2VDC <b>TOTAL</b> supply current	170 mA	+/- 20mA	
Regulated Internal DC Voltage under full load (board 1)	±15 VDC	+/- 0.5VDC per supply	
Regulated Internal DC Voltage under full load (board 2)	±15 VDC	+/- 0.5VDC per supply	

### 4.3 DC Offsets on 9-pin D-sub Output

As a general measure of the health, the DC offset at the differential outputs for each channel must be measured. Using a multimeter, measure the DC offset at the 9-pin D-sub output on the rear panel. Each respective front panel input is to be left open during this measurement. For each measurement, cycle the light grey front panel whitening rocker switch through all three of its positions. Record the results in Table 4.

**Table 4, Differential Output DC Offset**

<i>Differential DC Measurement Point</i>	<i>State of Front Panel Whitening Switch</i>	<i>Typical DC Offset</i>	<i>Allowable Range</i>	<i>Measured Value</i>	<b>Pass/Fail</b>
Rear D-sub, pin 1-6	One	0VDC	+/- 3mV		
Rear D-sub, pin 1-6	Both	0VDC	+/- 3mV		
Rear D-sub, pin 1-6	None	0VDC	+/- 3mV		
Rear D-sub, pin 2-7	One	0VDC	+/- 3mV		
Rear D-sub, pin 2-7	Both	0VDC	+/- 3mV		
Rear D-sub, pin 2-7	None	0VDC	+/- 3mV		
Rear D-sub, pin 3-8	One	0VDC	+/- 3mV		
Rear D-sub, pin 3-8	Both	0VDC	+/- 3mV		
Rear D-sub, pin 3-8	None	0VDC	+/- 3mV		
Rear D-sub, pin 4-9	One	0VDC	+/- 3mV		
Rear D-sub, pin 4-9	Both	0VDC	+/- 3mV		
Rear D-sub, pin 4-9	None	0VDC	+/- 3mV		

#### 4.4 AC Transfer Function

Using an SR785 Dynamic Signal Analyzer, measure the transfer function from the indicated input to the indicated output and record the magnitude and phase at the frequencies called out in Table 5. Set the SR785's output drive level to 10mV, and sweep from 5Hz to 50Hz using only 10 points. Ensure the SR785 is in A-B mode on the receiving channel so the measurement is fully differential.

**Table 5 AC Transfer Function**

<i>Signal Injection Point</i>	<i>Differential AC Measurement Point</i>	<i>Front Panel Whitening Switch</i>	<i>Frequency (Hz)</i>	<i>Nominal Transfer Function (dB/Deg)</i>	<i>Allowable Range (dB/Deg)</i>	<i>Measured Value (dB/Deg)</i>	<i>Pass/Fail</i>
Head 1 Pin 1-6	Rear D-sub, pin 1-6	One	5Hz	13.2dB/52.7Deg	+/- 0.5dB/5Deg		
			25Hz	19.6dB/19.7Deg	+/- 0.3dB/5Deg		
		Both	5Hz	26.5dB/105.4Deg	+/- 0.5dB/5Deg		
			25Hz	39.4dB/39.4Deg	+/- 0.3dB/5Deg		
		None	5Hz	0dB/0Deg	+/- 0.5dB/5Deg		
			25Hz	0dB/0Deg	+/- 0.3dB/5Deg		
Head 2 Pin 1-6	Rear D-sub, pin 2-7	One	5Hz	13.2dB/52.7Deg	+/- 0.5dB/5Deg		
			25Hz	19.6dB/19.7Deg	+/- 0.3dB/5Deg		
		Both	5Hz	26.5dB/105.4Deg	+/- 0.5dB/5Deg		
			25Hz	39.4dB/39.4Deg	+/- 0.3dB/5Deg		
		None	5Hz	0dB/0Deg	+/- 0.5dB/5Deg		
			25Hz	0dB/0Deg	+/- 0.3dB/5Deg		
Head 3 Pin 1-6	Rear D-sub, pin 3-8	One	5Hz	13.2dB/52.7Deg	+/- 0.5dB/5Deg		
			25Hz	19.6dB/19.7Deg	+/- 0.3dB/5Deg		
		Both	5Hz	26.5dB/105.4Deg	+/- 0.5dB/5Deg		
			25Hz	39.4dB/39.4Deg	+/- 0.3dB/5Deg		
		None	5Hz	0dB/0Deg	+/- 0.5dB/5Deg		
			25Hz	0dB/0Deg	+/- 0.3dB/5Deg		
Head 4 Pin 1-6	Rear D-sub, pin 4-9	One	5Hz	13.2dB/52.7Deg	+/- 0.5dB/5Deg		
			25Hz	19.6dB/19.7Deg	+/- 0.3dB/5Deg		
		Both	5Hz	26.5dB/105.4Deg	+/- 0.5dB/5Deg		
			25Hz	39.4dB/39.4Deg	+/- 0.3dB/5Deg		
		None	5Hz	0dB/0Deg	+/- 0.5dB/5Deg		
			25Hz	0dB/0Deg	+/- 0.3dB/5Deg		

## 4.5 Front Panel Test Switch

A rocker switch for each LSC head is present on the front panel of the chassis. This test verifies that the rocker switch provides the proper voltage to actuate the test relay in each LSC detector head served by this chassis. As required in Table 6, verify proper switching with a ohm-meter.

**Table 6 Rocker Switch Operation**

Switch Position	Measurement Point	Typical Value	Allowable Range	Pass or Fail (P or F)
Head 1 Normal	Head1 D-sub Pins 4 to 9	OPEN	-	
Head 1 Test	Head1 D-sub Pins 4 to 9	SHORT	Up to 2 Ohms	
Head 2 Normal	Head2 D-sub Pins 4 to 9	OPEN	-	
Head 2 Test	Head2 D-sub Pins 4 to 9	SHORT	Up to 2 Ohms	
Head 3 Normal	Head3 D-sub Pins 4 to 9	OPEN	-	
Head 3 Test	Head3 D-sub Pins 4 to 9	SHORT	Up to 2 Ohms	
Head 4 Normal	Head4 D-sub Pins 4 to 9	OPEN	-	
Head 4 Test	Head4 D-sub Pins 4 to 9	SHORT	Up to 2 Ohms	