LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

LIGO Laboratory / LIGO Scientific Collaboration

LIGO-T1100417-v2 *Advanced LIGO* 25 March 2014

Legacy WFS Interface Chassis Test Procedure

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Distribution of this document:
LIGO Scientific Collaboration

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1 Overview

This test procedure applies to the two channel, ISC Legacy WFS Interface board (LIGO-D1100546-v1 and v2), contained within chassis assembly D1100749. This module provides life support and interface to two initial LIGO WFS heads in the form of: HV bias voltage, DC readback of individual quadrant photocurrent, and DC power to the WFS head. This chassis is considered a high voltage design per LIGO EEIP definition. The HV bias applied to the front panel BNC will be present on both WFS D-Subminiature front panel connectors. There is no internally generated high voltage.

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

- Record all serial number data in Table 1

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 2.

3 Reference for chassis front and rear panel layout

Figure 1: ISC 2 Channel, Legacy WFS Interface, Front Panel

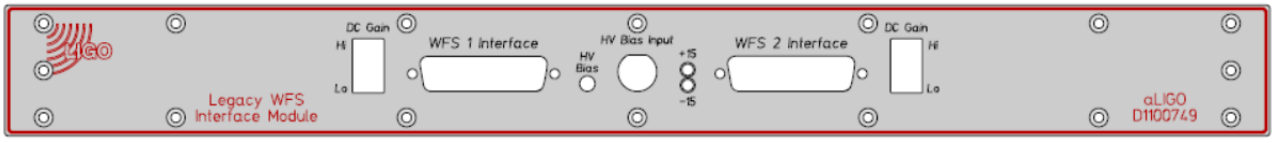
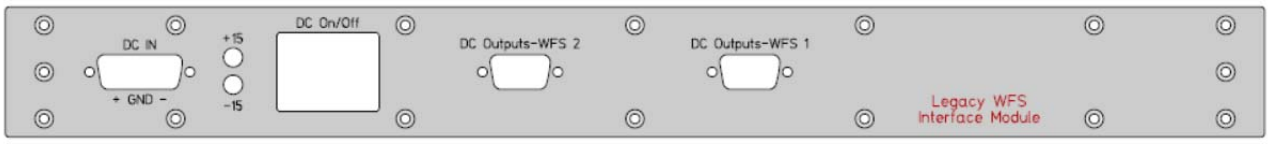


Figure 2: ISC 2 Channel, Legacy WFS Interface, Rear Panel



4 Test Data Tables

4.1 General Information

Table 1 Serial Number Data

Chassis Serial Number	DC PWR Board PCB Serial #	Internal PCB Serial #

4.2 DC Power Supply Data

Total chassis and individual circuit board quiescent current draw is recorded in Table 2. 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 2, Record of DC Test Data

Parameter	Typical Value	Allowable Range	Measured Value
Front Panel +/- 15VDC Power LEDs	Illuminated Green	N/A	
Rear Panel +/- 15VDC Power LEDs	Illuminated Green	N/A	
+18VDC, +/-0.2VDC **TOTAL** supply current	120 mA (all gain switches in Lo mode)	+/- 20mA	
-18VDC, +/-0.2VDC **TOTAL** supply current	109 mA	+/- 20mA	
Regulated Internal DC Voltage under full load (both boards)	15 VDC	+/- 0.5VDC	

4.3 DC Offsets on Each Rear Panel Output

As a general measure of the health, the DC offset at the differential outputs for each channel should be measured. Using a multimeter, measure the DC offset at each differential output on the associated front panel connector. Each respective input is to be shorted and the gain select should be “LOW” during this measurement. Record the results in Table 3.

Table 3, Differential Output DC Offset

Rear Differential DC Measurement Point	*Typical DC Offset*	*Allowable Range*	*Measured Value*	**Pass/Fail**
WFS 1 Channel 1	0VDC	+/- 3mV		
WFS 1 Channel 2	0VDC	+/- 3mV		
WFS 1 Channel 3	0VDC	+/- 3mV		
WFS 1 Channel 4	0VDC	+/- 3mV		
WFS 2 Channel 1	0VDC	+/- 3mV		
WFS 2 Channel 2	0VDC	+/- 3mV		
WFS 2 Channel 3	0VDC	+/- 3mV		
WFS 2 Channel 4	0VDC	+/- 3mV		

4.4 Frequency Response

The transfer function of each channel of the chassis should be measured using an SR785 dynamic signal analyzer. The SR785 input drive level is 100mV, 100 Hz to 10 kHz for all swept sine measurements.

Measure the magnitude and the phase by driving into the respective front panel D-sub and taking a signal at each rear panel D-sub output for each channel as required. The rear panel D-subs are pinned according to the LIGO convention of: Ch1 (pin 1&6), Ch2 (pin 2&7), Ch3 (pin 3&8), Ch4 (pin 4&9). Record the results in Table 4 and Table 5.

Table 4 Frequency Response WFS 1

Measurement Point	**Magnitude (dB)**	**Allowable Range**	**Measured Magnitude**	**Pass/Fail**
Ch. 1, LO gain	25.5	+/- 0.2dB		
Ch. 1, HI gain	46.1	+/- 0.2dB		
Ch. 2, LO gain	25.5	+/- 0.2dB		
Ch. 2, HI gain	46.1	+/- 0.2dB		
Ch. 3, LO gain	25.5	+/- 0.2dB		
Ch. 3, HI gain	46.1	+/- 0.2dB		
Ch. 4, LO gain	25.5	+/- 0.2dB		
Ch. 4, HI gain	46.1	+/- 0.2dB		

Table 5 Frequency Response WFS 2

Measurement Point	Magnitude (dB)	Allowable Range	Measured Magnitude	Pass/Fail
Ch. 1, LO gain	25.5	+/- 0.2dB		
Ch. 1, HI gain	46.1	+/- 0.2dB		
Ch. 2, LO gain	25.5	+/- 0.2dB		
Ch. 2, HI gain	46.1	+/- 0.2dB		
Ch. 3, LO gain	25.5	+/- 0.2dB		
Ch. 3, HI gain	46.1	+/- 0.2dB		
Ch. 4, LO gain	25.5	+/- 0.2dB		
Ch. 4, HI gain	46.1	+/- 0.2dB		