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LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

-LIGO-

CALIFORNIA INSTITUTE OF TECHNOLOGY

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Intensity Servo DC Photodiode Test Plan		
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1 Introduction

The tests described below are required to verify the correct operation of the Intensity Servo DC Photodiode (schematic # D010085 Rev.B, PCB # D010075 Rev.E). These tests should be performed with the Sallen-Key filter bypassed (JP1 spanning pins 1&2) unless otherwise noted.

2 Test Equipment

Dynamic Signal Analyzer
Function Generator
Oscilloscope
Power supplies
Voltage Calibrator

3 Tests

3.1 Input Power

Connect an ISS PD Test Board (D020591-00) to the 15-pin D connector on the PD board via a 15 pin ribbon cable. This cable should be connected to the "OUT" D-sub connector. Apply +/- 24 Volts to the appropriately labeled pins on the test board. Record the input voltage and current in the table below. Values should be +/-10mA of the nominal values.

Supply	Nominal Current	Actual	Pass/Fail
+24 V	0.11 A		
-24 V	0.10 A		

3.2 Test Enable

On the board is a relay that allows test signals to flow from the tester board to the PD circuit. This relay is activated when 5V is applied to the "Test Enable" pin of the tester board. When the relay is activated, a small click should be audible coming from the PD box. Apply a 1Vp-p, 100Hz sine wave to the "Test Input pin". Before activating the relay, read the voltage coming out of the AC path, then apply the 5V, and check again.

Apply 5V to "Test Enable" pin	Box click? Y/N	Output Voltage (0V or 1.6Vp-p, 100Hz sine)
NO		
YES		

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3.3 DC Path

This section will test the response of the DC channel of the board. The nominal response of each channel, when the first stage filter is engaged, is a pole at 53 Hz. The “Test Enable” test point should be tied to 5V with reference to a ground pin on the test board. Using the dynamic signal analyzer, input a 0 dBm source signal into the “Test In” point. Verify and record the response of the +DC pin to ground, in the table below.

Channel	Test Enable	Gain/Phase at 10Hz Nom -40dB/ -10deg	Gain/Phase at 53Hz Nom -43dB/ -42deg	Gain/Phase at 5KHz Nom -80dB/ -77deg
PD DC	+5V			

3.4 AC Path

This section will test the response of the AC channel of the board. The nominal response of each channel is flat out to 800 KHz. The “Test Enable” test point should be tied to 5V with reference to a ground pin on the test board. Using the dynamic signal analyzer, verify and record the response of the AC channel in the table below.

Channel	Test Enable	Gain/Phase at 10Hz Nom -2dB/ 0deg	Gain/Phase at 30KHz Nom -2dB/ -6deg	Gain/Phase at 800KHz Nom -5dB/ -233deg
PD AC	+5V			

3.5 DC Bias Path

The Dc Bias Path is supposed to sum a signal to the AC path to remove the DC light intensity and leave only the AC signal. Using a DC Voltage calibrator, input the Voltages in the following table across the +Zero to -Zero points, and record the voltage from the +OUT point on the test board, to Ground. This Voltage should be read on an Oscilloscope in order to check for any oscillations.

Voltage In	Expected Out	Actual Out
+0.01V	+1.2V	
+0.02V	+2.5V	
+0.1v	+13V	