LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

-LIGO-

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Test Procedure	**T1400304**-v2	
PCal AOM Driver and Laser Power Supply Chassis Test Procedure		
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Performed by:_____
Date:_____
Board Serial Number: _____

1. **Overview**
   The PCal AOM Driver and Laser Power Supply Chassis (1300250-v1) houses a Crystal Laser Power supply, an Isomet AOM, and a PCal Laser Distribution Board (D1400033-v1). This board allows an interface between the laser power supply and epics, as well as the site laser interlock system.

2. **Test Equipment**

   2.1 Power Supply capable of +/- 12V
   2.2 Digital Multimeter (DMM)
   2.3 Voltage Calibrator, or adjustable power supply

3. **Preliminaries**

   3.1 Perform visual inspection of the Chassis to make sure nothing looks overtly broken.
   3.2 Before connecting the power to the box, set power supplies to +/- 12 Volts and then turn them off. Connect the power supplies to the box under test at the end of its cable labeled "Laser 12V Power In".

4. **DC Tests**

   4.1 Open the chassis lid, and unplug connectors **P5**- "12V to Laser PS, **P1**- "Laser PS Signals To PS J3", **P4** "To Sen1 Board", and **P3**- "Laser PS LED Header" so that the board is completely disconnected from the Laser Power Supply board. Turn on the +/- 12V power supplies to the box under test and then turn on the back panel "Laser DC On/Off" Power switch. Record the current draw for each supply, and notice if the "Board Power" Front Panel LEDs come on.

Voltage	Current	Observed Current	FP LEDs On?
+12V	30mA +/- 10mA		
-12V	30mA +/- 10mA		

4.2 Make or find a 10-pin header-to-9-pin Dsub breakout cable. The pinout of that cable is shown below:

10-pin Header	9-pin Dsub
Pin 1	Pin 1
Pin 2	Pin 6
Pin 3	Pin 2
Pin 4	Pin 7
Pin 5	Pin 3
Pin 6	Pin 8
Pin 7	Pin 4
Pin 8	Pin 9
Pin 9	Pin 5
Pin 10	

Attach a standard 9-pin breakout board to the Dsub end of the cable, and plug the 10-pin end onto Header P1 "Laser PS Signals To PS J3". All of the pinouts in the following tests refer only to the pin on the 9-pin Dsub breakout board, not the 10-pin header on the schematic. This will subsequently be referred to as "the Breakout" in this procedure.

4.3 Laser PS Control test: Apply a voltage to pins 1(+) and 9(-) of the back panel 15-pin DSub J4, labeled "To PCal Interface", and read out the voltage from Pin 1(+) and Pin 6(GND) on the Breakout from section 4.2. Record the results in the table below:

Input J4 Pins 1(+) and 9(-)	Expected Output The Breakout pins 1(+) and 6(GND)	Observed Output The Breakout pins 1(+) and 6(GND)
1VDC	1 VDC +/- 0.1V	
5VDC	5 VDC +/- 0.1V	
12VDC	11.2 VDC +/- 0.2V	

4.4 Laser Enable Test: Short the back panel Dsub, J1 "From Access Control" Pins 1&6 together, and apply 12V to the back panel DSub J4, "To PCal Interface" Pins 2(+)&10(-). You should be able to hear the relay click, and see that the Breakout pins 2&8 are now shorted together.
Are the Breakout pins 2&8 shorted together now? (Yes/No)_____

4.5 **Laser Diode Current test:** Clip the Voltage Calibrator onto pins 4(+) and 3(GND) of the Breakout, and read out the voltage from Pin 3(+) and Pin 11(-) on the back panel DSub J4, labeled "To PCal Interface", and also on the front panel Dsub J2 "Current and Temp Monitors" Pins 1(+) and 6(-). The 12V input is to make sure that all of the OpAmps saturate at about the same voltage, so we're not expecting the output to reach 12V, there. Record the results in the table below:

Input Breakout Pins 4(+) and 3(GND)	Expected Output	Observed Output "To PCal Interface pins" 3(+) and 11(-)	Observed Output "Current and Temp Monitor" pins 1(+) and 6(GND)
1VDC	1 VDC +/- 0.1V		
5VDC	5 VDC +/- 0.1V		
12VDC	10.9 VDC +/- 0.2V		

4.6 **Laser Temperature Test:** Plug (only) the short 2-wire cable back in to P4, connecting the board to the small "Sen1 Board" that should be, in turn, connected to the Laser Power Supply. Clip the Voltage Calibrator onto pins Pin 6(+) and Pin 2(GND) on the unlabeled front panel DSub, in the "Crystal Laser" section (the Dsub on the Sen1 Board), and read out the voltage on Pin 4(+) and Pin 12(-) on the back panel DSub J4, labeled "To PCal Interface" and also on the front panel Dsub J2 "Current and Temp Monitors" Pins 2(+) and 7(-). The 12V input is to make sure that all of the OpAmps saturate at about the same voltage, so we're not expecting the output to reach 12V, there. Record the results in the table below:

Input Laser Dsub Pins 6(+) and 2(-)	Expected Output	Observed Output "To PCal Interface pins" 4(+) and 12(-)	Observed Output "Current and Temp Monitor" pins 2(+) and 7(GND)
1VDC	1 VDC +/- 0.1V		
5VDC	5 VDC +/- 0.1V		
12VDC	10.8 VDC +/- 0.2V		

4.7 LED Indicator Tests: Move the Breakout header connector over to P3 "Laser PS LED Header". Put a 1KOhm resistor in-line with the positive lead of the Voltage Calibrator, and set it to 10V. Apply the voltage (through the resistor) to the pins in the table below, and verify that the correct LEDs light, and have the correct color.

Breakout Input	LED	Function/Color Correct?
Pin 1(+) & Pin 6(-)	"I Limit" (Red)	
Pin 2(+) & Pin 7(-)	"Pwr On" (Green)	
Pin 3(+) & Pin 8(-)	"Lsr On" (Green)	
Pin 4(+) & Pin 9(-)	"Ovrheat" (Red)	