

**LASER INTERFEROMETER GRAVITATIONAL WAVE
OBSERVATORY**

-LIGO-

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AdLIGO HEPI Pier Interface Chassis Test Procedure		
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This is an internal working note of the LIGO Laboratory

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1. Overview

The HEPI Pier Interface Chassis serves several functions close to the vacuum envelope. One is to pass through and parse out the hydraulic valve actuation channels. A second function is to read out the L4C Seismometer channels, amplify them, and send them differentially to the Anti-Alias Chassis. Its last function is to read in the Inductive Position Sensor signals, whiten them, and send them differentially to the Anti-Alias Chassis.

The function of this procedure is to check each channel from its input to the respective output and to verify proper DC power consumption.

2. Test Equipment

- 2.1 Power Supply capable of +/- 18 volts
- 2.2 Function generator (Stanford Research DS360 or the like)
- 2.3 Oscilloscope
- 2.4 Stanford Research SR785 Network Analyzer, or the like

3. Preliminaries

- 3.1 Perform visual inspection on board to check for missing components or solder deficiencies
- 3.2 Before connecting the power to the chassis, set power supplies to +/- 18 Volts, and then turn them off. Connect the power supplies to the chassis under test at the back panel 3-pin power connector labeled "Power In".

4. DC Tests

- 4.1 Turn on the power supplies to the system under test and record the total current.

Measure	Voltage read	Current
+18V Supply	TP4 (+15V +/- 0.5) <i>15.04 V</i>	??mA +/- 10mA <i>110mA</i>
-18V Supply	TP5 (-15V +/- 0.5) <i>-15.10 V</i>	??mA +/- 10mA <i>100mA</i>
Power LEDs	Equally bright? <i>✓</i>	N/A
IPS Power+	J10-1 / J10-3 (-15V +/- 0.5) <i>+15.05 V</i>	N/A
IPS Power-	J10-2 / J10-3 (-15V +/- 0.5) <i>-15.09 V</i>	N/A

5. Dynamic Tests

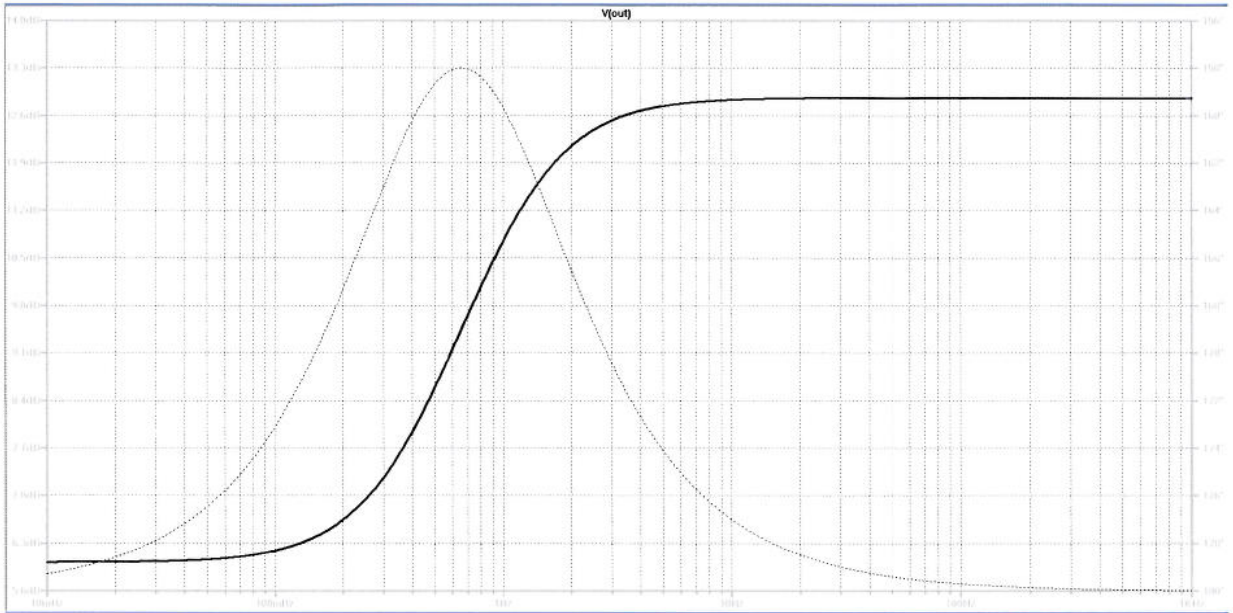
5.1 Valve throughput check: Set a function generator to a 5V p-p sine wave. Split this signal with a BNC Tee, with one signal going to the designated pins below, and the other going to channel 2 of an oscilloscope. Observe the amplitude at the designated output pins. All of the outputs should be the same amplitude as the input, with no observable phase delay or high-frequency noise. Place a check in the correct cell if the signal looks correct.

Input (Valve Input)	Output (Valve1 Out) or (Valve2 Out)	
J8-1 (+) / J8-6 (-)	J9T-1 (+) / J9T-6 (-)	✓
J8-2 (+) / J8-7 (-)	J9T-1 (+) / J9T-6 (-)	✓
J8-3 (+) / J8-8 (-)	J9B-1 (+) / J9B-6 (-)	✓
J8-4 (+) / J8-9 (-)	J9B-1 (+) / J9B-6 (-)	✓

5.2 L4C Seismometer Channel Check: Set a function generator to a 0.5V p-p sine wave. Input the signal on the correct pins below, and observe the amplitude at the designated output pins differentially (A-B) relative to ground. The outputs should have a gain of 22 V/V.

INPUT L4C INPUT	OUTPUT TO AA CHASSIS (A) – (B)	VALUE NOM 11V +/- 0.5V
L4C Horiz. In J1T-1 / J1T-6	To AA Chassis (J4-1/GND) – (J4-9/GND)	10.9Vpp
L4C Vert. In J1B-1 / J1B-6	To AA Chassis (J4-2/GND) – (J4-10/GND)	10.9Vpp
L4C Wit. In J5-1 / J5-6	To AA Chassis (J4-3/GND) – (J4-11/GND)	10.8Vpp

5.3 Inductive Position Sensor Channel Check: Set the SR785 for a 100mV source, and do a Swept Sine measurement from 10mHz to 10KHz on each channel. The nominal response is a Zero at 0.38Hz, and a pole at 0.86Hz. This should result in a gain change from 4 V/V at DC to 9 V/V at higher frequencies. The plot should look similar to the graph below.



INPUT IPS INPUT (DIFFERENTIAL)	OUTPUT TO AA CHASSIS (A) – (B)	VALUE LOOK LIKE THE GRAPH?
IPS X In J10-4 / J10-5	To AA Chassis (J4-4/GND) – (J4-12/GND)	✓
IPSY In J10-6 / J1B-7	To AA Chassis (J4-5/GND) – (J4-13/GND)	✓