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# LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

**-LIGO-**

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<b>WFS Whitening/Interface Module Test Plan</b>		
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Serial Number: \_\_\_\_\_

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# 1 Introduction

The tests described below are required to verify the correct operation of the WFS Whitening Interface Module (D990196, Rev B). For all tests described in this procedure the input and output for each channel are as shown in the table below.

Channel	Input +/-	Output +/-
I1	J1-11 / J1-12	J3-1 / J3-2
I2	J1-13 / J1-14	J3-5 / J3-6
I3	J1-15 / J1-16	J3-9 / J3-10
I4	J1-17 / J1-18	J3-13 / J3-14
Q1	J1-21 / J1-22	J3-17 / J3-18
Q2	J1-23 / J1-24	J3-21 / J3-22
Q3	J1-25 / J1-26	J3-25 / J3-26
Q4	J1-27 / J1-28	J3-29 / j3-30

# 2 Test Equipment

- Dynamic Signal Analyzer
- Function Generator
- Oscilloscope
- Power supplies

# 3 Tests

## 3.1 Input Power

Record the input voltage and current in the table below. Values should be +/-10mA of the nominal values.

Supply	Nominal Current	Actual	Pass/Fail
+15 V	TBD A		
-15 V	TBD A		
+5 V	TBD A		
-5 V	TBD A		

## 3.2 Stage 1 Whitening Response

This section will test the response of the first whitening stage for each channel of the board. The nominal response of each channel, when the first stage filter is engaged, is a zero at 4 Hz, a pole at 40 Hz and 3 poles at 800 Hz. (Note that the channel is also inverting.) The gain control voltage for each channel should be set to 0 VDC. Using the dynamic signal analyzer, verify and record the response of each channel in the table below.

Channel	Filter Enable	Gain/Phase at 4Hz Nom -1dB/ -135deg	Gain/Phase at 40Hz Nom +13dB/ -135deg	Gain/Phase at 800Hz Nom +13dB/ -405deg
I1	P1-17A ground			
I2	P1-19A ground			
I3	P1-21A ground			
I4	P1-23A ground			
Q1	P1-25A ground			

Serial Number: \_\_\_\_\_

Date: \_\_\_\_\_

Tech: \_\_\_\_\_

Channel	Filter Enable	Gain/Phase at 4Hz Nom -1dB/ -135deg	Gain/Phase at 40Hz Nom +13dB/ -135deg	Gain/Phase at 800Hz Nom +13dB/ -405deg
Q2	P1-27A ground			
Q3	P1-29A ground			
Q4	P1-31A ground			

### 3.3 Stage 2 Whitening Response

This section will test the response of the second whitening stage for each channel of the board. The nominal response of each channel, when the first stage filter is engaged, is a zero at 4 Hz, a pole at 40 Hz and 5 poles at 800 Hz. (Note that the channel is also inverting.) The gain control voltage for each channel should be set to 0 VDC. Using the dynamic signal analyzer, verify and record the response of each channel in the table below.

Channel	Filter Enable	Gain/Phase at 4Hz Nom -1dB/ -135deg	Gain/Phase at 40Hz Nom +13dB/ -135deg	Gain/Phase at 800Hz Nom +13dB/ -405deg
I1	P1-18A ground			
I2	P1-20A ground			
I3	P1-22A ground			
I4	P1-24A ground			
Q1	P1-26A ground			
Q2	P1-28A ground			
Q3	P1-30A ground			
Q4	P1-32A ground			

### 3.4 Bypass Enable/Disable

The nominal response of each channel, when the filter is bypassed, has four poles at 800 Hz (gain=-4dB, phase 180 degrees). Using a 1 V<sub>p-p</sub>, 100 Hz sine wave verify that the channel gain is -4dB (0.631) and inverting. The gain voltage should be set to 0VDC for each channel.

Channel	Bypass enable	Gain=0.631 (-4dB)?
I1	P1-17A and 18A open	
I2	P1-19A and 20A open	
I3	P1-21A and 22A open	
I4	P1-23A and 24A open	
Q1	P1-25A and 26A open	
Q2	P1-27A and 28A open	
Q3	P1-29A and 30A open	
Q4	P1-31A and 32A open	

Serial Number: \_\_\_\_\_

Date: \_\_\_\_\_

Tech: \_\_\_\_\_

### 3.5 Channel Gain Control

Each channel of the module has a gain adjustment that is controlled via a voltage on the P1 connector. Using the same test set up as section 3.4, verify correct operation of the gain control for each channel.

<b>Channel</b>	<b>Gain Control Pins</b>	<b>Gain Voltage=- 6.25VDC Gain=0.063 (-24dB)?</b>	<b>Gain Voltage=+6.25VDC Gain=6.3 (+16dB)</b>
I1	P1-1A		
I2	P1-2A		
I3	P1-3A		
I4	P1-4A		
Q1	P1-5A		
Q2	P1-6A		
Q3	P1-7A		
Q4	P1-8A		