



LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

*LIGO Laboratory / LIGO Scientific Collaboration*

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Advanced LIGO

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# RLF Notch Filter Test Procedure

Daniel Sigg, Marc Pirello

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of the LIGO Laboratory.

**California Institute of Technology**  
**LIGO Project – MS 18-34**  
**1200 E. California Blvd.**  
**Pasadena, CA 91125**  
Phone (626) 395-2129  
Fax (626) 304-9834  
E-mail: info@ligo.caltech.edu

**Massachusetts Institute of Technology**  
**LIGO Project – NW22-295**  
**185 Albany St**  
**Cambridge, MA 02139**  
Phone (617) 253-4824  
Fax (617) 253-7014  
E-mail: info@ligo.mit.edu

**LIGO Hanford Observatory**  
**P.O. Box 1970**  
**Richland WA 99352**  
Phone 509-372-8106  
Fax 509-372-8137

**LIGO Livingston Observatory**  
**P.O. Box 940**  
**Livingston, LA 70754**  
Phone 225-686-3100  
Fax 225-686-7189

<http://www.ligo.caltech.edu/>

Date	Engineer	Chassis Serial

## 1 Overview

## 2 Power Board

### 2.1 DC Power Supply

Total chassis power and individual voltages are recorded in Table 1. 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 1, Record of DC Test Data**

Parameter	Typical Value	Allowable Range	Measured Value
Front & Rear Panel LEDs	All eight on	N/A	
+24V current	0.02A	±50mA	
-24V current	0.02A	±50mA	
+17V current	0.14A	±50mA	
-17V current	0.43A	±50mA	
+15V (TP11 on power board)	+15V	±0.1V	
-15V (TP6 on power board)	-15V	±0.1V	
+VREF (TP12 on power board)	+10V	±0.1V	
-NREF (TP13 on power board)	-10V	±0.1V	
+5V (TP5 on power board)	+5V	±0.25V	
OK (TP14 on power board)	3.5V	3V to 5V	

### 2.2 DC Power Supply Noise

For the noise measurements use a SR785 and measure the rms power spectrum.

**Table 2, Record of DC Test Data**

Parameter	Typical Value	Allowable Range	Measured Value
+15V (TP11 on power board)	10nV/√Hz @ 140Hz	<20nV/√Hz	
-15V (TP6 on power board)	12nV/√Hz @ 140Hz	<20nV/√Hz	
+VREF (TP12 on power board)	5nV/√Hz @ 140Hz	<20nV/√Hz	
-VREF (TP13 on power board)	7nV/√Hz @ 140Hz	<20nV/√Hz	

### 3 Notches

#### 3.1 Measurement Setup

Set up an RF network analyzer to send an excitation to one of the filter inputs and tee off to the first input of the analyzer. Use the filter output to drive the A-B inputs of a SR560. Then use its 50 Ohm output to drive the second input of the analyzer.

#### 3.2 Notch Frequency Tuning

While running transfer functions continuously tune the variable capacitor to the correct notch frequency. If the notch frequency is out-of-range adjust the capacitors in positions C1-4 and C11-C14, respectively, to get the notch frequency in range.

**Table 3, Channel 1 Notch Frequency Tuning**

Notch	Nominal (Hz)	Allowable Range	Measured Frequency (Hz)	
			I	Q
1	105 kHz	$\pm 1$ kHz		
2	210 kHz	$\pm 1$ kHz		

**Table 4, Channel 1 Notch Frequency Depth**

Notch	Nominal (dB)	Allowable Range	Measured Depth (dB)	
			I	Q
1	40 dB	<30 dB		
2	40 dB	<30 dB		

**Table 5, Channel 2 Notch Frequency Tuning**

Notch	Nominal (Hz)	Allowable Range	Measured Frequency (Hz)	
			I	Q
1	105 kHz	$\pm 1$ kHz		
2	210 kHz	$\pm 1$ kHz		

**Table 6, Channel 2 Notch Frequency Depth**

Notch	Nominal (dB)	Allowable Range	Measured Depth (dB)	
			I	Q
1	40 dB	<30 dB		
2	40 dB	<30 dB		

### 3.3 Notch Enable

The notch filters can be enabled for each channel using a DIP switch SW1A and SW1B. Enable or disable each channel depending on need. If the channel is disabled, check that the resulting transfer function is flat.

**Table 7, Enable Notch Filters**

Channel	Required	Set	Transfer Function Flat	
			I	Q
Channel 1				
Channel 2				

### 3.4 Pictures

