

**CALIFORNIA INSTITUTE OF TECHNOLOGY  
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY**  
 Laser Interferometer Gravitational Wave Observatory (LIGO) Project

To/Mail Code:	
From/Mail Code:	Daniel Sigg
Phone/FAX:	
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**RF Demodulator Test Procedure**

**Required equipment:**

- Power supply
- 2 RF synthesizer
- Network analyzer (~100kHz bandwidth)
- RF scope and active probes
- Differential receiver

**Preparations:**

Test Engineer	Date	Pass

Write down revision and the serial number.

Module/Boards	Revision	Serial
D0900020		
D070375		
D0900016		

Power up the board and check that the current drawn from the +15V power supply is around nominal. Check that the LED is on.

Power supply	Current	Nominal
+24V		0.25A
-24V		0.25A

**LO signal:**

Set the first synthesizer to the required RF frequency (for example, 10MHz) and send it into the LO input—0 dBm minimum. Use an active probe and maximize the signal between TP5 and TP6 by adjusting C52. Do the same for TP3 and TP4 by adjusting C39. Trim C33 so that TP10 shows about -8V.

Step	Measured [dBm]	Nominal
TP5-TP6		4 Vpp
TP3-TP4		4 Vpp
TP10		-8 V

**Demodulated Signal:**

Set the first synthesizer to the required RF frequency (for example, 10MHz) and send it into the LO input—0 dBm minimum. Lock the second synthesizer to the first and set its frequency at 100Hz offset. Split the signal and inject it into all 4 RF inputs—7dBm each. Use channel 1 I-phase as the reference and measure the relative gain and phase at 100Hz with all other channels. Make this measurement at the front panel test outputs,

Step	Magnitude (dB)	phase (°)
Channel 1 / I-phase		note absolute voltage
Channel 1 / Q-phase		
Channel 2 / I-phase		
Channel 2 / Q-phase		
Channel 3 / I-phase		
Channel 3 / Q-phase		
Channel 4 / I-phase		
Channel 4 / Q-phase		

the rear panel D-sub “Monitor”, and

Step	Magnitude (dB)	phase (°)
Channel 1 / I-phase		note absolute voltage
Channel 1 / Q-phase		
Channel 2 / I-phase		
Channel 2 / Q-phase		
Channel 3 / I-phase		
Channel 3 / Q-phase		
Channel 4 / I-phase		
Channel 4 / Q-phase		

the rear panel D-sub “Oupputs” (requires differential receiver).

Step	Magnitude (dB)	phase (°)
Channel 1 / I-phase		note absolute voltage
Channel 1 / Q-phase		
Channel 2 / I-phase		
Channel 2 / Q-phase		
Channel 3 / I-phase		
Channel 3 / Q-phase		
Channel 4 / I-phase		
Channel 4 / Q-phase		

**Transfer Functions:**

Measure the audio transfer function from the RF input to the D-sub “Outputs” from 10Hz to 100kHz. Attach the plots.