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 Amplifier Test Procedure

Required equipment:

- Power supply
- RF synthesizer
- RF power meter
- RF network analyzer (~100MHz bandwidth)

Preparations:

Test Engineer	Date	Pass

Write down revision and the serial number.

Module/Boards	Revision	Serial
D080710		
D080714		

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

Power supply	Current	Nominal
+24V		0.1A
–24V		none
+16.5V		1.1A
–16.5V		none

Output power:

Inject a 10dBm sine wave into the input and measure the output power. Adjust internal attenuators as needed. Check on/off switches of power amplifiers. For outputs 7 and 8 a Wenzel amplifier will output a maximum of 26dBm, whereas a Cougar Teledyne amplifier will output a maximum of 30dBm.

Amplifier output	**Manufacturer**

Output power	**Measured [dB]**			**Nominal**
Frequency	**10MHz**	**30MHz**	**100MHz**	
Output 1				13dBm
Output 2				13dBm
Output 3				13dBm
Output 4				13dBm
Output 5				13dBm
Output 6				13dBm
Output 7				26/30dBm
Output 7 (off)				none
Output 8 (0 dB atten.)				25/29dBm
Output 8 (12 dB atten.)				13/17dBm
Output 8 (24 dB atten.)				1/5dBm
Output 8 (36 dB atten.)				–11/–7dBm
Output 8 (48 dB atten.)				–23/–19dBm
Output 8 (off)				none

Remote Sensing:

For the 30MHz frequency write write down the measured power levels at the rear panel BNCs. The output at M1 through M3 is a quarter of the nominal: $P = 12\text{dBm} - 10\text{dBm/V}(U - 4\text{V})$.

Output power	**Measured [V]**	**4 x Nominal**
Frequency	**30MHz**	
M3 (output 1 to 6)		2.9V
M1 (output 7)		2.6V/2.3V
M1 (output 7 off)		>8V
M2 (output 8, 0 dB atten.)		2.7/2.2V
M2 (output 8, 12 dB atten.)		3.9/3.5V
M2 (output 8, 24 dB atten.)		5.1/4.7V
M2 (output 8, 36 dB atten.)		6.3/5.9V
M2 (output 8, 48 dB atten.)		7.5/7.1V
M2 (output 8 off)		>8V

Double check these values at the D-sub connector.

D-sub connector	**Mon 1 (pin 1/9)**	**Mon 2 (pin 2/10)**	**Mon 3 (pin 3/11)**
pass/fail			

Write down the temperature values at the D-sub connector: $T = 20°\text{C} + 50°\text{C/V}(U - 6\text{V})$.

D-sub connector	**T 1 (pin 4/12)**	**T 2 (pin 5/13)**	**T 3 (pin 6/14)**
Voltage			
Temperature			

Check that the OK signal is high (>2.5V).

D-sub connector			**OK (pin 7/15)**
pass/fail			

Harmonics:

Use the network analyzer to measure the harmonics of a 10MHz signal at output 1. Make sure the measurement is not limited by the input source.

Harmonics	Measured [dBc]	Nominal
2 order		>25 dBc
3 order		>30 dBc
4 order		>30 dBc
5 order		>30 dBc
7 order		>30 dBc

Use the network analyzer to measure the harmonics of a 10MHz signal at output 7.

Harmonics	Measured [dBc]	Nominal
2 order		>20 dBc
3 order		>25 dBc
4 order		>30 dBc
5 order		>30 dBc
7 order		>30 dBc

Use the network analyzer to measure the harmonics of a 10MHz signal at output 8.

Harmonics	Measured [dBc]	Nominal
2 order		>20 dBc
3 order		>25 dBc
4 order		>30 dBc
5 order		>30 dBc
7 order		>30 dBc