S1103450



# LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

# LIGO Laboratory / LIGO Scientific Collaboration

LIGO-E1100333-v2

Advanced LIGO

6 April 2011

Test Procedure for Slow Controls Concentrator RF Amplifiers

**Daniel Sigg** 

Distribution of this document: LIGO Scientific Collaboration

This is an internal working note 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

LIGO Hanford Observatory P.O. Box 1970

Richland WA 99352

Phone 509-372-8106

Fax 509-372-8137

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 Livingston Observatory P.O. Box 940

Livingston, LA 70754

Phone 225-686-3100

Fax 225-686-7189

Twelve RF amplifiers, RF frequency dividers or RF frequency doublers can be connected to the concentrator and will be connected to the EtherCAT system with a single cable. A DB25 cable connects the RF amplifiers, but only 2 signals are read from each RF amplifiers: the M1 analog readback and the OK TTL readback. The EtherCAT uplink is connected through a single DB37 cable.

# 2 Test Equipment

- Oscilloscope
- Function generator
- Tester for RF amplifier concentrator
- DC power supplies

#### 3 Documentation

- Schematic—<u>D1100262-v1</u>
- Tester---D1100000-v1

#### 4 Tests

Power up the measurement equipment and connect the Tester to the DUT. One DB37 cable is permanently attached, whereas the DB25 cable is switch from port 1 through 12 on the concentrator.

#### 4.1 Power

Check the VCC voltage on the concentrator port. The voltage should be within 5% of nominal.

### 4.2 Signals

Port	Signal	Pass/Fail
1	Switch/LED	Pass
	Sine wave	Pass
2	Switch/LED	Pess
	Sine wave	Pass
3	Switch/LED	Pass
	Sine wave	Pass
4	Switch/LED	$\rho_{\rm ess}$
	Sine wave	Pess
5	Switch/LED	1555
	Sine wave	Pass
6	Switch/LED	1855
	Sine wave	Pass
7	Switch/LED	Pass
	Sine wave	Rus
8	Switch/LED	I RSS
	Sine wave	Pass
9	Switch/LED	RSS
	Sine wave	Pess_
10	Switch/LED	Pass
	Sine wave	RS5
11	Switch/LED	Pass,
	Sine wave	Pess
12	Switch/LED	less
	Sine wave	Pss



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TP6 (+ 5V) +5V

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1	Switch/LED	Pass
	Sine wave	Pass
2	Switch/LED	Pass
	Sine wave	Pass
3	Switch/LED	Pass
	Sine wave	Pass
4	Switch/LED	Pass
	Sine wave	Pass
5	Switch/LED	Pass
	Sine wave	Pass
6	Switch/LED	Pass
	Sine wave	Pass
7	Switch/LED	Pass
	Sine wave	Pass
8	Switch/LED	Pass
	Sine wave	Pass
9	Switch/LED	Pass
	Sine wave	Pass
10	Switch/LED	Pass
	Sine wave	Pass
11	Switch/LED	Pass
	Sine wave	Pass
12	Switch/LED	Pass
	Sine wave	Pass



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# 4.2 Signals

Port	Signal	Pass/Fail
1	Switch/LED	Pass
	Sine wave	Pass
2	Switch/LED	Pass
	Sine wave	Rus
3	Switch/LED	KS5
	Sine wave	Pass
4	Switch/LED	Pass
	Sine wave	Pass
5	Switch/LED	Pass
	Sine wave	Pass
6	Switch/LED	Pass
	Sine wave	Pass
7	Switch/LED	Pass
	Sine wave	Pass
8	Switch/LED	Pass
<del></del>	Sine wave	Pass
9	Switch/LED	Pass
	Sine wave	Pass
10	Switch/LED	P255
	Sine wave	Pess
11	Switch/LED	Pass
·	Sine wave	P&-55
12	Switch/LED	Pass
	Sine wave	Pass



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TP6 (+ 5V) +5V

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Port	Signal	Pass/Fail
1	Switch/LED	Ass
	Sine wave	RSS
2	Switch/LED	Pess
	Sine wave	Pass
3	Switch/LED	Pass
	Sine wave	Pess
4	Switch/LED	RSS
<u> </u>	Sine wave	Pess
5	Switch/LED	P=55
	Sine wave	Pess
6	Switch/LED	Per
<del>_</del>	Sine wave	Pes
7	Switch/LED	PSS
·	Sine wave	Pess
8	Switch/LED	Pass
	Sine wave	1tss
9	Switch/LED	Dest
	Sine wave	Pass
10	Switch/LED	
	Sine wave	
11	Switch/LED	Pess
	Sine wave	Pus
12	Switch/LED	less
_	Sine wave	455



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# 4.2 Signals

Port	Signal	Pass/Fail
1	Switch/LED	Pass
	Sine wave	1255
2	Switch/LED	1255
	Sine wave	Pass
3	Switch/LED	Psss
	Sine wave	Pas
4	Switch/LED	<b>18</b> 55
	Sine wave	Ass.
5	Switch/LED	Rs5
	Sine wave	Pass
6	Switch/LED	PSSS
	Sine wave	Pass
7	Switch/LED	Ry
	Sine wave	Pass
8	Switch/LED	Pass
	Sine wave	Pass
9	Switch/LED	Pas
	Sine wave	Pros
10	Switch/LED	Pess
	Sine wave	P255
11	Switch/LED	PSS
	Sine wave	Fa. 55
12	Switch/LED	Pass
	Sine wave	Pess



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Port	Signal	Pass/Fail
1	Switch/LED	las
	Sine wave	Pass
2	Switch/LED	Pass
	Sine wave	Pass
3	Switch/LED_	Pass
	Sine wave	PESS.
4	Switch/LED	Pass
	Sine wave	Pass
5	Switch/LED	Pass
	Sine wave	Pass
6	Switch/LED	Pass
	Sine wave	Lass
7	Switch/LED	Pass
	Sine wave	PESS
8	Switch/LED	Pass
	Sine wave	Pass
9	Switch/LED	Pos
	Sine wave	Pass
10	Switch/LED	Pass
	Sine wave	Pess 5
11	Switch/LED	Pass
	Sine wave	RSS
12	Switch/LED	Pess
	Sine wave	Pess



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Port	Signal	Pass/Fail
1	Switch/LED	1655
	Sine wave	lass
2	Switch/LED	Pess
	Sine wave	Pass
3	Switch/LED	RSS
	Sine wave	Ros
4	Switch/LED	Par
	Sine wave	Res
5	Switch/LED	Pass
	Sine wave	Pess
6	Switch/LED	Ress
	Sine wave	Pess
7	Switch/LED	Pass
	Sine wave	Pas
8	Switch/LED	Pass
	Sine wave	Pass
9	Switch/LED	Past
	Sine wave	RSS
10	Switch/LED	Pess
	Sine wave	Pass
11	Switch/LED	Prs ;
	Sine wave	V=ss
12	Switch/LED	Pess
	Sine wave	Pasy



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1	Switch/LED	Pass
	Sine wave	Pass
2	Switch/LED	Pass
	Sine wave	Pass
3	Switch/LED	Pass
	Sine wave	Pass
4	Switch/LED	Pass
	Sine wave	Pass
5	Switch/LED	Pass
	Sine wave	Pass
6	Switch/LED	Pass
	Sine wave	Pass
7	Switch/LED	Pos
. <u></u>	Sine wave	Pass
8	Switch/LED	Pass
	Sine wave	Pass
9	Switch/LED	Pas
	Sine wave	Pas s
10	Switch/LED	Pars
	Sine wave	Pass
11	Switch/LED	Rss
	Sine wave	Rs,
12	Switch/LED	Pass
	Sine wave	Pass



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# 4.2 Signals

Port	Signal	Pass/Fail	
1	Switch/LED	ESS	
	Sine wave	655	
2	Switch/LED	1-55	
	Sine wave	P-55	
3	Switch/LED	Pass	_
	Sine wave	Pess	
4	Switch/LED	RS	
	Sine wave	RSS	
5	Switch/LED	Ress	
	Sine wave	Pess	
6	Switch/LED	P-55	
	Sine wave	Post	
7	Switch/LED	Pess	
	Sine wave	Pess	
8	Switch/LED	Pess	
	Sine wave	Pass	
9	Switch/LED	155	
	Sine wave	Pess	
10	Switch/LED	P-ST	
	Sine wave	RSS	
11	Switch/LED	Pass	
	Sine wave	Pess	
12	Switch/LED	Pess	
	Sine wave	Pess	



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Port	Signal	Pass/Fail
1	Switch/LED	Pass
	Sine wave	Pass
2	Switch/LED	Pess
	Sine wave	Pass
3	Switch/LED	Yass .
	Sine wave	BSS
4	Switch/LED	PESS.
	Sine wave	Pos
5	Switch/LED	Pess
	Sine wave	Pass
6	Switch/LED	PESS
	Sine wave	P35
7	Switch/LED	Pess
	Sine wave	Ress
8	Switch/LED	P255
	Sine wave	Pess .
9	Switch/LED	f+Ss
	Sine wave	Pess
10	Switch/LED	Pas
	Sine wave	Prss
11	Switch/LED	Paps
	Sine wave	f-19
12	Switch/LED	Pess
	Sine wave	V555



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Power up the measurement equipment and connect the Tester to the DUT. One DB37 cable is permanently attached, whereas the DB25 cable is switch from port 1 through 12 on the concentrator.

#### 4.1 Power

Check the VCC voltage on the concentrator port. The voltage should be within 5% of nominal.

TP6 (+ 5V) +5V

## 4.2 Signals

Port	Signal	Pass/Fail
1	Switch/LED	Pass
	Sine wave	Pess
2	Switch/LED	Pass
	Sine wave	Pass
3	Switch/LED	Pess
	Sine wave	fus
4	Switch/LED	PSS
	Sine wave	Pass
5	Switch/LED	P<55
	Sine wave	Pass
6	Switch/LED	Pas
	Sine wave	Pess
7	Switch/LED	Pess
·-·	Sine wave	Pass
8	Switch/LED	Pos
	Sine wave	Par
9	Switch/LED	Pass
	Sine wave	Poss
10	Switch/LED	P655
	Sine wave	P555
11	Switch/LED	Pas
	Sine wave	PESS
12	Switch/LED	Kass
	Sine wave	Pess



# LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

# LIGO Laboratory / LIGO Scientific Collaboration

LIGO- E1100333-v2

Advanced LIGO

6 April 2011

Test Procedure for Slow Controls Concentrator RF Amplifiers

**Daniel Sigg** 

Distribution of this document: LIGO Scientific Collaboration

This is an internal working note 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

P.O. Box 1970
Richland WA 99352
Phone 509-372-8106
Fax 509-372-8137

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

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

Twelve RF amplifiers, RF frequency dividers or RF frequency doublers can be connected to the concentrator and will be connected to the EtherCAT system with a single cable. A DB25 cable connects the RF amplifiers, but only 2 signals are read from each RF amplifiers: the M1 analog readback and the OK TTL readback. The EtherCAT uplink is connected through a single DB37 cable.

# 2 Test Equipment

- Oscilloscope
- Function generator
- Tester for RF amplifier concentrator
- DC power supplies

### 3 Documentation

- Schematic—D1100262-v1
- Tester—D1100000-v1

### 4 Tests

Power up the measurement equipment and connect the Tester to the DUT. One DB37 cable is permanently attached, whereas the DB25 cable is switch from port 1 through 12 on the concentrator.

#### 4.1 Power

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TP6 (+ 5V) +5V

# 4.2 Signals

Port	Signal	Pass/Fail	
1	Switch/LED	655	
	Sine wave	Vass	
2	Switch/LED	Pass	
	Sine wave	PES 5	
3	Switch/LED	(405)	_
<u> </u>	Sine wave	155	
4	Switch/LED	Pass	
	Sine wave	Pass	
5	Switch/LED	1355	_
	Sine wave	8655	
6	Switch/LED	Yass	
	Sine wave	PESS	
7	Switch/LED	Pass	
<u>.</u>	Sine wave	JE55	
8	Switch/LED	JE58	
	Sine wave	Pess	
9	Switch/LED	PESS	
	Sine wave	Pass	
10	Switch/LED	Pass	
	Sine wave	Pos	
11	Switch/LED	fass	
	Sine wave	PSS	
12	Switch/LED	Pass	
	Sine wave	Priss	



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# 4.2 Signals

Port	Signal	Pass/Fail
1	Switch/LED	Pass
	Sine wave	1295
2	Switch/LED	Pess
	Sine wave	Pass
3	Switch/LED	Pess
	Sine wave	Pess
4	Switch/LED	Pass
	Sine wave	PSSS
5	Switch/LED	Pass
	Sine wave	Pess
6	Switch/LED	Pess
	Sine wave	Pess
7	Switch/LED	Pess
	Sine wave	PES5
8	Switch/LED	Pess
	Sine wave	Pess
9	Switch/LED	Pass
	Sine wave	fres
10	Switch/LED	Pess
	Sine wave	Pass
11	Switch/LED	1855
	Sine wave	K-55
12	Switch/LED	Pos
	Sine wave	VESS.



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### 4.2 Signals

Port	Signal	Pass/Fail
1	Switch/LED	Pe55
	Sine wave	1255
2	Switch/LED	Pess
	Sine wave	
3	Switch/LED	Pess'
	Sine wave	Pess.
4	Switch/LED	Jas .
	Sine wave	Pess
5	Switch/LED	Pess
	Sine wave	955
6	Switch/LED	8455
	Sine wave	lass.
7	Switch/LED	G-55
	Sine wave	Pass
8	Switch/LED	OCS
	Sine wave	Pass
9	Switch/LED	Pass
	Sine wave	Pass
10	Switch/LED	lass
	Sine wave	Pes 5
11	Switch/LED	Pess
	Sine wave	Jks s
12	Switch/LED	P455
	Sine wave	lag



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#### 4.1 Power

Check the VCC voltage on the concentrator port. The voltage should be within 5% of nominal.

TP6 (+ 5V) 75V

## 4.2 Signals

Port	Signal	Pass/Fail
1	Switch/LED	P55
	Sine wave	P=55
2	Switch/LED	PEST
	Sine wave	PESS
3	Switch/LED	Rest.
	Sine wave	Pass
4	Switch/LED	Pass
	Sine wave	Pass
5	Switch/LED	P<55
	Sine wave	Pass
6	Switch/LED	Pass
	Sine wave	Pas
7	Switch/LED	Pass
	Sine wave	Pass
8	Switch/LED	Rest
	Sine wave	Pess
9	Switch/LED	Pass
	Sine wave	Pess
10	Switch/LED	Pass
	Sine wave	Pass
11	Switch/LED	Pas
	Sine wave	Pass
12	Switch/LED	Pas-
	Sine wave	lass.