LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

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Shutter Timing Module Tester Test Procedure

Joshua R. Myers

Richard S Abbott

Digitally signed by Richard S Abbott
DN: cn=Richard S Abbott, c=US, o=LIGO, ou=Caltech, email=abbott@ligo.caltech.edu
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California Institute of Technology
LIGO Project – MS 18-33
Pasadena, CA 91125
Phone (626) 395-2129
Fax (626) 304-9834
E-mail: info@ligo.caltech.edu

Massachusetts Institute of Technology
LIGO Project – MS 20B-145
Cambridge, MA 01239
Phone (617) 253-4824
Fax (617) 253-7014
E-mail: info@ligo.mit.edu

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

Date _____
Tech _____
Board Serial Number_____

1 Overview

The following procedure refers to D050340-A, the Shutter Timing Tester Module. The photodetectors on the anti-symmetric port of the interferometer are protected from high optical power pulses associated with loss of arm cavity lock by a mechanical shutter. The mechanical shutter is triggered to close once the detected light levels exceed a predetermined threshold. The ASPD Shutter Timing Module measures the time taken for a mechanical shutter to close relative to the trigger signal. This board is used in the testing of the ASPD Shutter Timing Module.

1.1 Test Equipment

The following test equipment is necessary:

DC power supply (capable of +5VDC)
Scope
Function Generator (DS340, DS345, etc.)

1.2 Test Setup

Connect a DC power supply that has been previously adjusted to +5VDC to the board, +5 to TP1 and GND to TP2. The function generator should be set to 1Hz, 5Vpp, +2.5VDC offset square wave. Verify the signal using an oscilloscope before connecting to the board being tested.

1.3 Test Overview

The test procedure is divided into the following sections:

- DC power supply checks
- Pulse Width Verification
- Delay Width Verification

1.4 DC Power Supply Checks

Turn on the power supply and record the following data in Table 1. Many bench supplies may not correctly report the current draw of this board. If that is the case, it is sufficient to verify proper operation of the board , mark this section as OK, and proceed with the remainder of the procedure.

Table 1

Supply	Nominal Current	Actual Current	Check if OK
+5 V	5 mA (± 2 mA)		

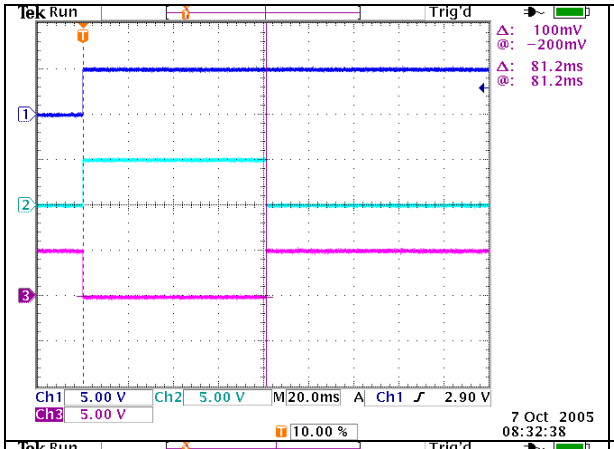
Date _____
Tech _____
Board Serial Number_____

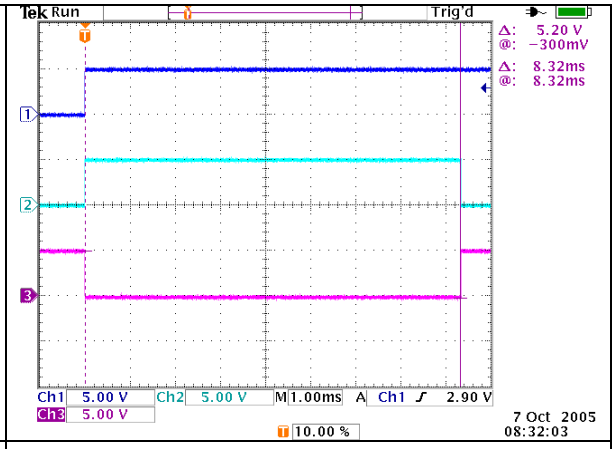
1.5 Pulse Width Verification

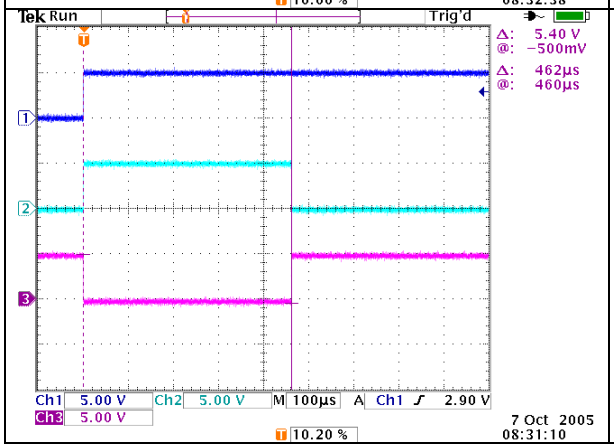
Connect the 1Hz signal to J5 of the board being tested and adjust R2 and R3 clockwise until the maximum pulse duration is observed on J1 and J2. Record the value of the pulse duration in the table below. Adjust R3 fully CCW and record the value below, and lastly adjust R2 fully CCW and record the value below. Repeat this test for the second channel, this time monitoring the outputs on J3 and J4 and adjusting R8 and R9. During the second part of this test, make sure that JMP1 is set to the Out position.

Table 2

Setting	Nominal Duration	Actual Duration	Check if OK
R2, R3 fully CW	90 ms (± 10 ms)		
R2 fully CW, R3 fully CCW	9 ms (± 1 ms)		
R2, R3 fully CCW	460 ns (± 50 ns)		
R8, R9 fully CW	90 ms (± 10 ms)		
R8 fully CW, R9 fully CCW	9 ms (± 1 ms)		
R8, R9 fully CCW	460 ns (± 50 ns)		







Traces:

1) 1 Hz Input (J5)

2) Output Signal (J1/J3)

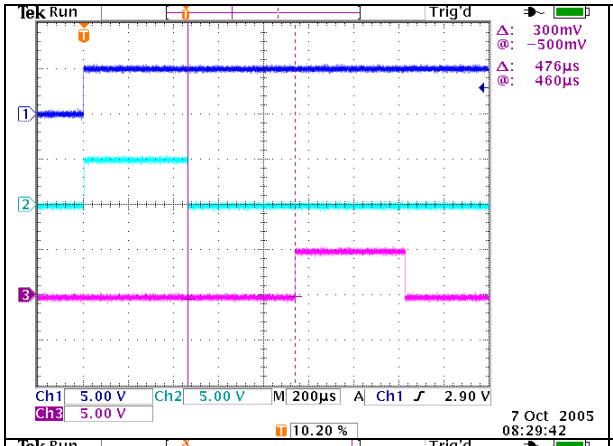
3) Inverted Output Signal (J2/J4)

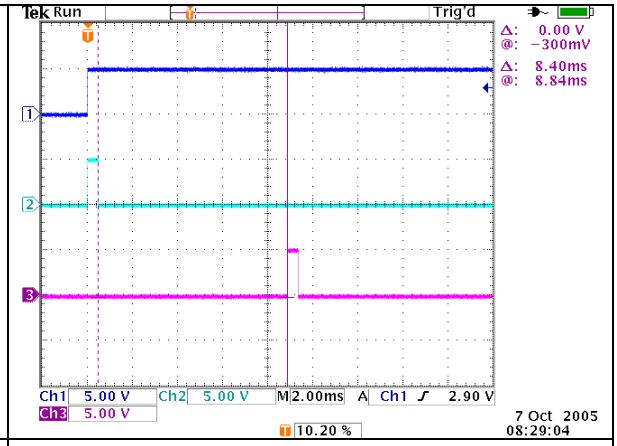
1.6 Delay Width Verification

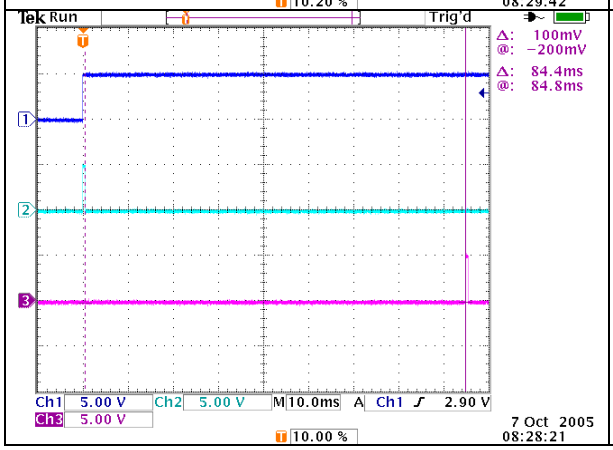
Move JMP1 to the IN position and monitor J1 and J3. Adjust R2, R3, R8, and R9 so that the minimum pulse width is being output on both channels (should be fully CCW on all pots). Adjust R5 and R6 so that the minimum delay between the two pulses is observed and record this value. Adjust R5 fully CW and record the new value for the delay between the two pulses, and finally adjust R6 fully CW and record the delay between the two pulses.

Table 3

Setting	Nominal Duration	Actual Duration	Check if OK
R5, R6 fully CCW	460 ns (± 50 ns)		
R2 fully CW, R3 fully CCW	9 ms (± 1 ms)		
R2, R3 fully CCW	90 ms (± 9 ms)		







Traces:

1) 1 Hz Input (J5)

2) Output Signal Channel 1 (J1)

3) Output Signal Channel 2 (J3)