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LIGO-E1200340-v1

advanced LIGO

6/12/2012

Test Procedure for Shutter Controller

Paul Schwinberg and Daniel Sigg

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1 Introduction

The following test procedure describes the test of proper operation of the shutter controller.

2 Test Equipment

- Voltmeter
- Oscilloscope
- Shutter Controller Tester — D1200449-v1.
- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *S1203606*

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK _____ Channel 2 OK Not OK _____

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.38 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .604 V Readback .004 V

Channel 2 Mid set point 2.5 V Readback 2.38 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 _____ V Channel 2 OK Trigger 2 _____ V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .218 V

Channel 2 out HI 5 V LO .219 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ~~2.5~~^{1.3} V Readback 1.29 V

Channel 1 Highest set point 2.6 V Readback 2.58 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ~~2.5~~^{1.3} V Readback 1.29 V

Channel 2 Highest set point 2.6 V Readback 2.58 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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3 Tests *S/N*

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The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI *5* V LO *0.1* V close HI *5* V LO *.1* V

Channel 2 open HI *5* V LO *.1* V close HI *5* V LO *.1* V

- 2) Verify that with no threshold voltage applied the shutter does not close. Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .004 V Readback .004 V

Channel 1 Mid set point 2.5 V Readback 2.385 V

Channel 1 Highest set point 4.645 V Readback 4.402 V

Channel 2 Lowest set point .004 V Readback .004 V

Channel 2 Mid set point 2.5 V Readback 2.385 V

Channel 2 Highest set point 4.645 V Readback 4.402 V

3.0 - OPEN BOTH SHUTTERS - SETS BOTH POTS TO MIN

- 3) Verify that when a threshold voltage is applied the shutter closes. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 2.506 V Channel 2 OK Trigger 2 2.506 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .04 V Readback .04 V

Channel 1 Mid set point ^{1.3}~~2.5~~ V Readback 1.288 V

Channel 1 Highest set point 2.606 V Readback 2.585 V

Channel 2 Lowest set point _____ V Readback _____ V

Channel 2 Mid set point ^{1.3}~~2.5~~ V Readback _____ V

Channel 2 Highest set point _____ V Readback _____ V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK _____

Channel 2 OK _____ Not OK _____



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A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.58 V

Channel 1 Highest set point 4.64 V Readback 4.40 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.38 V

Channel 2 Highest set point 4.46 V Readback 4.40 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .62 V Channel 2 OK Trigger 2 .42 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ^{1.3}~~2.5~~ V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.58 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ^{1.3}~~2.5~~ V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.58 V

4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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3 Tests *S 1203609*

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 The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.
 A Uniblitz shutter should be connected to each output.*

1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

2) Verify that with no threshold voltage applied the shutter does not close. Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK _____ Channel 2 OK Not OK _____

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.37 V

Channel 1 Highest set point 4.64 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.37 V

Channel 2 Highest set point 4.64 V Readback 4.4 V

3) Verify that when a threshold voltage is applied the shutter closes. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 ^{.55}~~2.5~~ V Channel 2 OK Trigger 2 .55 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point 0.03 V Readback 0.03 V

Channel 1 Mid set point 1.3
2.5 V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.58 V

Channel 2 Lowest set point 0.03 V Readback 0.03 V

Channel 2 Mid set point 1.3
2.5 V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.58 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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3 Tests S1203610

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A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.38 V

Channel 1 Highest set point 4.6 V Readback 4.48 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.38 V

Channel 2 Highest set point 4.6 V Readback 4.48 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .500 V Channel 2 OK Trigger 2 .500 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point 0.003 V Readback 0.003 V

Channel 1 Mid set point 1.3
~~2.5~~ V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.58 V

Channel 2 Lowest set point 0.003 V Readback 0.003 V

Channel 2 Mid set point 1.3
~~2.5~~ V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.58 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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A Uniblitz shutter should be connected to each output.

1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.3 V

Channel 1 Highest set point 4.64 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.3 V

Channel 2 Highest set point 4.64 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ^{1.3}~~2.5~~ V Readback 1.3 V

Channel 1 Highest set point 2.5 V Readback 2.5 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ^{1.3}~~2.5~~ V Readback 1.3 V

Channel 2 Highest set point 2.5 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK _____ Channel 2 OK Not OK _____

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.43 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.43 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point 0.03 V Readback 0.03 V

Channel 1 Mid set point ~~2.5~~^{1.3} V Readback 1.3 V

Channel 1 Highest set point ~~4.6~~^{2.6} V Readback 2.58 V

Channel 2 Lowest set point 0.03 V Readback 0.03 V

Channel 2 Mid set point ~~2.5~~^{1.3} V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.58 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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Test Procedure for Shutter Controller

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1 Introduction

The following test procedure describes the test of proper operation of the shutter controller.

2 Test Equipment

- Voltmeter
- Oscilloscope
- Shutter Controller Tester — D1200449-v1.
- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *S1203613*

*The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.
 The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.
 A Uniblitz shutter should be connected to each output.*

1) Verify that the basic logic works. Toggle the open and close switches for both drivers.
 The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK
 Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V
 Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

2) Verify that with no threshold voltage applied the shutter does not close. Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK _____ Channel 2 OK Not OK _____

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.38 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.38 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

3) Verify that when a threshold voltage is applied the shutter closes. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ~~2.5~~ 1.3 V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ~~2.5~~ 1.3 V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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1 Introduction

The following test procedure describes the test of proper operation of the shutter controller.

2 Test Equipment

- Voltmeter
- Oscilloscope
- Shutter Controller Tester — D1200449-v1.
- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *S12 03614*

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

2) Verify that with no threshold voltage applied the shutter does not close. Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.41 V

Channel 1 Highest set point 4.6 V Readback 4.48 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.41 V

Channel 2 Highest set point 4.6 V Readback 4.48 V

3) Verify that when a threshold voltage is applied the shutter closes. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ^{1.3}~~2.5~~ V Readback 1.29 V

Channel 1 Highest set point 2.6 V Readback 2.58 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ^{1.3}~~2.5~~ V Readback 1.29 V

Channel 2 Highest set point 2.6 V Readback 2.58 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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1 Introduction

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2 Test Equipment

- Voltmeter
- Oscilloscope
- Shutter Controller Tester — D1200449-v1.
- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *S120365*

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.38 V

Channel 1 Highest set point 4.6 V Readback 4.48 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.39 V

Channel 2 Highest set point 4.6 V Readback 4.48 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ~~2.5~~^{1.3} V Readback 1.29 V

Channel 1 Highest set point 2.6 V Readback 2.58 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ~~2.5~~^{1.3} V Readback 1.29 V

Channel 2 Highest set point 2.6 V Readback 2.59 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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1 Introduction

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2 Test Equipment

- Voltmeter
- Oscilloscope
- Shutter Controller Tester — D1200449-v1.
- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *S1203616*

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

2) Verify that with no threshold voltage applied the shutter does not close. Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point 0.003 V Readback 0.003 V

Channel 1 Mid set point 2.5 V Readback 2.38 V

Channel 1 Highest set point 4.6 V Readback 4.48 V

Channel 2 Lowest set point 0.003 V Readback 0.003 V

Channel 2 Mid set point 2.5 V Readback 2.38 V

Channel 2 Highest set point 4.6 V Readback 4.41 V

3) Verify that when a threshold voltage is applied the shutter closes. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 5 V Channel 2 OK Trigger 2 5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO 0.22 V

Channel 2 out HI 5 V LO 0.22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ~~2.5~~^{1.3} V Readback 1.29 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ~~2.5~~^{1.3} V Readback 1.29 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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2 Test Equipment

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- Oscilloscope
- Shutter Controller Tester — D1200449-v1.
- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *S1203617*

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.39 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.38 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ~~2.5~~^{1.3} V Readback 1.29 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ~~2.5~~^{1.3} V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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2 Test Equipment

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- Oscilloscope
- Shutter Controller Tester — D1200449-v1.
- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *S1203618*

*The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.
 The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.
 A Uniblitz shutter should be connected to each output.*

1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point -.003 V Readback -.003 V

Channel 1 Mid set point 2.5 V Readback 2.34 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point -.003 V Readback -.003 V

Channel 2 Mid set point 2.5 V Readback 2.38 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 5 V Channel 2 OK Trigger 2 5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point 0.003 V Readback 0.003 V

Channel 1 Mid set point ~~2.5~~^{1.3} V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point 0.003 V Readback 0.003 V

Channel 2 Mid set point ~~2.5~~^{1.3} V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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Paul Schwinberg and Daniel Sigg

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1 Introduction

The following test procedure describes the test of proper operation of the shutter controller.

2 Test Equipment

- Voltmeter
- Oscilloscope
- Shutter Controller Tester — D1200449-v1.
- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests S1203619

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.44 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.44 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point 0.003 V Readback 0.003 V

Channel 1 Mid set point 1.3
2.5 V Readback 1.3 V

Channel 1 Highest set point 2.5 V Readback 2.5 V

Channel 2 Lowest set point 0.003 V Readback 0.003 V

Channel 2 Mid set point 1.3
2.5 V Readback 1.3 V

Channel 2 Highest set point 2.5 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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The following test procedure describes the test of proper operation of the shutter controller.

2 Test Equipment

- Voltmeter
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- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests

51203620

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point 1.003 V Readback .603 V

Channel 1 Mid set point 2.5 V Readback 2.44 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.44 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 5 V Channel 2 OK Trigger 2 5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point 1.03 V Readback 1.03 V

Channel 1 Mid set point 1.3
2.5 V Readback 1.29 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 1.3
2.5 V Readback 1.29 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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2 Test Equipment

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- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *S1203621*

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.44 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.44 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ~~2.5~~ 1.3 V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.58 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ~~2.5~~ 1.3 V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.58 V

- 4) Verify that when close is applied the shutter stays closed. Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *51203622*

*The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.
 The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.
 A Uniblitz shutter should be connected to each output.*

1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK _____ Channel 2 OK Not OK _____

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.44 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.44 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point 0.003 V Readback 0.003 V

Channel 1 Mid set point ~~2.5~~ 1.3 V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point 0.003 V Readback 0.003 V

Channel 2 Mid set point ~~2.5~~ 1.3 V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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1 Introduction

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2 Test Equipment

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- Oscilloscope
- Shutter Controller Tester — D1200449-v1.
- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *51203623*

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

2) Verify that with no threshold voltage applied the shutter does not close. Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.4 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.4 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

3) Verify that when a threshold voltage is applied the shutter closes. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 5 V Channel 2 OK Trigger 2 5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point 1.063 V Readback 1.003 V

Channel 1 Mid set point 1.3
2.5 V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point 1.003 V Readback 1.003 V

Channel 2 Mid set point 1.3
2.5 V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests

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The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK _____ Channel 2 OK Not OK _____

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.4 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.4 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 _____ V Channel 2 OK Trigger 2 _____ V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point 0.003 V Readback 0.003 V

Channel 1 Mid set point ~~2.5~~^{1.3} V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point 0.003 V Readback 0.003 V

Channel 2 Mid set point ~~2.5~~^{1.3} V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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1 Introduction

The following test procedure describes the test of proper operation of the shutter controller.

2 Test Equipment

- Voltmeter
- Oscilloscope
- Shutter Controller Tester — D1200449-v1.
- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests 51203625

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK _____ Channel 2 OK Not OK _____

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.4 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.4 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ^{1.3}~~2.5~~ V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ^{1.3}~~2.5~~ V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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Test Procedure for Shutter Controller

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The following test procedure describes the test of proper operation of the shutter controller.

2 Test Equipment

- Voltmeter
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- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests S1203626

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5. V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.4 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.4 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point 0.003 V Readback 0.003 V

Channel 1 Mid set point 1.3
2.5 V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point 0.003 V Readback 0.003 V

Channel 2 Mid set point 1.3
2.5 V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 1.3 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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The following test procedure describes the test of proper operation of the shutter controller.

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- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests 51203627

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

2) Verify that with no threshold voltage applied the shutter does not close. Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.4 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.4 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

3) Verify that when a threshold voltage is applied the shutter closes. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ~~2.5~~^{1.3} V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ~~2.5~~^{1.3} V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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2 Test Equipment

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- Board Schematics — D1102312-v1.

3 Tests *S1203628*

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

2) Verify that with no threshold voltage applied the shutter does not close. Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.4 V

Channel 1 Highest set point ~~.003~~ 4.6 V Readback ~~.003~~ 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.4 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

3) Verify that when a threshold voltage is applied the shutter closes. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 V Channel 2 OK Trigger 2 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point 0.003 V Readback 0.003 V

Channel 1 Mid set point 1.3
2.5 V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point 0.003 V Readback 0.003 V

Channel 2 Mid set point 1.3
2.5 V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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The following test procedure describes the test of proper operation of the shutter controller.

2 Test Equipment

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- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *S1203629*

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

2) Verify that with no threshold voltage applied the shutter does not close. Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.4 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.4 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

3) Verify that when a threshold voltage is applied the shutter closes. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ^{1.3}~~2.5~~ V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ^{1.3}~~2.5~~ V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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The following test procedure describes the test of proper operation of the shutter controller.

2 Test Equipment

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- Oscilloscope
- Shutter Controller Tester — D1200449-v1.
- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *S1203630*

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

- 2) **Verify that with no threshold voltage applied the shutter does not close.** Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK Channel 2 OK Not OK

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.4 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.4 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

- 3) **Verify that when a threshold voltage is applied the shutter closes.** Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ~~2.5~~^{1.3} V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ~~2.5~~^{1.3} V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK



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- Oscilloscope
- Shutter Controller Tester — D1200449-v1.
- 2 Uniblitz shutters
- Board Schematics — D1102312-v1.

3 Tests *S1203631*

The Shutter Control has two D880C Shutter Drivers mounted on the main PCB.

The Shutter Controller Tester should be powered up and plugged into the powered Shutter Control.

A Uniblitz shutter should be connected to each output.

- 1) **Verify that the basic logic works.** Toggle the open and close switches for both drivers.

The monitor LEDs on both the Controller and Tester should change states.

Channel 1 open OK Not OK close OK Not OK

Channel 2 open OK Not OK close OK Not OK

Verify with a voltmeter that the front panel BNCs read the correct TTL levels, when toggling open and close. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 open HI 5 V LO .1 V close HI 5 V LO .1 V

Channel 2 open HI 5 V LO .1 V close HI 5 V LO .1 V

2) Verify that with no threshold voltage applied the shutter does not close. Set the threshold pot at minimum and verify the voltage is zero with a meter connected to J1. Now ramp the PD pot from minimum to maximum, the monitor LEDs should not change state.

Channel 1 OK Not OK _____ Channel 2 OK Not OK _____

Verify with a voltmeter that the front panel BNC readback shows the correct photodetector voltage levels, when ramping. The photodiode voltages at the BNC should be 5% below the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point 2.5 V Readback 2.4 V

Channel 1 Highest set point 4.6 V Readback 4.4 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point 2.5 V Readback 2.4 V

Channel 2 Highest set point 4.6 V Readback 4.4 V

3) Verify that when a threshold voltage is applied the shutter closes. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should close and the the monitor LEDs should change state, read the trigger voltage with a meter connected to J1.

Channel 1 OK Trigger 1 .5 V Channel 2 OK Trigger 2 .5 V

Verify with a voltmeter that the front panel OUT BNCs read the correct TTL levels, when toggling the shutter. Write down the voltages (TTL HI > 2.0V and TTL LO < 0.8V).

Channel 1 out HI 5 V LO .22 V

Channel 2 out HI 5 V LO .22 V

Verify with a voltmeter that the front panel BNC readback shows the correct threshold voltage levels, when ramping. The threshold readback voltages should be the same as the set point. Write down the voltages for

Channel 1 Lowest set point .003 V Readback .003 V

Channel 1 Mid set point ^{1.3}~~2.5~~ V Readback 1.3 V

Channel 1 Highest set point 2.6 V Readback 2.5 V

Channel 2 Lowest set point .003 V Readback .003 V

Channel 2 Mid set point ^{1.3}~~2.5~~ V Readback 1.3 V

Channel 2 Highest set point 2.6 V Readback 2.5 V

- 4) **Verify that when close is applied the shutter stays closed.** Mount a 50 terminator to the front panel close BNC. Set the threshold pot at 2.5 volts and verify with meter connected to J1. Now ramp the PD pot from minimum to maximum, the shutter should stay close for all voltages.

Channel 1 OK Not OK

Channel 2 OK Not OK