

Last Edited: 2/16/2024

Title **Voltage Regulators**

Caltech LIGO  
\*  
\*

Size: A    DCC Number: D2400008    Revision: v1

Engineer: \*    Date: 4/17/2024

Upper Trip Point = 15.5V  
Lower Trip Point = 14.5V

Upper Trip Point = 5.5V  
Lower Trip Point = 4.5V

Upper Trip Point = 5.5V  
Lower Trip Point = 4.5V

Upper Trip Point = 18.5V  
Lower Trip Point = 17.5V

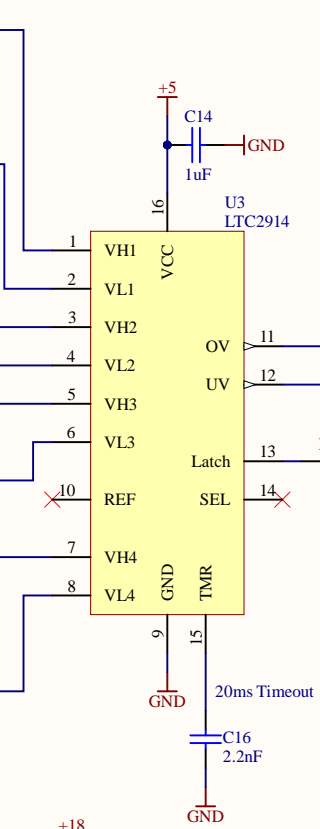
BIAS Voltage Monitor Readout

15V Supply Monitor Readout

5V Supply Monitor Readout

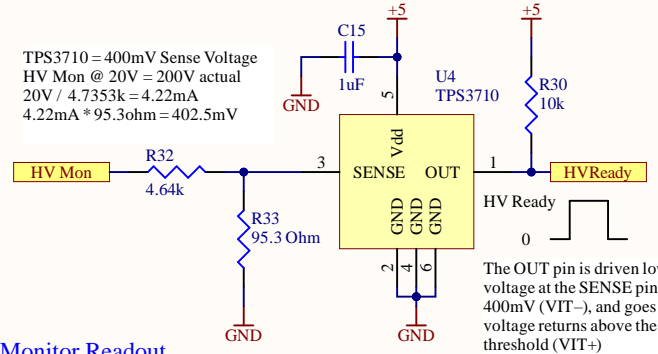
HV/10 Supply Monitor Readout

D2400008-v1.1 HRUF Shutter Driver[2D]



Latch tied high to disable OV latch mode

TPS3710 = 400mV Sense Voltage  
HV Mon @ 20V = 200V actual  
 $20V / 4.7353k = 4.22mA$   
 $4.22mA * 95.3ohm = 402.5mV$



The OUT pin is driven low when the voltage at the SENSE pin drops below 400mV (VIT-), and goes high when the voltage returns above the respective threshold (VIT+)

Title  
**Voltage Monitor**

LIGO Project  
California Institute of Technology  
Massachusetts Institute of Technology

LIGO

Size: A DCC Number: D2400008

Revision: v1

Engineer: D. Schaetzl

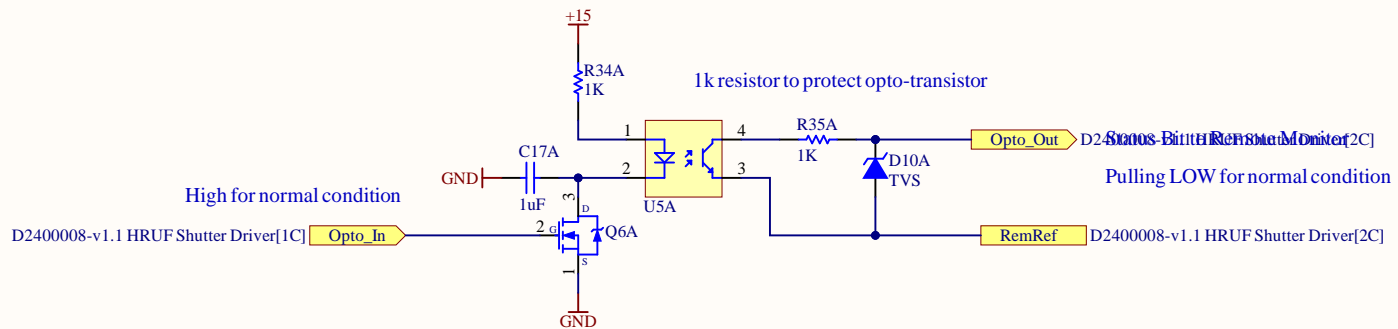
Date: 4/17/2024

Time: 8:13:37 AM

File: C:\Dean\Fast Shutter\D2400XXX-v1 HRUF Shutter Driver\D2400XXX-v1 HRUF Shutter Driver\D2400008-v1 VoltageMonitor.SchDoc

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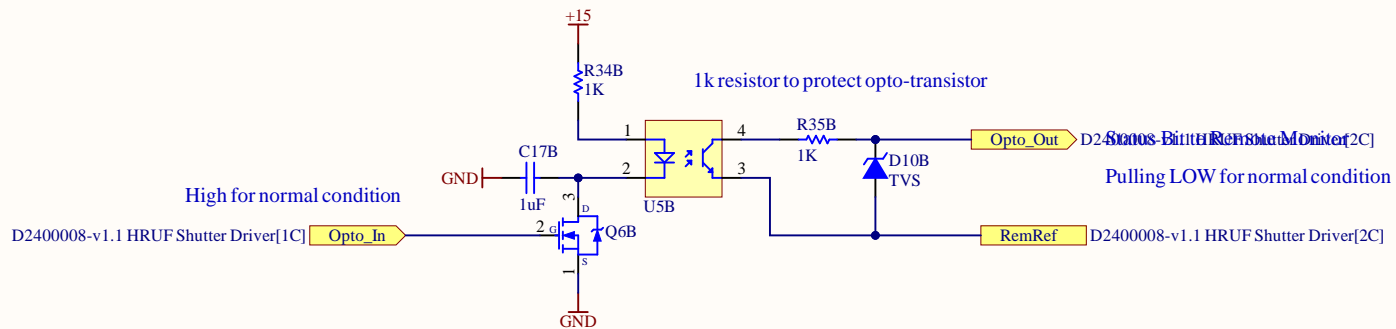
Last Edited: 2/16/2024



In order to deterministically annunciate a fault condition, the input to this stage is held at +5V such that the output will pull low. The remote readout for this monitor normally floats high, and will be actively pulled low by this stage. A loss of power on this monitor, or a disconnected cable, will show as a fault condition to the remote readout stage.

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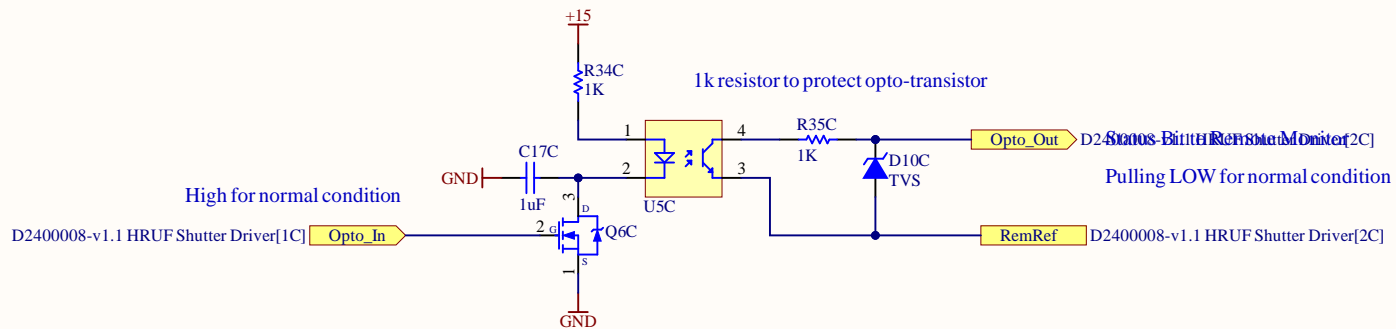
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Size: A	DCC Number: D1300780	Revision: v6	Engineer: Shao, R. Abbott	Date: 4/17/2024	
File: C:\Dean\Fast Shutter\D2400XXX-v1 HRUF Shutter Driver\D2400XXX-v1 HRUF Shutter Driver\D2400008-v1 OptoOut.SchDoc				Time: 8:13:37 AM	
				Sheet 4 of 7	



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Title		LIGO Project California Institute of Technology Massachusetts Institute of Technology		LIGO <sup>®</sup>	
Size: A	DCC Number: D1300780	Revision: v6	Engineer: Shao, R. Abbott	Date: 4/17/2024	Time: 8:13:37 AM
File: C:\Dean\Fast Shutter\D2400XXX-v1 HRUF Shutter Driver\D2400XXX-v1 HRUF Shutter Driver\D2400008-v1 OptoOut.SchDoc				Sheet 4 of 7	



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Title **Opto-isolated Output Monitor**

LIGO Project  
California Institute of Technology  
Massachusetts Institute of Technology



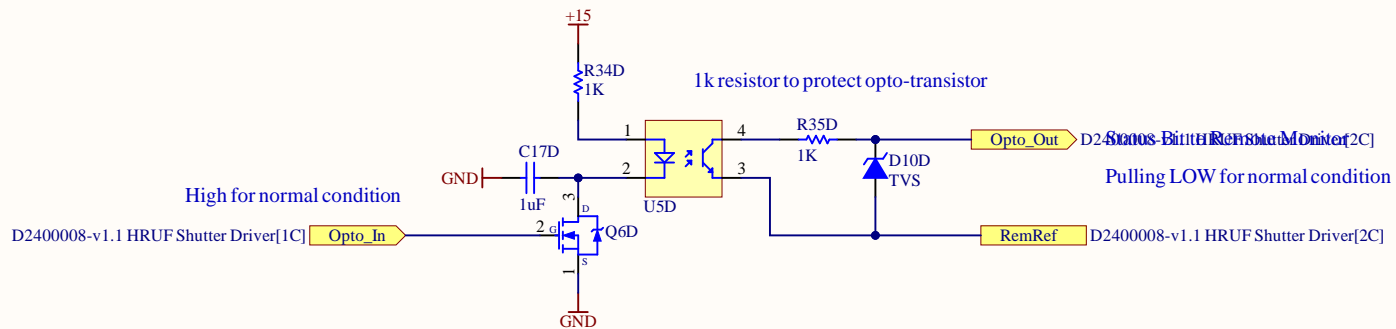
Size: A DCC Number: D1300780

Revision: v6

Engineer: Shao, R. Abbott

Date: 4/17/2024

Time: 8:13:38 AM



High for normal condition

1k resistor to protect opto-transistor

Pulling LOW for normal condition

In order to deterministically annunciate a fault condition, the input to this stage is held at +5V such that the output will pull low. The remote readout for this monitor normally floats high, and will be actively pulled low by this stage. A loss of power on this monitor, or a disconnected cable, will show as a fault condition to the remote readout stage.

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Title **Opto-isolated Output Monitor**

LIGO Project  
California Institute of Technology  
Massachusetts Institute of Technology



Size: A DCC Number: D1300780

Revision: v6

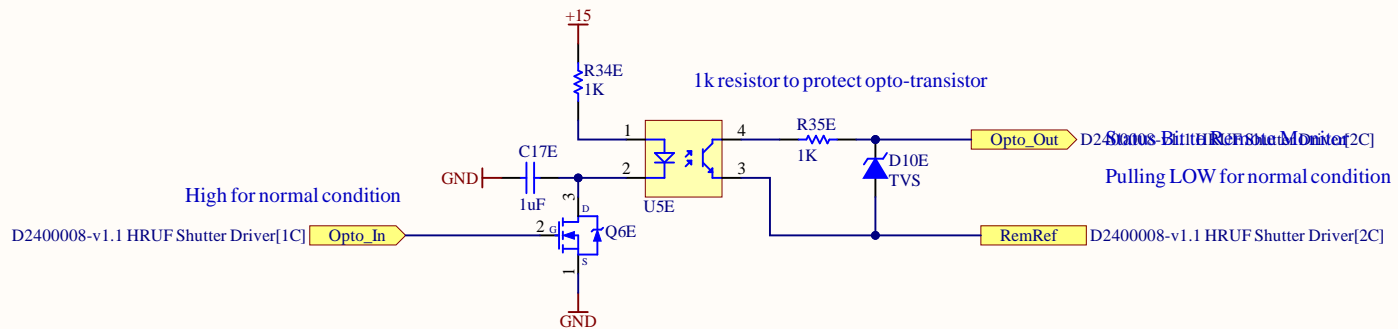
Engineer: Shao, R. Abbott

Date: 4/17/2024

Time: 8:13:38 AM

File: C:\Dean\Fast Shutter\D2400XXX-v1 HRUF Shutter Driver\D2400XXX-v1 HRUF Shutter Driver\D2400008-v1 OptoOut.SchDoc

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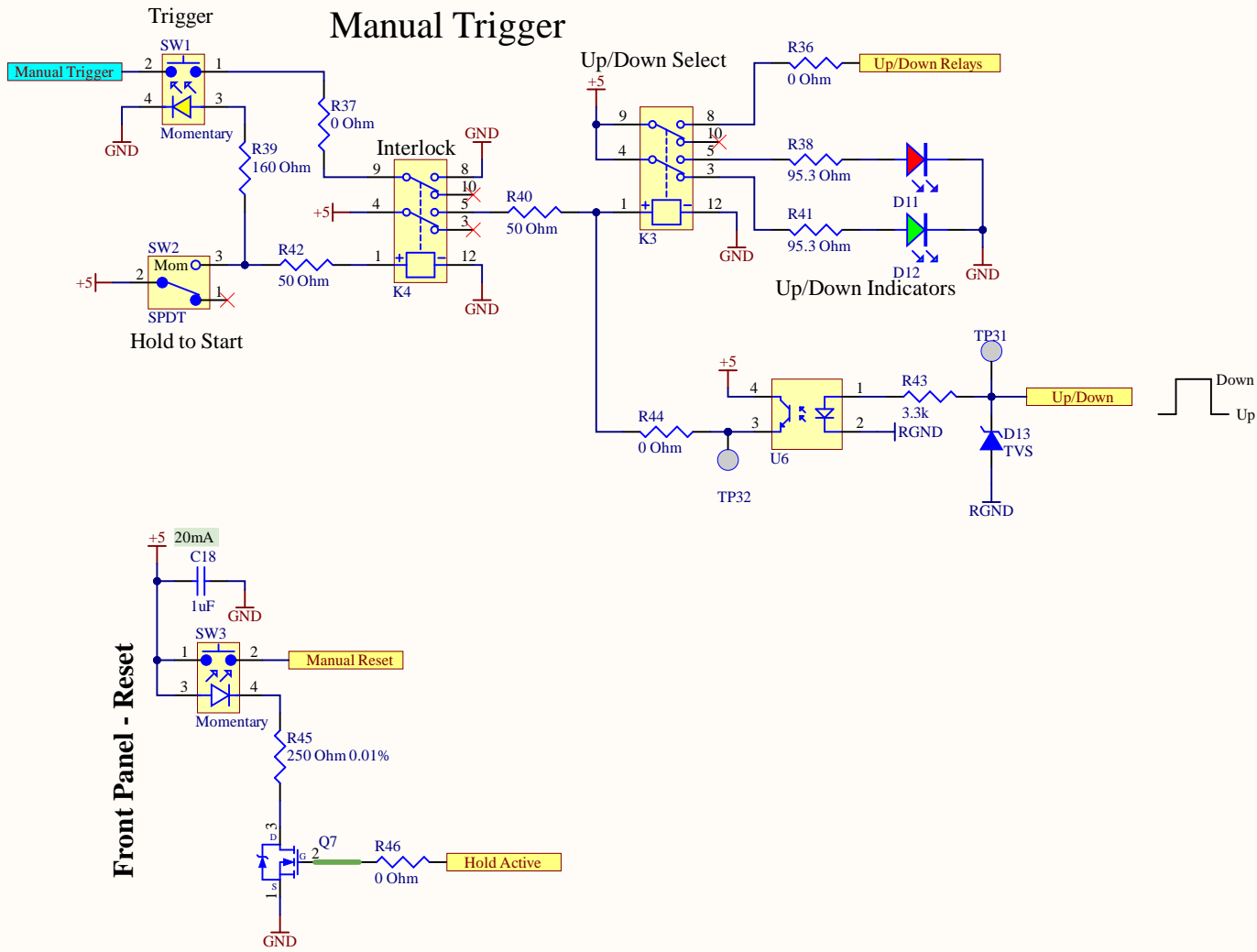


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Size: A	DCC Number: D1300780	Revision: v6	Engineer: Shao, R. Abbott	Date: 4/17/2024	Time: 8:13:38 AM
File: C:\Dean\Fast Shutter\D2400XXX-v1 HRUF Shutter Driver\D2400XXX-v1 HRUF Shutter Driver\D2400008-v1 OptoOut.SchDoc				Sheet 4 of 7	

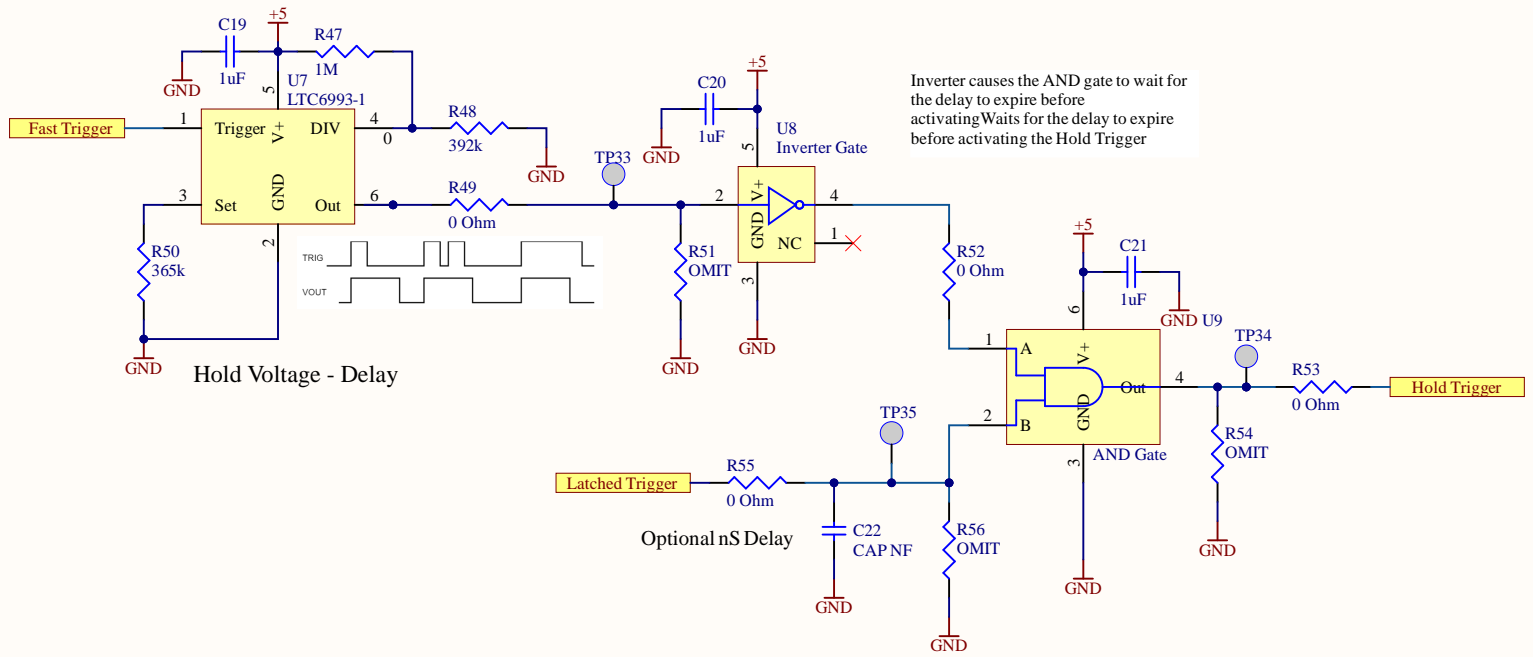




Last Edited: 2/16/2024

Title <b>Manual Operation</b>			LIGO CIT *	
Size: A	DCC Number: D2400008	Revision: v1	Engineer: D Schaetzl	Date: 4/17/2024
File: C:\Dean\Fast Shutter\D2400XXX-v1 HRUF Shutter Driver\D2400XXX-v1 HRUF Shutter Driver\D2400008-v1 Manual Activation.SchDoc				Time: 8:13:38 AM
				Sheet 5 of 7

LTC6993-1 is a Non-Retriggering One Shot. i.e. the rising edge trigger produces sets Vout for the delay time once regardless of the trigger.



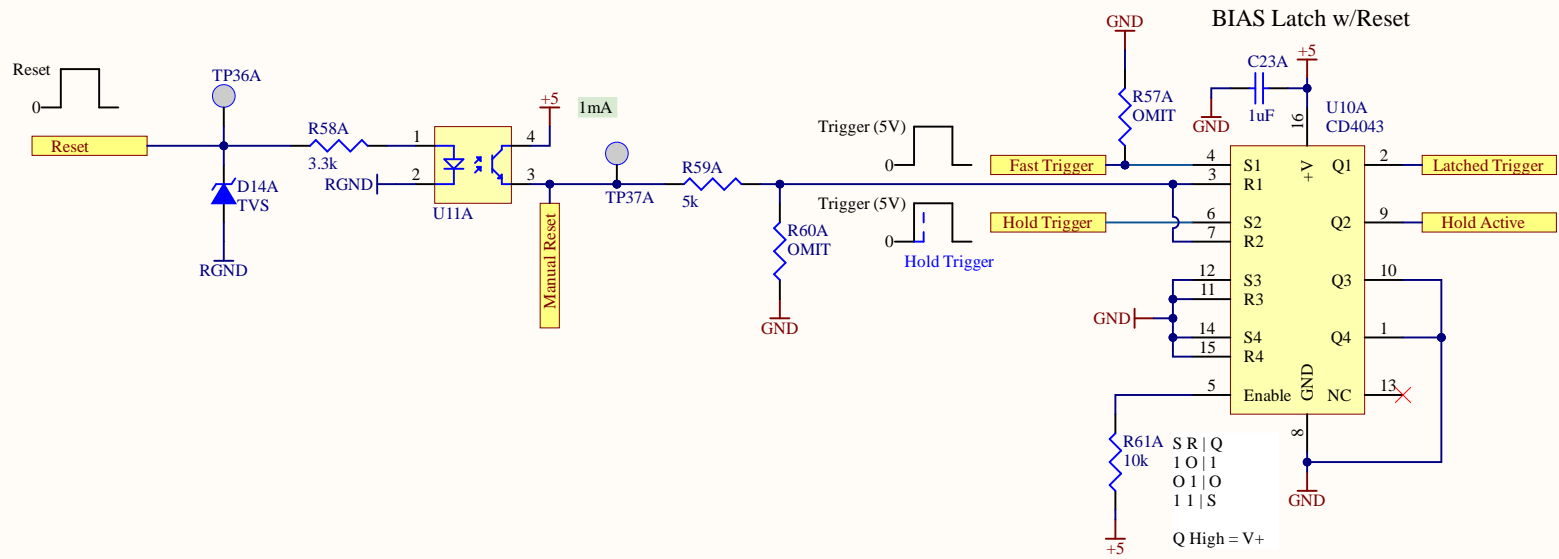
Inverter causes the AND gate to wait for the delay to expire before activating. Waits for the delay to expire before activating the Hold Trigger

Hold Voltage - Delay

Optional nS Delay

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Title <b>Hold</b>			LIGO CIT *	
Size: A	DCC Number: D2400008	Revision: v1	Engineer: D Schaetzl	Date: 4/17/2024
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				Sheet 6 of 7



Last Edited: 2/16/2024

Title

**Latch**

Caltech LIGO

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LIGO

Size: A

DCC Number: D2400008

Revision: v1

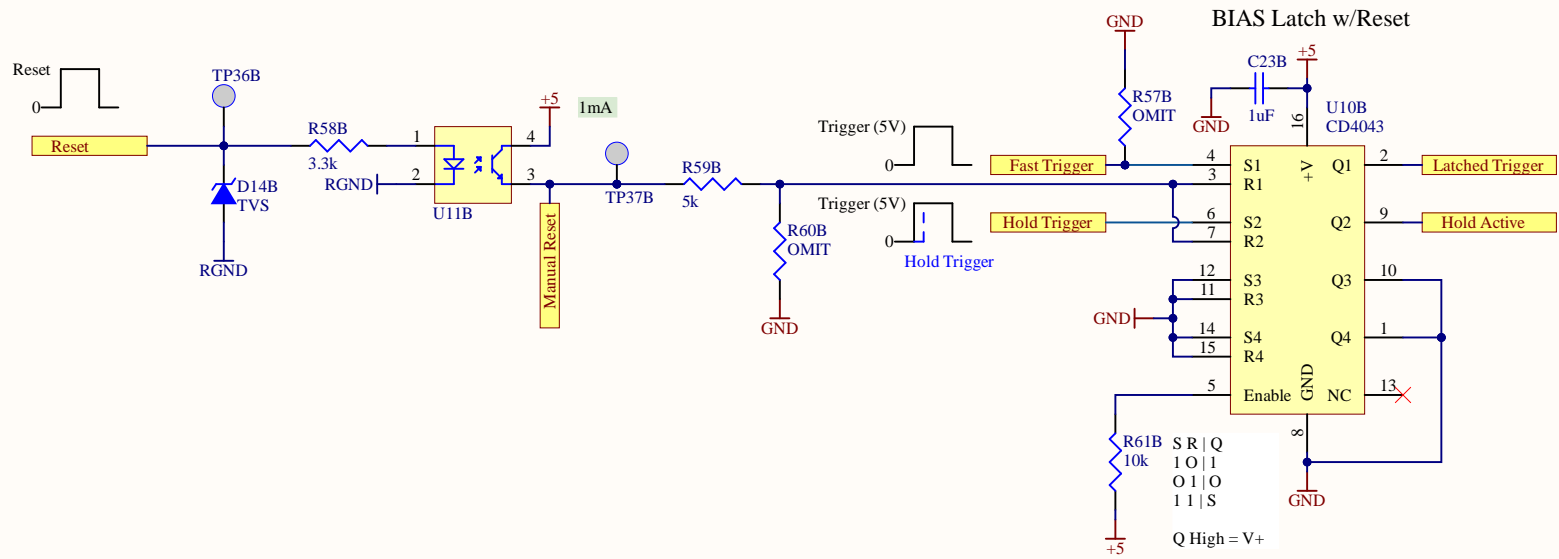
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Title

**Latch**

Caltech LIGO

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LIGO

Size: A

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