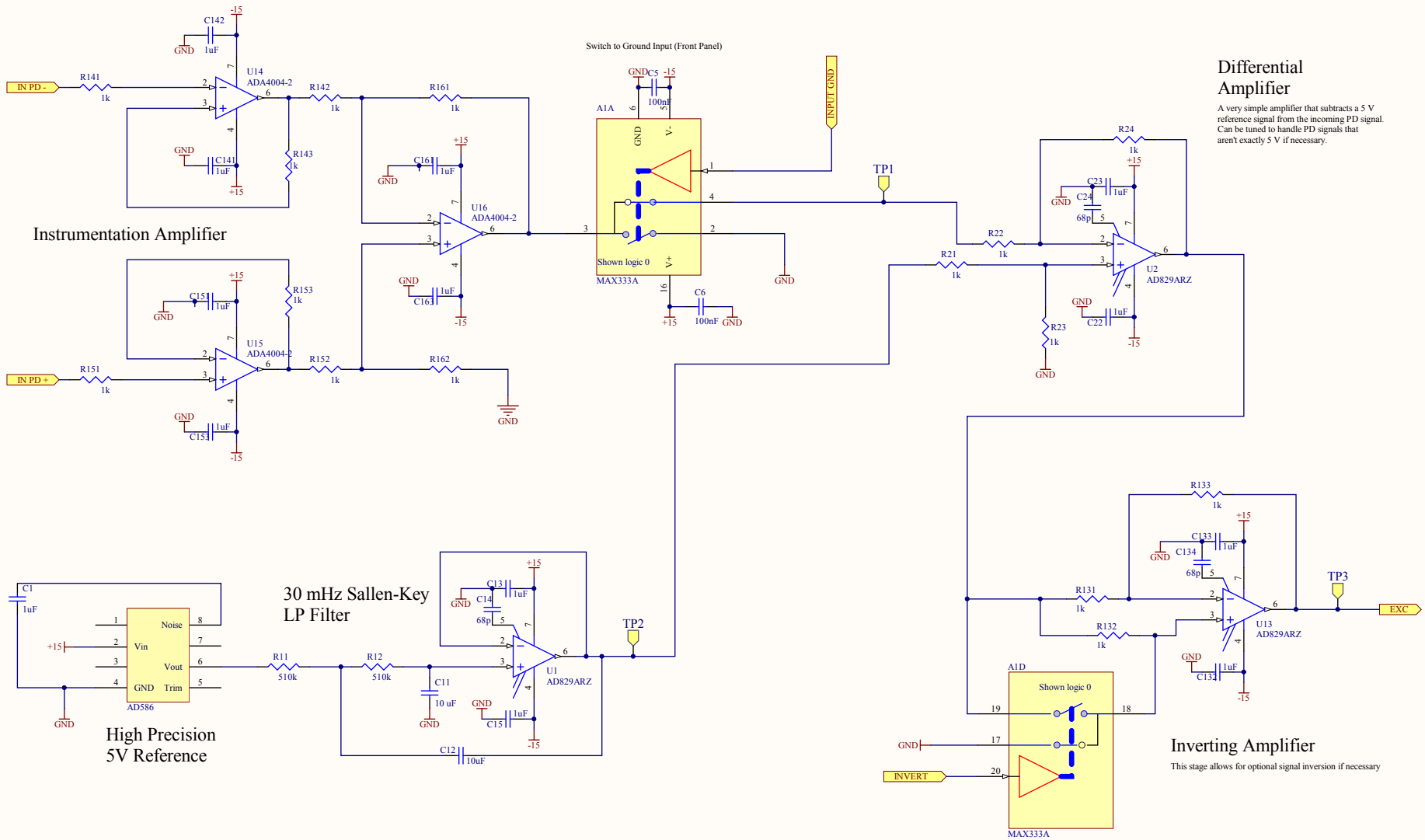


Title		Last Edited:	
<b>ISS - 40m Facility</b>		LIGO Laborator California Institute of Technology Massachusetts Institute of Technology	
Size: A	DCC Number: *	Revision: *	Engineer: Charles Blakemore
File: C:\Users\cit40m\Documents\ISS Schematics - Chas\40m\v1\40mServo_v1.SchDoc		Date: 7/24/2013	Time: 10:38:58 PM
		Sheet 1 of 5	



## Differential Amplifier

A very simple amplifier that subtracts a 5 V reference signal from the incoming PD signal. Can be tuned to handle PD signals that aren't exactly 5 V if necessary.

## Inverting Amplifier

This stage allows for optional signal inversion if necessary

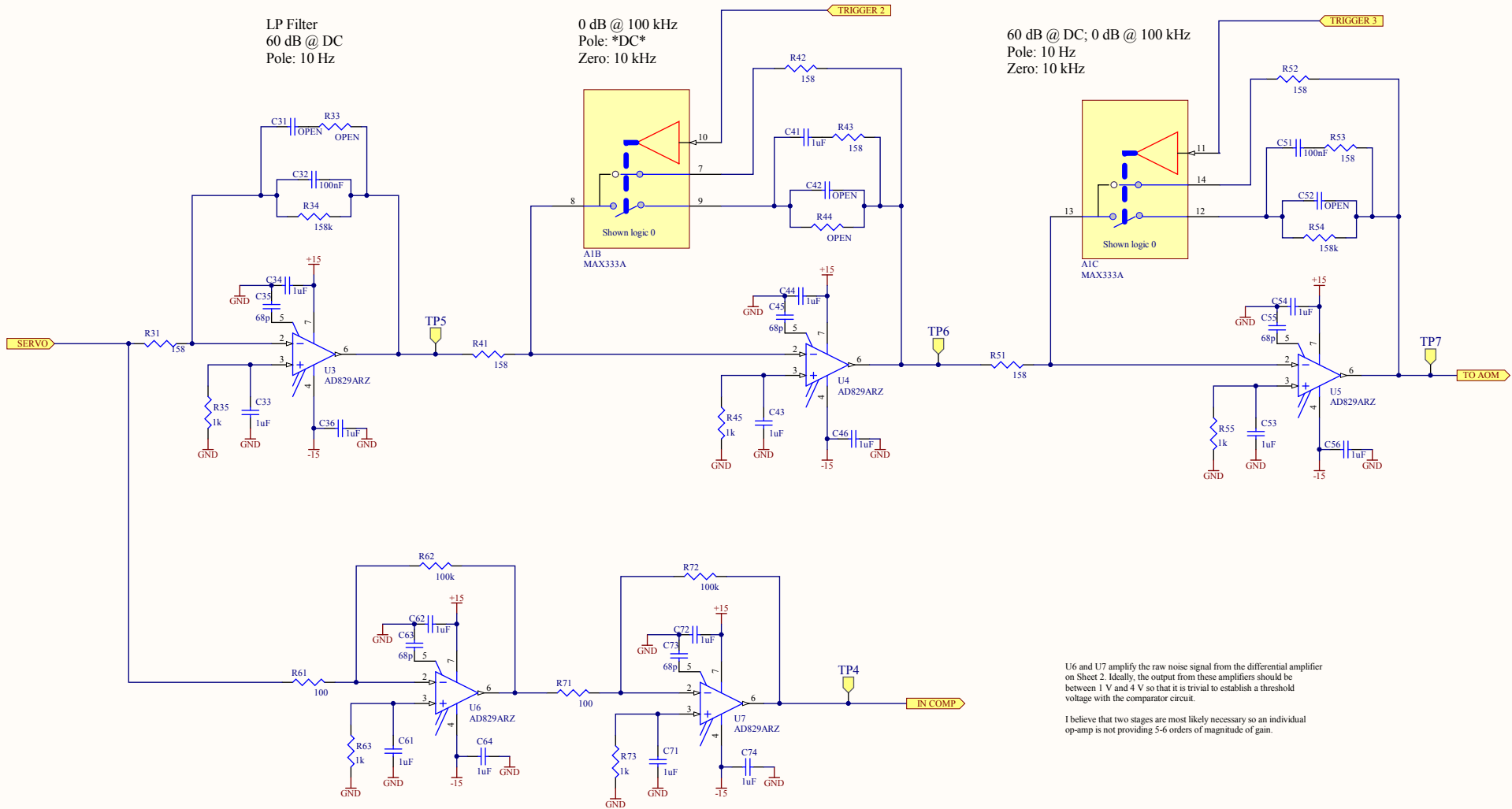
Title				LIGO Laboratory California Institute of Technology Massachusetts Institute of Technology		LIGO	
ISS: Pre-Servo				Revision: *		Date: 7/24/2013	
Size: B		DCC Number: *		Engineer: Charles Blakemore		Time: 10:38:58 PM	
File: C:\Users\cit40m\Documents\ISS Schematics - Chas\40m\1\40mServo v1-a-Pre-Servo.SchDoc				Sheet 2 of 5			

Last Edited:

LP Filter  
60 dB @ DC  
Pole: 10 Hz

0 dB @ 100 kHz  
Pole: \*DC\*  
Zero: 10 kHz

60 dB @ DC; 0 dB @ 100 kHz  
Pole: 10 Hz  
Zero: 10 kHz



U6 and U7 amplify the raw noise signal from the differential amplifier on Sheet 2. Ideally, the output from these amplifiers should be between 1 V and 4 V so that it is trivial to establish a threshold voltage with the comparator circuit.

I believe that two stages are most likely necessary so an individual op-amp is not providing 5-6 orders of magnitude of gain.

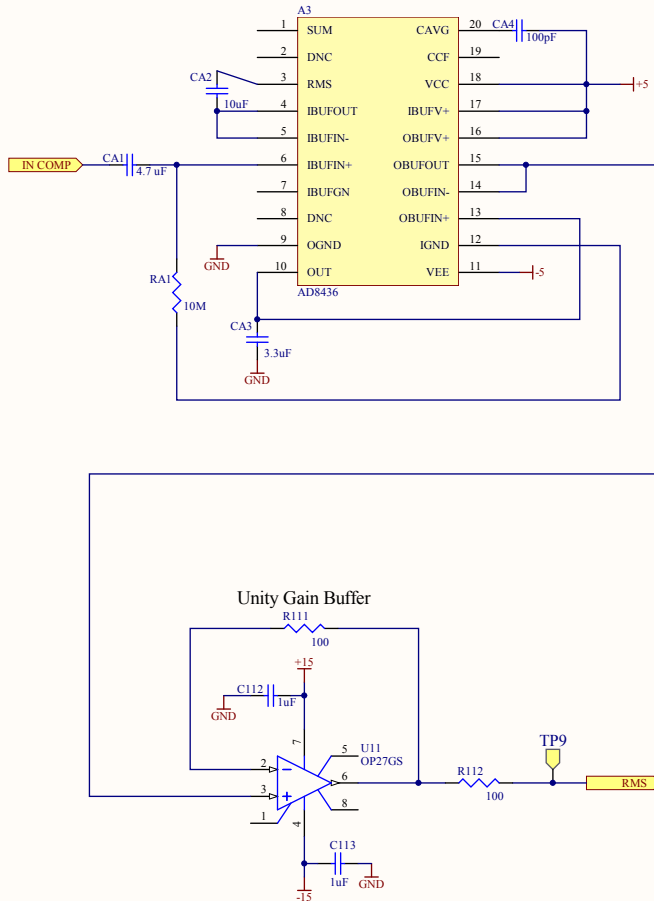
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Title <b>ISS: Servo</b>		LIGO Laboratory California Institute of Technology Massachusetts Institute of Technology		LIGO	
Size: B	DCC Number: *	Revision: *	Engineer: Charles Blakemore	Date: 7/24/2013	
File: C:\Users\cit40m\Documents\ISS Schematics - Chas40m\140mServo v14-Filter Stages SchDoc				Time: 10:38:58 PM	Sheet 3 of 5

# AD8436 RMS-to-DC Converter

Here, the AD8436 is connected according to the manufacturer recommendations. Pin connections on the AD8436 come directly from the manufacturer's datasheet. (www.analog.com/static/imported-files/data\_sheets/AD8436.pdf)

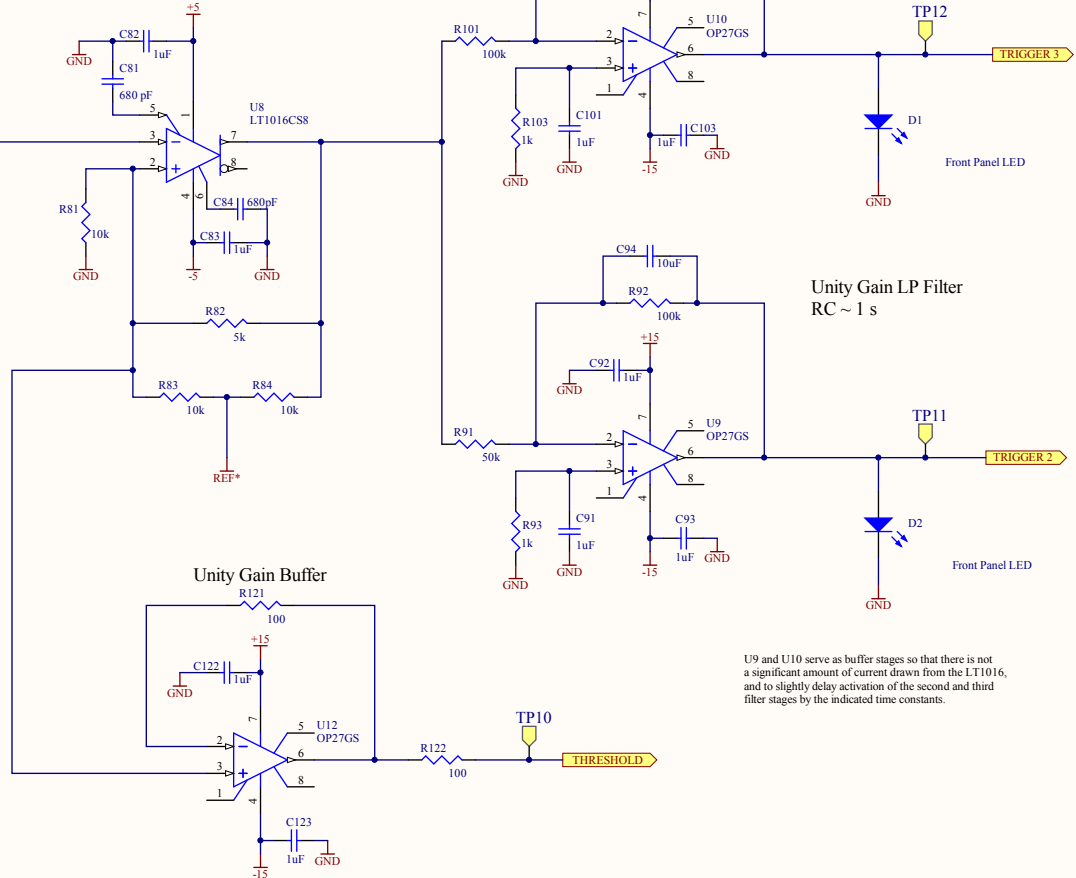
This is a very simple design to accomplish basic RMS-to-DC conversion and should work quite effectively for the type of inputs we're interested in.



The LT1016 and accompanying circuitry has two states. If the DC-voltage from the AD8436 is larger than the threshold established by the REF\* port and the voltage divider created by R83 and R81 then the LT1016's output is set at 0 V.

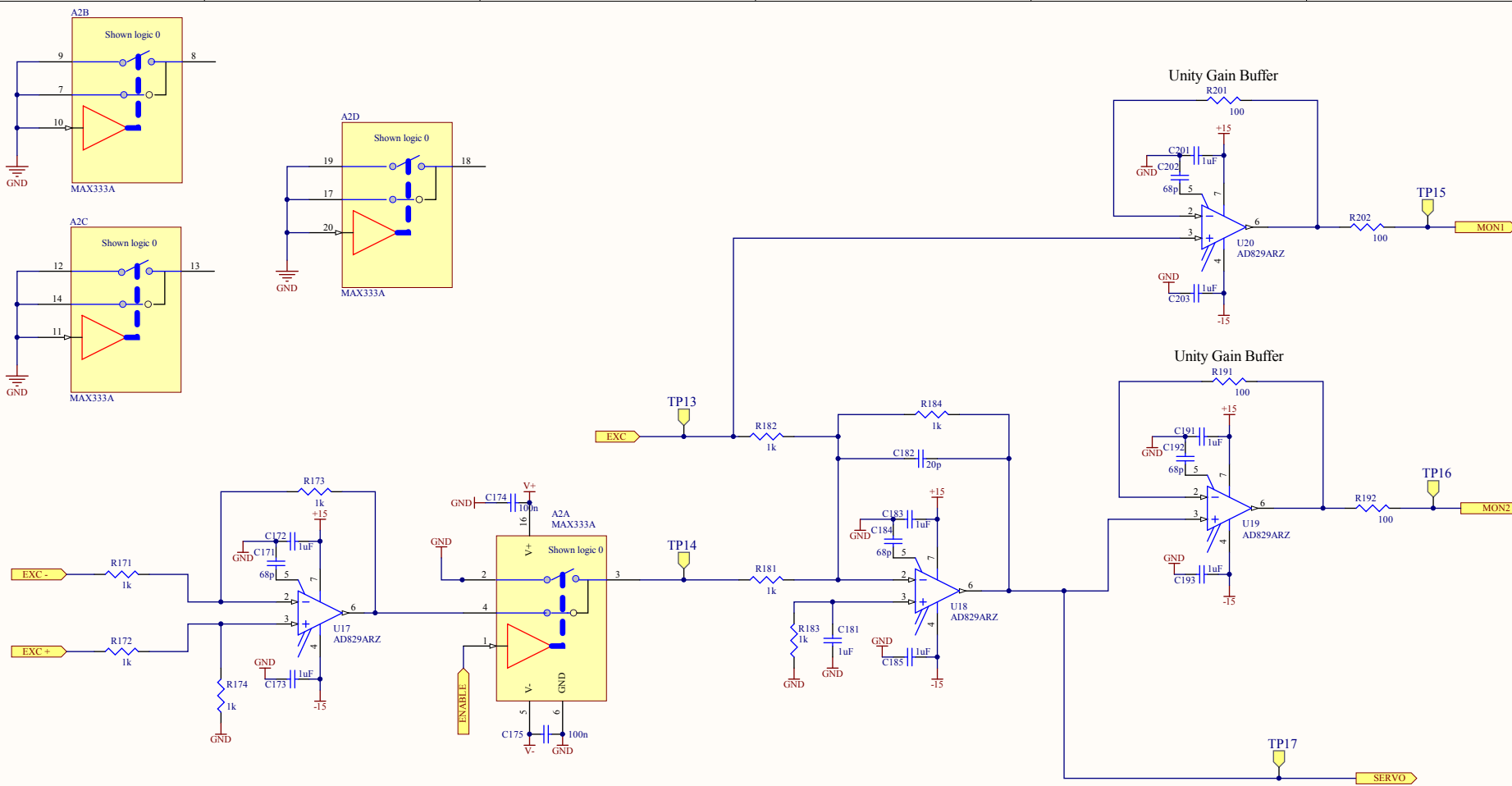
If the DC-voltage input is lower than the threshold, then the LT1016's output is 4.2 V (based on prototype build).

R82 also serves to establish hysteresis. The value can be changed to change the difference (in volts) between the upper and lower threshold voltages.



U9 and U10 serve as buffer stages so that there is not a significant amount of current drawn from the LT1016, and to slightly delay activation of the second and third filter stages by the indicated time constants.

Title				Last Edited:	
<b>ISS: Comparator + Triggering</b>				LIGO Laboratory California Institute of Technology Massachusetts Institute of Technology	
Size: B	DCC Number: *	Revision: *	Engineer: Charles Blakemore	Date: 7/24/2013	LIGO
File: C:\Users\cit40m\Documents\ISS Schematics - Chas40m\140m Servo v1-c-Comparator.SchDoc				Time: 10:38:58 PM	Sheet 4 of 5



Last Edited:

Title <b>ISS: Excitation</b>		LIGO Laboratory California Institute of Technology Massachusetts Institute of Technology		LIGO	
Size: B	DCC Number: *	Revision: *	Engineer: Charles Blakemore	Date: 7/24/2013	
File: C:\Users\cit40m\Documents\ISS Schematics - Chas40m\140m\Servo v1-4-Excitation.SchDoc				Time: 10:38:58 PM	Sheet 5 of 5