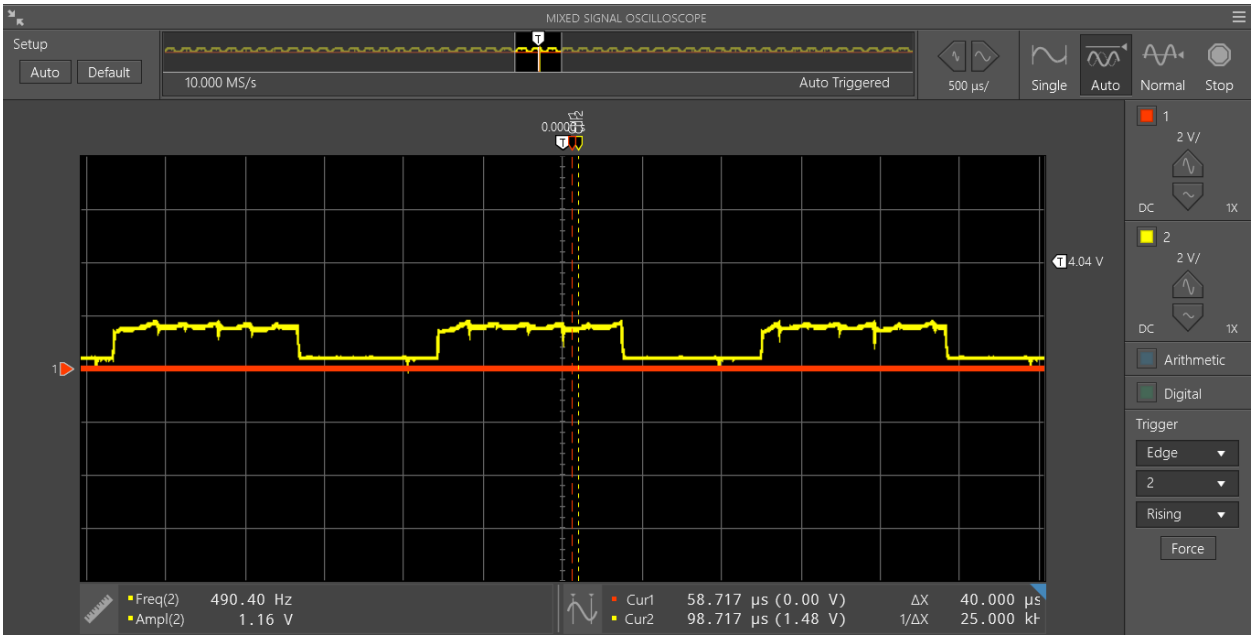
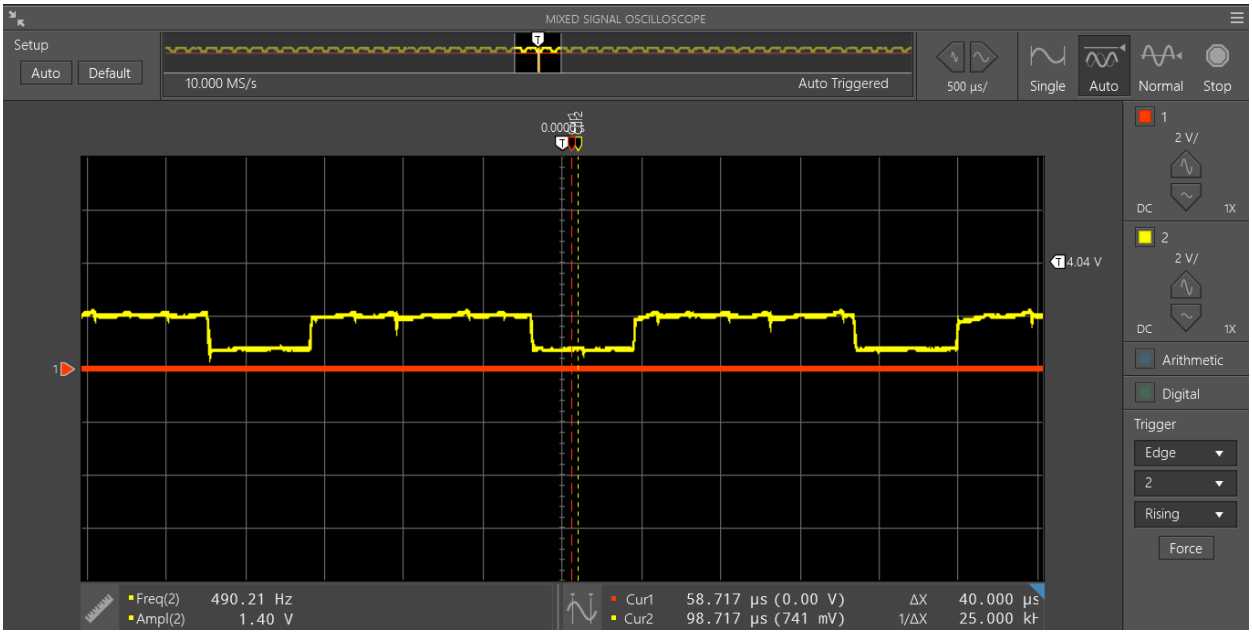
1. Adding the diode seemed to clear up a *tiny* amount of noise on the connection but of all the things we checked for the lab this made the smallest difference.

No diode:

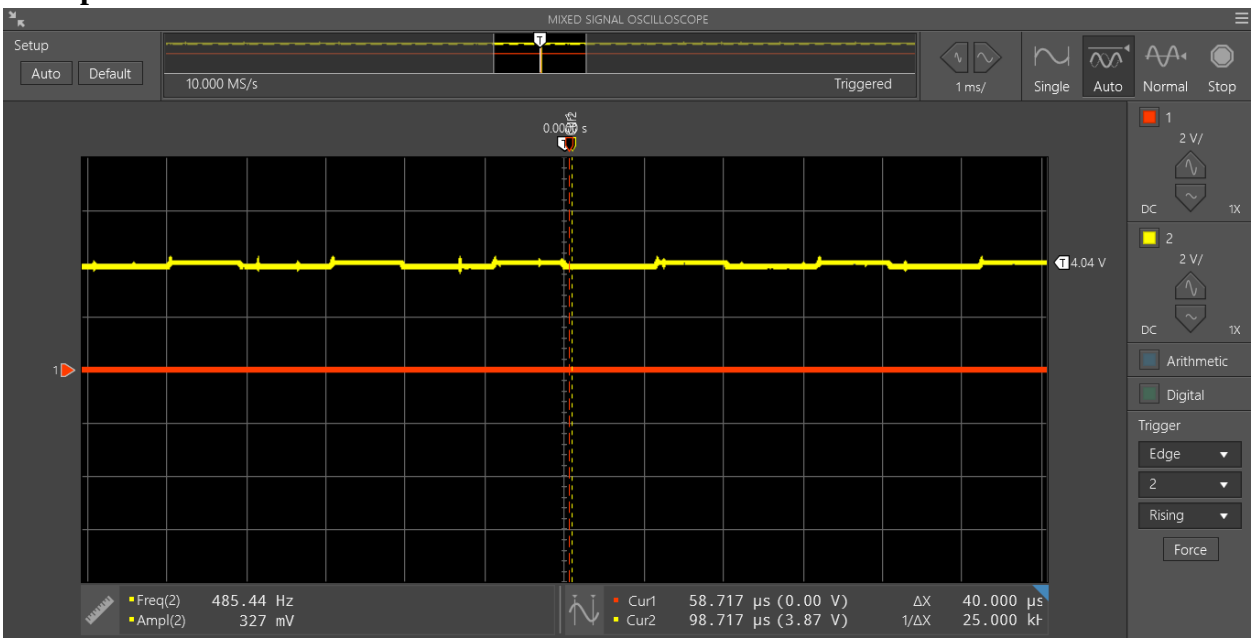


With diode:

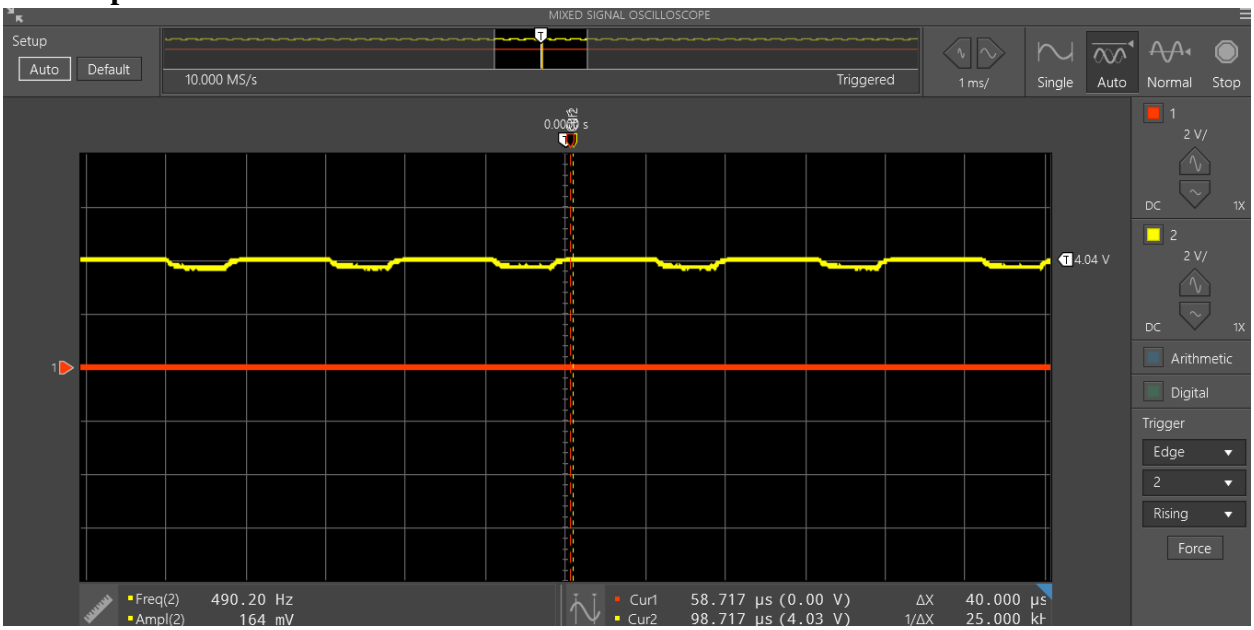


2. VCC seemed to have about the same voltage regardless of the decoupling capacitor (around 4V), but you can see that with the cap it's a bit of a smoother curve (and this was more pronounced when we cranked the motors all the way up).

No cap:

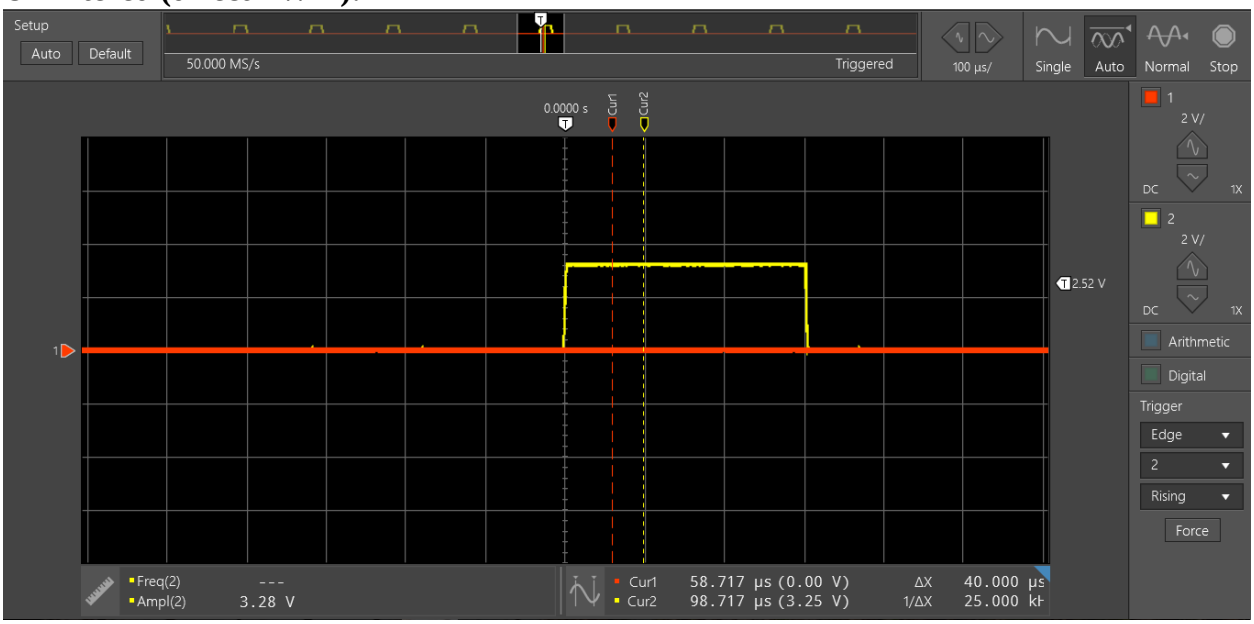


With cap:

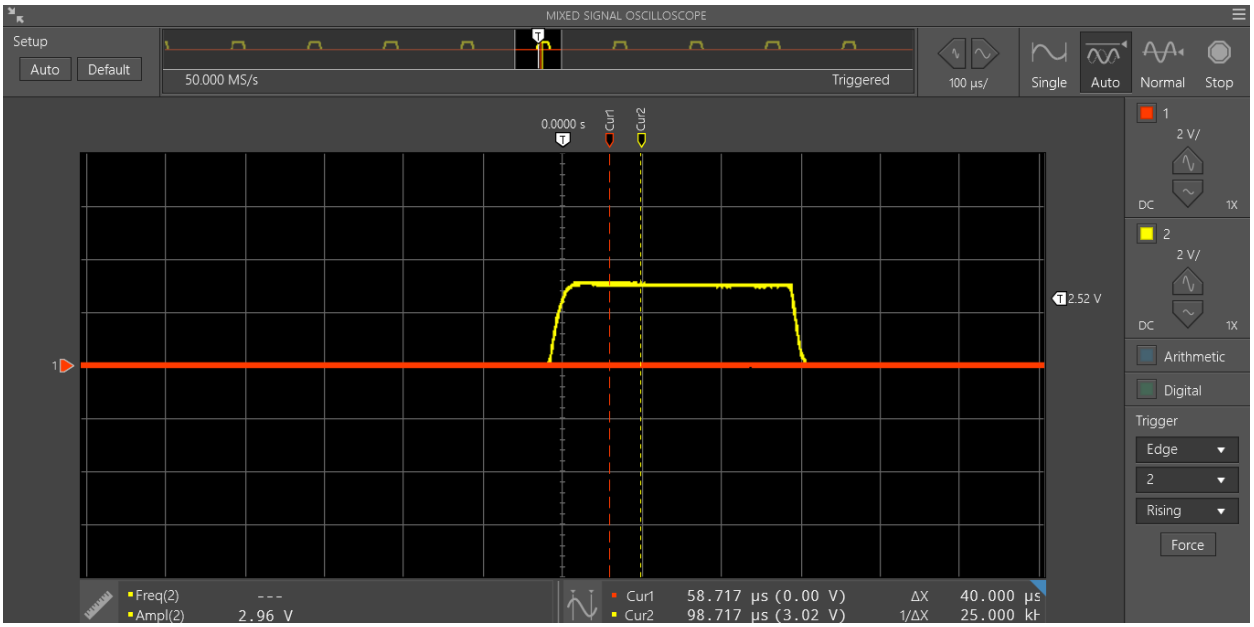


3. You can clearly see the work of the filter (cap/resistor) here. The direct PWM signal is a sharp digital curve whereas the filtered signal is curved on the rising edge and goes low more gradually as well.

Unfilitered (direct PWM):

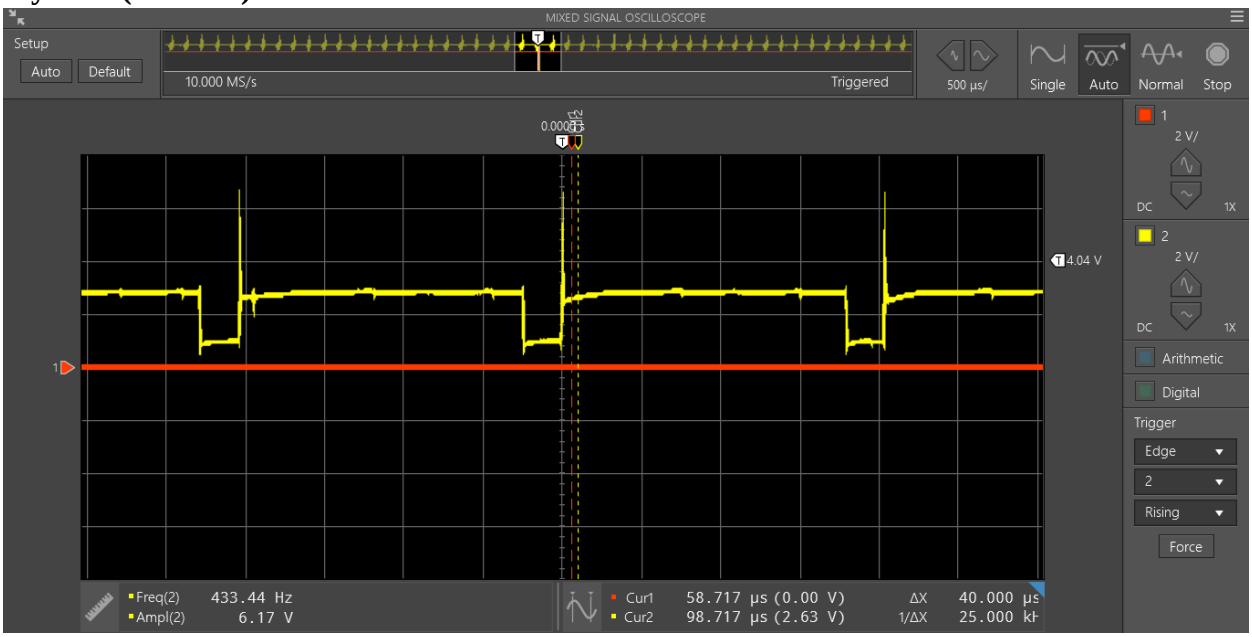


Filtered:



4. Without the filter the flyback has a huge voltage spike in it as you can see below. With the filter its completely gone.

Flyback (no filter):



Flyback (with filter):