

THE UNIVERSITY OF TEXAS AT ARLINGTON
COMPUTER SCIENCE AND ENGINEERING

LABORATORY 6 REPORT

ELECTRONICS LABORATORY

Submitted toward the partial completion of the requirements for CSE 3323-002

Submitted by,

Servando Olvera

1001909287

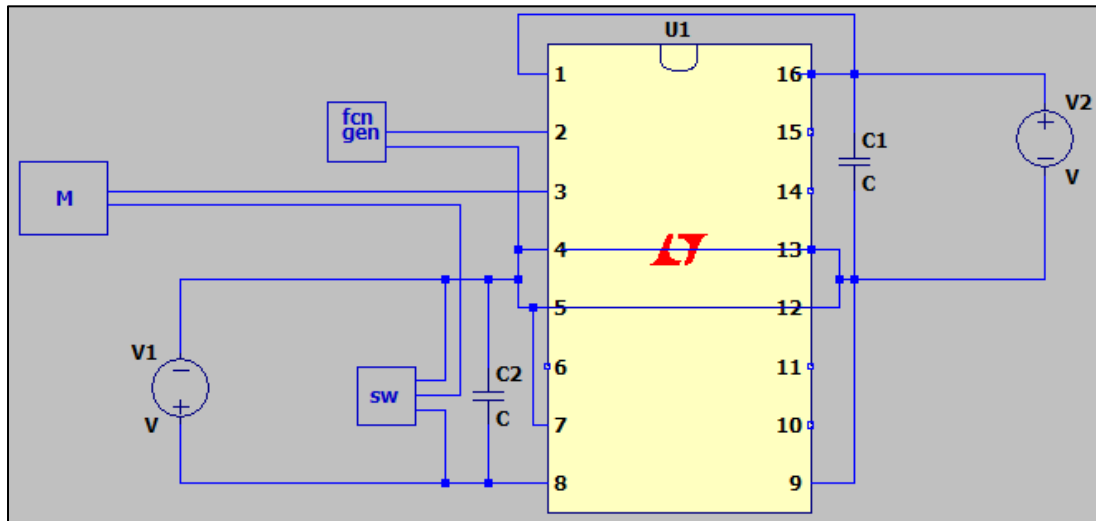
Date 11/07/2023

Lab 8: Speed Motor Control

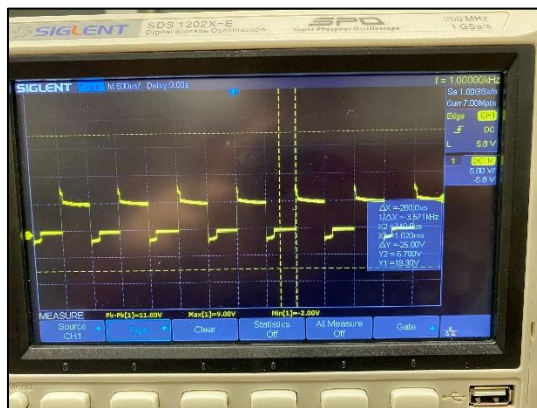
Part 1:

Set Up

Circuit Diagram:



Findings:



- Check output 1 (pin3) with the oscilloscope with duty cycle around 50% . What is output 1 voltage range with the motor running “forward”? When reversed? Explain how voltages can exceed +7 V or be less than 0 V.

Forward V = -2V to 13.6 V

Reversed V = -2V to 9 V

Voltage can exceed 7 or be lower than 0, because the voltage reference changes at some point in the circuit. From 7 to 5 the change is -2 volts and 7 plus 5 go up to

12 volts, thus providing the ranges for this circuit and motor. Additionally, the inductance within the circuit fluctuates and thus the output oscillates above 7 volts or below 0 volts.

- Relative to the function generator output, when do the output voltage excursions (>7 or <0) occur? - that is during transitions or the steady state high or low periods?

The output voltage excursions happen at the beginning of both steady states, the high and low.

- What duty cycle results in max speed in the “fwd” direction? When reversed?

Forward Max Speed @ 20%

Reversed Max speed @ 80%

Part 2:

Theory

Analysis:

Motors have complicated models, but all have inductance.

- Given the properties of an inductor, what would you expect to happen to the voltage between motor leads if the motor was open circuited while significant motor current was flowing?

Inductors oppose changes in current flow, and when the circuit is open-circuited, the inductor will try to maintain the current that was previously flowing through it. As a result, a voltage spike will occur across the motor leads.

- Given the above, can you explain the reason for the diodes in the block diagram of the driver?

The diodes shown in the diagram serve as protection. These diodes prevent damage to the motor and the circuit components when the motor is open-circuited and a spike in voltage occurs. Diodes will provide a safe path for the dissipation of the energy.