LAB REPORT

ENGINEERING LABORATORY

ENGR 1204, FALL 2022

Laboratory Exercise #7

Laboratory Name: Benchtop Pulse Width Modulation

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WENTWORTH
Institute of Technology

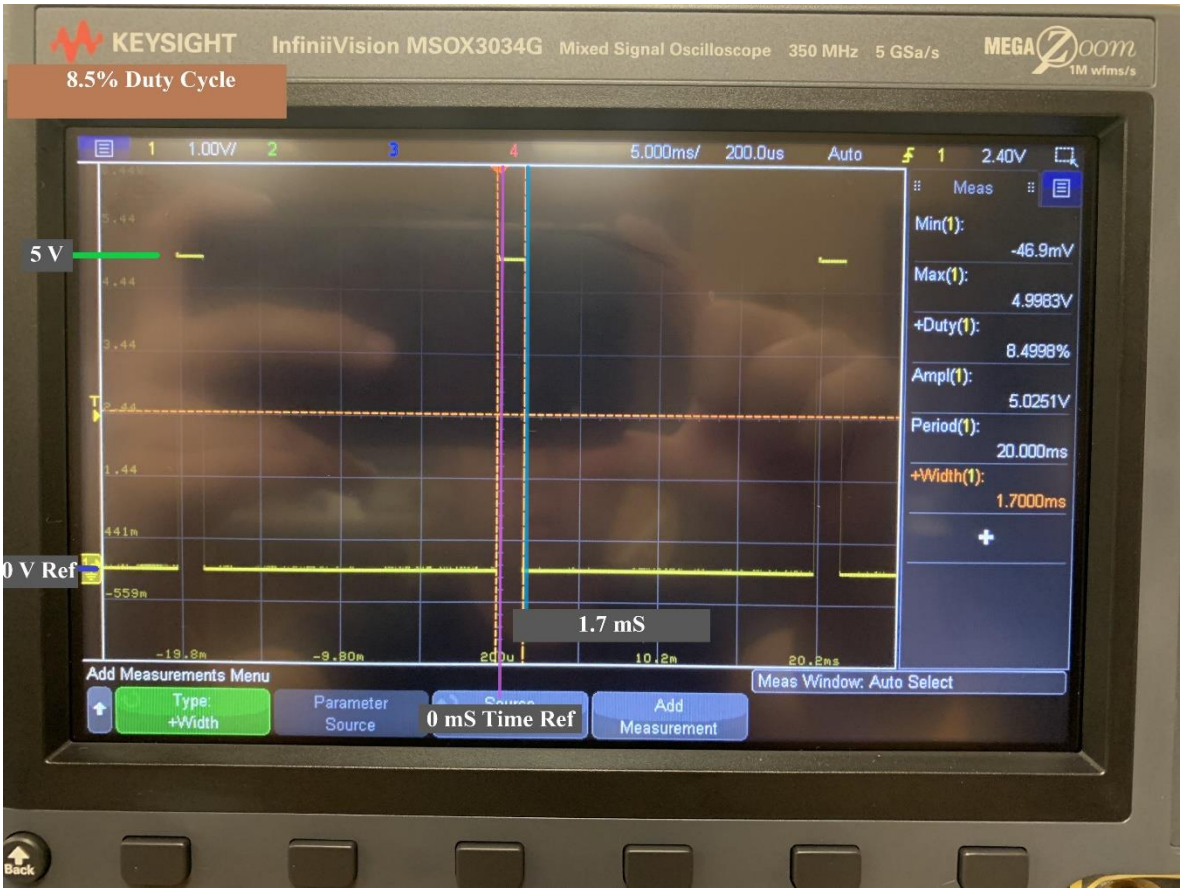
Objective: This lab tests a servo motor's rotation as different values of Pulse width and duty cycle percentage is inputted. Max and minimum rotation is recorded from both the clockwise and counterclockwise direction. Pulse width and data cycle is also recorded for values when the servo motor does not rotate. All duty cycle values inputted are within the servo motor's Pulse width range of 1.3 milliseconds to 1.7 milliseconds.

Procedure & Results: A servo motor's speed and direction of rotation is tested through various duty cycle percentages and pulse widths using a Waveform Generator and Oscilloscope.

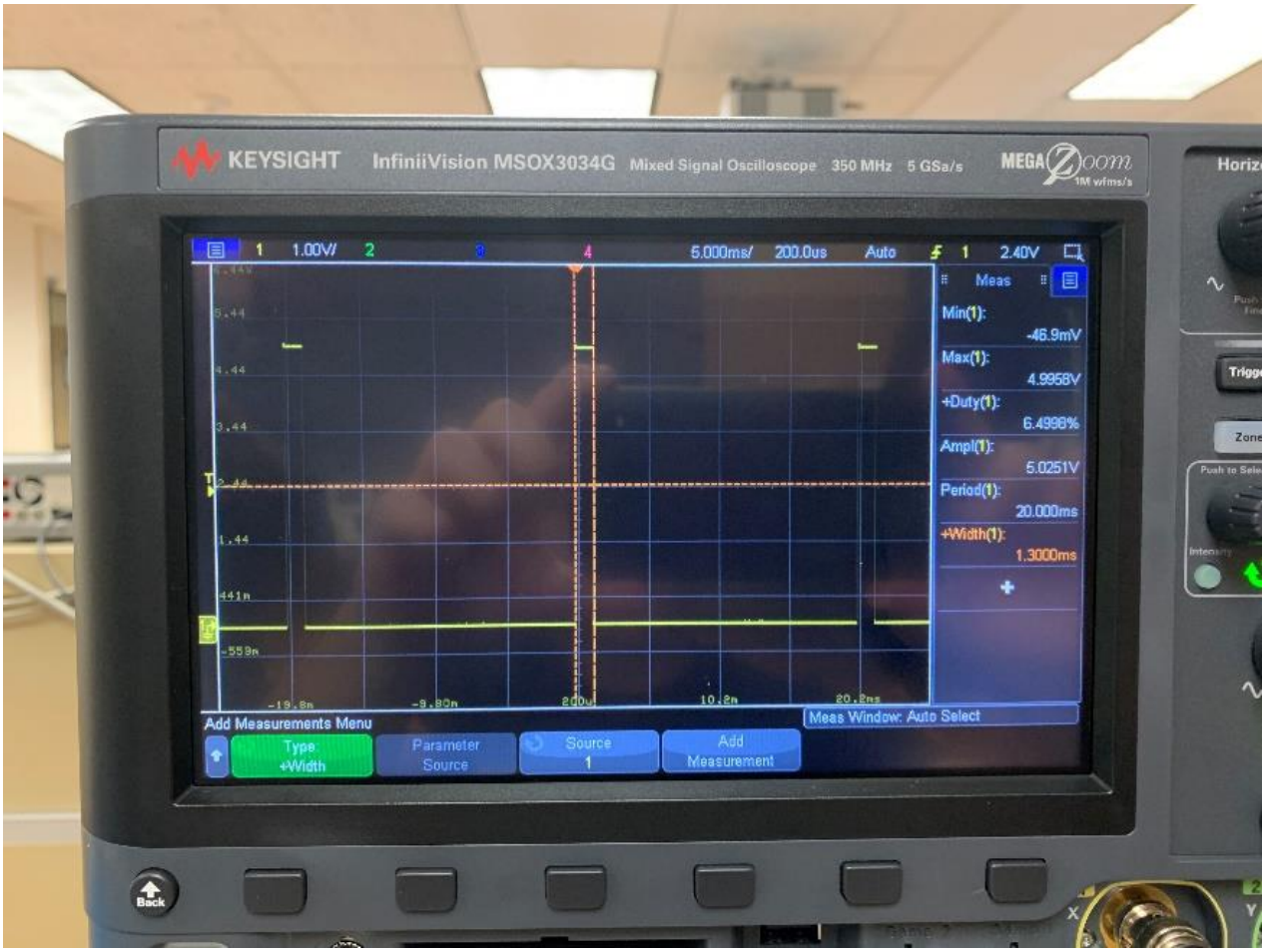
Motor Behavior	Duty Cycle (%)	PW (ms)
Max Clockwise Rotation	6.5%	1.3 ms
Slow Clockwise Rotation	7.4%	1.480 ms
Stopped (no rotation)	7.5%	1.5 ms
Slow Counterclockwise Rotation	7.6%	1.520 ms
Max Counterclockwise Rotation	8.5%	1.7 ms

The servo motor did not rotate at 7.5%; knowing this, values close to this percentage were inputted to get slow clockwise and counterclockwise rotation. A duty cycle of 7.4% was tested to get the slow clockwise rotation. 7.6% was inputted which resulted in the duty cycle for the slow counterclockwise rotation. Max clockwise rotation was just the minimum allowed duty cycle (6.5%) of the servo motor. The max counterclockwise rotation was the maximum allowed duty

cycle (8.5%) of the servo motor.




KEYSIGHT
InfiniiVision MSOX3034G
Mixed Signal Oscilloscope
350 MHz
5 GSa/s
1 1.00V/ 2 3 4 5.000ms/ 200.0us Auto 1 2.40V
Meas
Min(1):
-44.4mV
Max(1):
4.9983V
+Duty(1):
7.4998%
Ampl(1):
5.0251V
Period(1):
20.000ms
+Width(1):
1.5000ms
Add Measurements Menu
Meas Window: Auto Select
Type
+Width
Parameter
Source
Source
1
Add
Measurement



Summary: This lab successfully shows the different types of rotations of a servo motor using different pulse widths values within the servo motor's range. Initially, there was difficulty properly setting up the oscilloscope because the minimum and maximum voltage values of the square wave did not match the set-up instructions. It was later known that the noise of the oscilloscope machine was what made the signal less accurate. It was only when we applied a setting on the oscilloscope that helped to stabilize the minimum and maximum values.