

Massachusetts Institute of Technology  
Department of Mechanical Engineering

2.12 Introduction to Robotics  
*Laboratory No.1*

Section: \_\_\_\_\_, Date: \_\_\_\_\_

Students Name: \_\_\_\_\_ and \_\_\_\_\_

Read the reference guides.

Initial set up and wiring checked by the lab instructor.

**11.** Look at the PWM values on the Dashboard interface as you move the joystick horizontally and vertically.

- a. What PWM numbers (there are sixteen of them) on the dashboard do X and Y motion correspond to?
- b. What is the maximum value? Minimum? What is the value when the joystick is in the neutral setting? How many bits is the signal?
- c. What variables in the dashboard program do the buttons on the joystick correspond to? What lights are illuminated on the OI when the joystick buttons are pressed?
- d. As you move the joystick what lights are illuminated on the OI and under what circumstances?

**12.** Turn on the oscilloscope and observe the waveform. As you move the joystick, the duty cycle should vary.

- a. What is the frequency of the PWM signal?

- b. What is the maximum duty cycle? Minimum? What about at the neutral position? Is this what you expected? Any hypotheses why these are like this?
- c. What is the voltage the PWM signal operates at?
- d. What is the risetime? Falltime?

DC motor wiring checked by the lab instructor.

**15.** Using a multi-meter, look at the voltages that drive the motor.

- a. What is the voltage range as you vary the joystick position?
- b. Is this voltage linear with joystick position?
- c. Does this correspond to what you saw the PWM signal you saw earlier? Why or why not?

**16.** Comment on the switching between brake and coast modes. How long does the motor take to stop in the Brake mode? How long for the coast mode?

Digital inputs checked.

Radio link checked.

**Extra**

Program down load successfully performed.

What happens when you have 2 identical team numbers?

Other comments and observations