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**Pre-Lab #3**

**0.1)** Ports and pins to output to the motors in each part:

To drive the motor we will be using the following ports and pins on the: HBridge DRV8814, jumper stack J2 pins 1 and 2; DRV8811, jumper stack J2 pins 1 and 2; D53658, jumper stack J1 pin 1.

**0.**2**)** Initializations required:

Port Z pins 3,4,6,7,8 should be configured as outputs, and port V pin 5 as an input. The PORTS\_SetPortDirection() function will be used to do this. Also, the A/D converter must be initialized with AD\_Init(), the timer must be initialized with TIMERS\_Init(), the RC Servo must be initialized with RC\_Init(), the stepper motor will be initialized with Stepper\_Init(), and the PWM must be initialized with PWM\_Init();

**0.3)** ADC operating modes being used:

ADC\_MODULE\_ON Turn on ADC

ADC\_FORMAT\_INTG Output 16 bit unsigned int

ADC\_CLK\_AUTO Auto convert with internal counter

ADC\_AUTO\_SAMPLING\_ON Auto sample

ADC\_VREF\_AVDD\_AVSS Internal + and – voltage references configured

ADC\_SCAN\_ON ADC scan selection for CHO

ADC\_BUF\_16 16-bit word buffer

ADC\_SAMPLE\_TIME\_31 31 Tad auto sample time

ADC\_CONV\_CLK\_32Tcy A/D conversion clock select bit

ADC\_CONV\_CLK\_PB A/D conversion clock from PB clock

**0.4)** Device connections:

**Uno32 Connections**

|  |  |  |  |
| --- | --- | --- | --- |
| **UNO Port-Pin** | **Device** | **Device Port-Pin** | **Comments** |
| Z-03 | DRV8814 | J1-11 | Direction A |
| Z-04 | DRV8814 | J1-12 | Enable A |
| Z-07 | DRV8814 | J1-7 | Direction B |
| Z-08 | DRV8814 | J1-8 | Enable B |
| Z-03 | DRV8811 | J5-4 | Direction |
| Z-04 | DRV8811 | J5-5 | Enable |
| Z-06 | DRV8811 | J5-3 | PWM -> step |
| Z-06 | DS3658 | J2-9 | PWM -> Ch.A |
| V-05 | 50k pot | Middle Pin (Wiper) | (Input) |

**DRV8814 Connections**

|  |  |  |
| --- | --- | --- |
| **DRV8814 Port-Pin** | **Purpose** | **Comments** |
| J1 | Inputs | See Uno32 Connections |
| J2-1 | Motor power |  |
| J2-2 | Motor ground |  |
| J3-1 | Power (8 – 30V) |  |
| J3-2 | High current ground |  |
| J6-open | Brake | Decay Mode |
| J6-closed | Coast | Decay Mode |

**DRV8811 Connections**

|  |  |  |
| --- | --- | --- |
| **DRV8811 Port-Pin** | **Purpose** | **Comment** |
| J2-1 | Motor power |  |
| J2-2 | Motor ground |  |
| J5 | Inputs | See Uno32 Connections |
| J4|J3-00 | Full-Step | Coils Energized (2) |
| J4|J3-01 | Half-Step | Coils Energized (1-2) |
| J4|J3-01 | Quarter-Step | Coils Energized |
| J4|J3-11 | Eighth-Step | Coils Energized |

**DS3658 Connections**

|  |  |  |
| --- | --- | --- |
| **DS3658 Port-Pin** | **Purpose** | **Comment** |
| J2 | Inputs | See Uno32 Connections |
| J1-1 | Motor power |  |
| J1-2 | Motor ground |  |
| J4-1 | +12V Supply |  |
| J4-2 | Ground |  |
| J3-open | Diodes unconnected | Kickback Diodes |
| J3-closed | Diodes to VCC | Kickback Diodes |

**0.5)** Ribbon connector and the ports we will use are listed below:

**Uno32 Port Z**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 3 | 5 | 7 | 9 | 11 | 13 |
|  | DirA/Dir |  | DirB |  |  |  |
|  | EnA/En | PWM-> Step/Ch.A | EnB |  |  |  |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 |

**DS3658**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 3 | 5 | 7 | 9 | 11 | 13 |
|  |  |  |  | Ch. A |  |  |
|  |  |  |  |  |  |  |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 |
|  |  |  | **DRV8814** |  |  |  |
| 1 | 3 | 5 | 7 | 9 | 11 | 13 |
|  |  |  | DirB |  | DirA |  |
|  |  |  | EnB |  | EnA |  |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 |
|  |  |  | **DRV8811** |  |  |  |
| 1 | 3 | 5 | 7 | 9 | 11 | 13 |
|  | Step | En |  |  |  |  |
|  | Dir |  |  |  |  |  |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 |

**0.6)** PWM state diagram and an expected plot of its output at 10 kHz:



