Experiment no: 09

Name of the experiment: DC motor speed control using PWM and PIC microcontroller.

Objective(s):

1. To know about the PWM and functionality of PIC microcontroller.
2. To learn about PIC microcontroller.

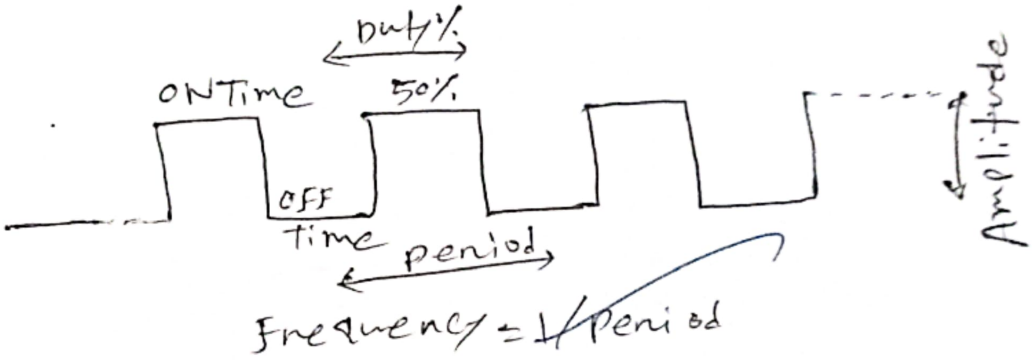
Theory: PWM stand for pulse width modulation. A modulation technique that generates variable width pulses to represent the amplitude of an analog input signal. To understand PWM as a type of signal which can be produced from a digital IC such as microcontroller or 555 timer. For the ease of understanding let us consider a 5v PWM signal, in this case the PWM signal will either be 5v(high) or at ground level 0v(low). The duration at which the signal stays high is called the "on time" and the duration at which the signal stays low is called as the "off time".

Duty cycle of the PWM: A PWM signal stays on for a particular time and then stays off for the rest of the period. The percentage of time in which

the PWM signal remains HIGH is called as duty cycle.

Duty cycle = Turn ON time / (Turn ON time + Turn OFF time)

The following image represents a PWM signal with 50% duty cycle. Considering an entire time period (on time + off time) the PWM signal stays on only for 50% of the time period.



Frequency of a PWM:

The frequency of a PWM signal determines how fast a PWM completes one period..

Frequency = 1/Time Period

Time period = on time + off time

Normally the PWM signals generated by microcontroller will be around 500Hz, such high frequencies will be used in high speed switching devices like inverters or converters.

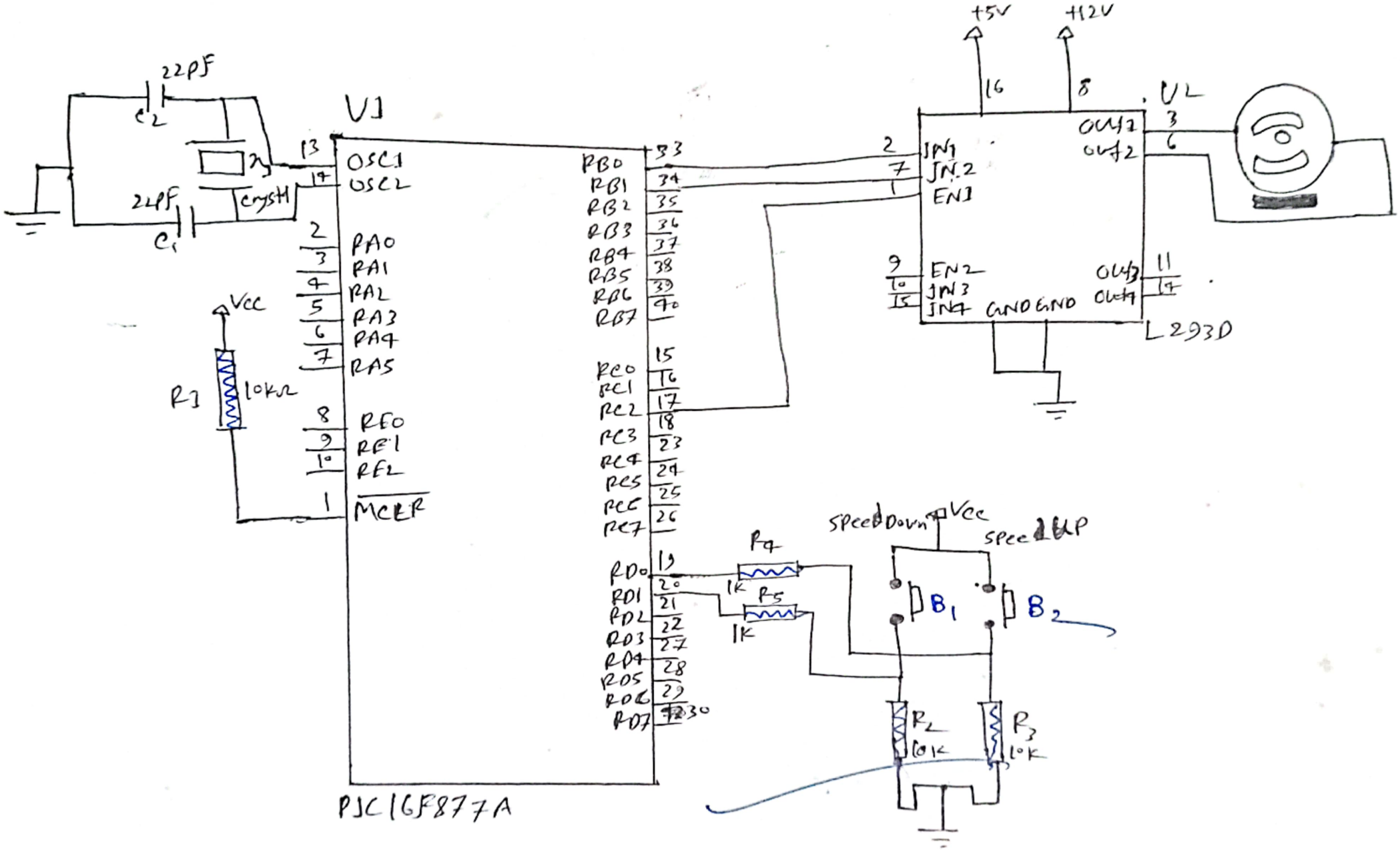


Fig: DC Motor speed control using PWM

source code:

```
void main()
{
short duty = 0;
TRISD = 0XFF;
TRISB = 0X00;
PORTB.F0 = 0XFF;
PORTB.F1 = 0X00;
PWM1_init (1000);
PWM1_start();
PWM1_set_Duty(duty);
while(1)
{
if (RD0_bit && duty<250)
{
Delay_ms(100);
if (RD0_bit && duty < 250)
{
duty = duty+10;
PWM1_set_Duty(duty);
}
}
if (RD1_bit && duty>0)
{
duty = duty-10;
PWM1_set_Duty(duty);
}
}
Delay_ms(10);
}
}
```