

'-----Title-----

```
' File.....pwm1.pbp
' Started....4/25/06
' Microcontroller used: Microchip Technology 16F88
'                         microchip.com
' PicBasic Pro Code: micro-Engineering Labs, Inc.
'                      melabs.com
```

'-----Program Description-----

```
' pwm1.pbp drives a dc motor at different speeds
```

'-----Related Lesson-----

```
' pwm1.pbp is used in the lesson MOTOR CONTROL WITH PWM at:
' http://www.cornerstonerobotics.org/curriculum/lessons_year2/erii21_motor_control_pwm.pdf
```

'-----Comments-----

```
' Rather than reducing the voltage to a motor through
' a potentiometer for example, PWM cuts the time a
' motor receives voltage by turning pulses on and off
' very quickly. This pulse can feed a transistor switch
' which then drives the motor at different speeds.
```

'-----New PicBasic Pro Commands----

```
' The PicBasic Pro Compiler Manual is on line at:
' http://www.microengineeringlabs.com/resources/index.htm#Manuals
```

```
' PWM Pin, Duty, Cycle
```

```
' Pin is the output pin for the pulse.
' Duty adjusts the amount of time the pulse is on and off.
' Duty ranges from 0 (0% on time and 100% off time)
' to 255 (100% on time and 0% off time).
' Look around page 122 in the PicBasic Pro Compiler Manual
' The Jameco motors that we tested would not turn with
' duty values less than 140 (a 55% duty cycle). See the
' Jameco gear head motor charts listed in the table.
' Cycle is the number of cycles the pulse is sent.
```

'-----Revision History-----

```
' 11/25/07 Change MCU from 16F84A to 16F88
' 11/25/08 Convert from PIC16F84A to PIC16F88,
' add PIC16F88 oscillator and ANSEL = 0 initializations.
```

'-----Initialization-----

```
ANSEL = 0          ' Configure all pins to digital
                  ' operation since not using ADC
                  ' (Analog to Digital Converter)
```

```
OSCCON = $60           ' Sets the internal oscillator in the
                       ' 16F88 to 4 MHz

'-----Main Code-----

start:

PWM 0,255,200      ' Pulse sent to PORTB.0 at a duty
                      ' value of 255(100% duty cycle) for
                      ' 200 cycles. At 4MHz, each cycle
                      ' is about 5 ms long, so the total
                      ' time for 200 cycles is:
                      ' Total Time = 200*5 ms = 1000 ms or 1 sec.

PWM 0,190,200      ' Pulse sent to PORTB.0 at a duty
                      ' value of 190(75% duty cycle) for
                      ' 200 cycles. Motor rotational speed
                      ' approximately 50% of maximum rpm
                      ' for the Jameco motors used.

PWM 0,140,200      ' Pulse sent to PORTB.0 at a duty
                      ' value of 140(55% duty cycle) for
                      ' 200 cycles. Motor rotational speed
                      ' approximately 20-24% of maximum rpm
                      ' for the Jameco motors used.

GOTO start          ' Jump to start label

END
```