

```
'-----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)
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```
OSCCON = $60      ' Sets the internal oscillator in the  
                  ' 16F88 to 4 MHz
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'-----Main Code-----'
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loop:
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```
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 loop        ' Jump to loop label and start all over
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END
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