```
'---------------Title--------------

' File......serin2_pwm.pbp
' Started....12/23/08
' Microcontroller used:  Microchip Technology PIC16F88
'                        microchip.com
' PicBasic Pro Code: micro-Engineering Labs, Inc.
'                    melabs.com

'--------Program Desciption--------

' Program uses SERIN2 command to receive command from
' the PC to control the rotational speed of a motor.

' ----Terminal Program Options-----

' HyperTerminal - 9600 baud 8N1, Flow control = None
'
' To download TeraTerm Pro 3.1.3, see:
' http://www.ayera.com/teraterm/download.cfm
' and download TeraTerm Pro Web 3.1.3.
' The terminal program must be the active window for this
' program to work.

'----------Related Sites----------

' See: http://www.melabs.com/resources/samples/pbp/ser2mod.bas

'-----------Connections-----------

' 16F88 Pin     Function      Name Given      Wiring
'                             In Program
' ---------  ------------     ----------    ----------
'
'    RB4                      PWMout      1K Resistor to Base
'                                         of 2N2222A transistor
'    RB2     Receiver Pin     PICSI       MAX232 Pin 9
'    RB5     Transmit Pin     PICSO       MAX232 Pin 10
'
' See the schematic for the PIC power and MCLR connections


' MAX232 Pin  Datasheet          Function and Wiring
'             Designation
' ---------   ---------   ------------------------------------
'
'  Pin 7      T2OUT      Receive Data to Male RS232 DB9 Pin 2
'  Pin 8      R2IN       Transmit Data from Male RS232 DB9 Pin 3
'  Pin 9      R2OUT      Receive Data to PIC RB2
'  Pin 10     T2IN       Transmit Data from PIC RB5
'
' See schematic at:
' http://cornerstonerobotics.org/schematics/pic_programming_serin2_pwm.pdf

'------------Revisions------------
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' 9/21/10 Initiatize RB5 to HIGH

'---------Constants/Defines-------

    DEFINE OSC       8       ' Defines oscillator setting at 8 MHz.
                             ' For SEROUT2, an oscillator speed faster
                             ' than 4MHZ may be required for reliable
                             ' operation at 9600 baud and above.

'------------Variables------------

     InputData   VAR   BYTE      ' Variable to receive input data
     PulseWidth  VAR   BYTE      ' Variable for pulse width
     MODE        VAR   WORD      ' WORD for MODE value
     PICSI       VAR   PORTB.2   ' Names PORTB.2 name as PICSI
     PICSO       VAR   PORTB.5   ' Names PORTB.5 name as PICSO
     PWMout      VAR   PORTB.4   ' Names PORTB.4 as PWMout

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

     ANSEL = 0               ' Changes analog bits to digital.
                             ' See table below.

'    Analog Bit    Analog or Digital      PIC16F88 Pin
'   ------------  ------------------     --------------
'       AN0            Digital                RA0
'       AN1            Digital                RA1
'       AN2            Digital                RA2
'       AN3            Digital                RA3
'       AN4            Digital                RA4
'       AN5            Digital                RB6
'       AN6            Digital                RB7


    OSCCON = $70             ' Sets the internal oscillator in the
                             ' 16F88 to 8 MHz

    TRISB = %11101111        ' Sets RB4 to output

    PORTB = %00100000        ' Sets PIC transmit pin RB5 to HIGH

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

    MODE = 84               ' Set RX/TX speed to 84 for 9600 baud
                            ' MODE = 188 (4800 baud)
                            ' MODE = 396 (2400 baud)
                            ' See appendix in manual for other
                            ' MODE examples.

    PulseWidth = 255        ' Set initial value for PulseWidth

' Instructions sent to terminal program

    SEROUT2 PICSO, MODE, ["        Instructions:",10,13]
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    SEROUT2 PICSO, MODE, [" ",10,13]
    SEROUT2 PICSO, MODE, ["After the bell tone from the computer speaker,",
10,13]
    SEROUT2 PICSO, MODE, ["you have 2 seconds to type in any number
between",10,13]
    SEROUT2 PICSO, MODE, ["0 and 255. Then hit the enter key.",10,13]
    SEROUT2 PICSO, MODE, ["Or, after the bell tone, you have 2 seconds to",
10,13]
    SEROUT2 PICSO, MODE, ["type in any letter, then a number between",10,
13]
    SEROUT2 PICSO, MODE, ["0 and 255, then another letter.  The",10,13]
    SEROUT2 PICSO, MODE, ["non-digits before and after the number",10,13]
    SEROUT2 PICSO, MODE, ["are ignored and the number is assigned to",10,
13]
    SEROUT2 PICSO, MODE, ["the variable InputData",10,13]

loop:

     SERIN2 PICSI, MODE, 2000, nodata, [DEC InputData]
                           ' SERIN2 uses a timeout and a label.
                           ' If we get no input data within 2000 ms,
                           ' we jump to nodata, and use the last
                           ' value we had for PulseWidth.
                           ' Format:SERIN2 Pin,Mode,TimeOut,Label,[Item1]
                           ' Pin = PICSI,(RB2), Declared in variables
                           ' Mode = 84 (9600 baud rate)
                           ' TimeOut = 2000 ms
                           ' Label = nodata
                           ' [Item1] = [DEC inputData]
                           ' The Jameco gearhead motors that we tested
                           ' would not turn with PWM Duty values
                           ' less than 170 (a 67% duty cycle).

     SEROUT2 PICSO, MODE, [DEC InputData,10,13]
                           ' Format:  SEROUT2 Pin, Mode, [Item1]
                           ' Pin = PICSO,(RB5), Declared in Variables
                           ' Mode = 84 (9600 baud rate)
                           ' [Item1] = [DEC InputData, 10, 13]
                           ' Transmits Value of InputData, 10
                           ' (the ASCII codes for line feed),
                           ' and 13 (the ASCII code for carriage return)
                           ' to the PC.

     PulseWidth = InputData
                           ' Set pulseWidth = inputData

nodata:                    ' nodata label, program jumps to nodata if
                           ' data is not received within 1000 ms timeout.

     PWM PWMout,PulseWidth,800
                           ' Format: PWM Pin,Duty,Cycle
                           ' Pin = PWMout,(RB4), Declared in variables
                           ' Duty = PulseWidth, a variable with
                           ' values between 0(0%) and 255(100%).
                           ' Cycle = 800, PWM signal sent out RB4
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                            ' for 800 cycles.
    SEROUT2 PICSO, MODE, [7]
                            ' Sends bell tone to computer speakers
    GOTO loop
END
```