

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

' File.....servo3.pbp  
' Started....6/1/05  
' Microcontroller used: Microchip Technology 16F88  
' microchip.com  
' PicBasic Pro Code: micro-Engineering Labs, Inc.  
' melabs.com

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

' Rotates servos into clockwise and counter-clockwise rotations,  
' creating a panning motion. Discussion about basic servo pulse  
' control may be found at [www.seattlerobotics.org/guide/servos.html](http://www.seattlerobotics.org/guide/servos.html) or  
' [www.geocities.com/hobby\\_robotics/was.htm](http://www.geocities.com/hobby_robotics/was.htm)

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

' servo3.pbp is used in the lesson PIC PROGRAMMING 3 SERVOS at:  
' [http://cornerstonerobotics.org/curriculum/lessons\\_year2/erii13\\_pic\\_programming3\\_servos.pdf](http://cornerstonerobotics.org/curriculum/lessons_year2/erii13_pic_programming3_servos.pdf)

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

' WITH THE PIC16F88, MAKE SURE TO HAVE SEPARATE POWER  
' SUPPLIES FOR THE PIC AND THE SERVO. MAKE SURE TO  
' HAVE A COMMON GROUND BETWEEN THE PIC AND SERVO. We use one 9V  
' battery and two 78L05 voltage regulators. See  
' discussion about voltage regulators at:  
' [http://cornerstonerobotics.org/curriculum/lessons\\_year2/erii3\\_diodes\\_power\\_supplies\\_voltage\\_reg.pdf](http://cornerstonerobotics.org/curriculum/lessons_year2/erii3_diodes_power_supplies_voltage_reg.pdf)

' Also, initialize the state of PORTB as LOW  
' since that will set the correct polarity of the  
' PULSOUT statement. See PULSOUT in PicBasic Pro  
' Compiler manual by microEngineering Labs, Inc.  
' The PicBasic Pro Compiler Manual is on line at:  
' <http://www.microengineeringlabs.com/resources/index.htm#Manuals>  
' Look around page 121 in the PicBasic Pro Compiler Manual

' Servos may be modified or hacked to allow  
' for continuous rotation so they can be used  
' as motors on small robots. The book  
' Amphibionics by Karl Williams gives an  
' in depth treatment on how to modify servos Also see:  
' [http://cornerstonerobotics.org/curriculum/lessons\\_year2/erii17\\_hacking\\_servos.pdf](http://cornerstonerobotics.org/curriculum/lessons_year2/erii17_hacking_servos.pdf)

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

PIC16F88 Pin	Wiring
RB0	Servo Control Wire
Vdd	+5 V
Vss	Ground

```
'          MCLR          4.7K Resistor to +5 V

'-----Revision History-----
' 11/14/07 Change MCU from 16F84A to 16F88
' 11/14/07 Add 16F88 oscillator initialization
' 11/27/07 Add power supply warning
' 5/21/08  Changed title from servo2.pbp to servo3.pbp

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

      p0      VAR      BYTE      ' Byte to store servo position

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

      PORTB = %00000000      ' Equivalent to: PORTB = 0
                          ' Sets all PORTB pins to LOW(0 volts)
                          ' Make certain to include this
                          ' initialization as it sets the
                          ' proper polarity of pulses in
                          ' the PULSOUT command.

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

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

start:

' Rotate counter-clockwise

      FOR p0 = 200 TO 100 STEP -1      ' Change value of pulse from 2 ms to
                          ' 1 ms in steps of 10 us. See next
                          ' command.

      PULSOUT 0,p0                  ' Sends a pulse, p0, out on pin RB0.
                          ' The period, p0, is multiplied by the
                          ' increment for a 4 MHz oscillator
                          ' (10 us) to get a pulse out time.
                          ' For example, if p0 = 200,
                          ' 200 * 10 us = 2000 us = 2 ms

      PAUSE 20 - p0/100              ' Pause 20 ms less pulse width (p0/100)
                          ' If p0 = 200, p0/100 = 200/100 = 2 ms.
                          ' This equation keeps the period of
                          ' the servo pulse a constant 20 ms.

      NEXT p0                        ' Go back to the FOR statement and do
                          ' next value of p0

' Rotate clockwise

      FOR p0 = 100 TO 200            ' Change value of pulse from 1 ms to
                          ' 2 ms in steps of 10 us.
```

```
PULSOUT 0,p0           ' Sends a pulse, p0, out on pin RB0.  
                        ' Pulse out time varies from 1.0 msec  
                        ' to 2.0 msec.  
  
PAUSE 20 - p0/100      ' Pause 20 ms less pulse width (p0/100)  
  
NEXT p0                ' Go back to the FOR statement and do  
                        ' next value of p0  
  
GOTO start            ' Makes the program run forever.  
  
END
```