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'-----Title-----
' File.....step_mot_hi_torque.pbp
' Started....2/13/09
' Microcontroller Used:  Microchip Technology 16F88
'                          microchip.com
' PicBasic Pro Code:  micro-Engineering Labs, Inc.
'                          melabs.com
' Stepper Motor Used:  Jameco #237623

'-----Program Description-----
' Program drives stepper motor with about 1.4 times the
' torque as in step_mot1.pbp.

'-----Schematic-----
' Use the same schematic as step_mor1.pbp.  See schematic at:
'
' http://www.cornerstonerobotics.org/schematics/pic\_programming\_step\_mot1.pdf

'-----Related Lesson-----
' step_mot_hi_torque.pbp is used in the lesson Stepper Motor Control with
' a PIC at:
' http://www.cornerstonerobotics.org/curriculum/lessons\_year2/erii\_stepper\_motor.pdf
' Lesson also includes a section on how to figure out how to hook
' up a stepper motor with six leads when a data sheet for the
' motor is unavailable.

'-----Comments-----
' WITH THE PIC16F88, BE CERTAIN TO HAVE SEPARATE POWER
' SOURCES FOR THE PIC AND THE STEPPER MOTOR.  MAKE SURE
' TO HAVE A COMMON GROUND BETWEEN THE PIC AND MOTOR.

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

'-----PIC Connections-----
'
'      PIC16F88 Pin          Wiring
'      -----
'      RB0                   Stepper Motor Control Wire 1
'      RB1                   Stepper Motor Control Wire 2
'      RB2                   Stepper Motor Control Wire 3
'      RB3                   Stepper Motor Control Wire 4
'      Vdd                   +5 V
'      Vss                   Ground
'      MCLR                  4.7K Resistor to +5 V

'-----Variables-----
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Delay  VAR    WORD  ' WORD for variable Delay

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

TRISB = %00000000    ' Sets all PortB pins to output

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

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

Delay = 5            ' Sets Delay variable to 5(msec)
                    ' Delay changes the rotational speed
                    ' of the motor. Check for the minimum
                    ' Delay value of your motor.
                    '
                    '   Delay Value      Approx. No-load Current
                    '                   Jameco #237623 Stepper Motor
                    ' -----
                    '      20                1.43 A
                    '      10                1.13 A
                    '       6                0.72 A
                    '       5                0.60 A
                    '       4                0.40 A
                    '       3                0.19 A
                    '       2                Motor Stops Operating
                    '                               Properly

start:

PORTB = 12          ' Equivalent to PORTB = %00001100
                    ' in binary. Makes pin RB3 and RB2 HIGH and
                    ' all other PORTB pins LOW. This sends a
                    ' HIGH signal to the NPN transistors
                    ' connected to pins RB3 & RB2. The NPN
                    ' transistors ground the ends of the coils
                    ' connected to them, activaing those 2 coils.
                    ' All other coils are off.

PAUSE Delay        ' PAUSE in milli-seconds so
                    ' PAUSE Delay is a pause of 5(ms)

PORTB = 6           ' Equivalent to PORTB = %00000110
                    ' in binary. Makes pin RB2 and RB1 HIGH and
                    ' all other PORTB pins LOW. This sends a
                    ' HIGH signal to the NPN transistors
                    ' connected to pins RB2 & RB1. The NPN
                    ' transistors ground the ends of the coils
                    ' connected to them, activaing those 2 coils.
                    ' All other coils are off.

PAUSE Delay

PORTB = 3           ' Equivalent to PORTB = %00000011
                    ' in binary. Makes pin RB1 and RB0 HIGH and
                    ' all other PORTB pins LOW. This sends a

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                                ' HIGH signal to the NPN transistors
                                ' connected to pins RB1 & RB0.
PAUSE Delay
PORTB = 9                        ' Equivalent to PORTB = %00001001
                                ' in binary. Makes pin RB3 and RB0 HIGH and
                                ' all other PORTB pins LOW. This sends a
                                ' HIGH signal to the NPN transistors
                                ' connected to pins RB3 & RB0.
PAUSE Delay
GOTO start                      ' Start process over again
END
```