```
'---------------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 Desciption--------

' 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-------------
```

```
    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 varaiable 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
```

```
                        ' 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
```