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'-----Title-----
' File.....16F877A_adc3.pbp
' Started....1/7/08
' Microcontroller used: Microchip Technology PIC16F877A
'                       microchip.com
' PicBasic Pro Code: micro-Engineering Labs, Inc.
'                       melabs.com

'-----Program Description-----
' The program uses one of the analog-to-digital
' converters,(AN4), to measure the voltage
' on the center pin of a potentiometer (an analog signal).
' It then converts the analog voltage into an 10-bit
' digital value and displays the result as a
' voltage (0-5V) on an LCD.

'-----Schematic-----
' See schematic at:
' http://www.cornerstonerobotics.org/schematics/pic16f877a\_adc1.pdf

'-----Related Lesson-----
' adc3.pbp (the 16F88 program) is used in
' the lesson Resistive Sensors at:
' http://www.cornerstonerobotics.org/curriculum/lessons\_year2/erii23\_resistive\_sensors.pdf

'-----Revisions-----
' 1/17/09: Change microcontroller from 16F88 to 16F877A

'-----PIC Connections-----
'
'      16F877A Pin           Wiring
'      -----
'      RB4                  LCD pin 11(DB4)
'      RB5                  LCD pin 12(DB5)
'      RB6                  LCD pin 13(DB6)
'      RB7                  LCD pin 14(DB7)
'      RA0                  Center Lead of Potentiometer
'      RA4                  LCD Register Select(RS)
'      RB3                  LCD Enable(E)

'-----LCD Connections-----
'
'      LCD Pin             Wiring
'      -----
'      1                   Ground(Vss)
'      2                   + 5v(Vdd)
'      3                   Center of 20K Pot(Contrast)
'      4                   RA4(Register Select,RS)
'      5                   Ground(Read/Write,R/W)
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'          6          RB3(Enable)
'          7          No Connection(DB0)
'          8          No Connection(DB1)
'          9          No Connection(DB2)
'         10          No Connection(DB3)
'         11          RB4(DB4)
'         12          RB5(DB5)
'         13          RB6(DB6)
'         14          RB7(DB7)

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

' To free up AN0 (Pin RA0) for an analog input, the
' default four LCD Data Bits must be removed from RA0 - RA3.
' This is relocated to the upper 4 bits RB4 - RB7 in PORTB
' using the LCD DEFINE statements below. All other
' default LCD pins and functions are left unchanged.
' For details see:
' http://www.cornerstonerobotics.
org/curriculum/lessons_year2/eri116_lcd3_pot_command_and_lcd_defines.pdf
' or
' Look around page 97 in the PicBasic Pro Compiler Manual.
' The PicBasic Pro Compiler Manual is on line at:
' http://www.microengineeringlabs.com/resources/index.htm#Manuals

    DEFINE LCD_DREG    PORTB    ' PORTB - Data bit Port
    DEFINE LCD_DBIT    4        ' Set starting Data Bit to bit 4
    DEFINE ADC_BITS    10       ' Sets the number of bits in
                                ' the result to 10

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

    x          VAR WORD    ' WORD for potentiometer input
    temp_int   VAR WORD    ' Word for integer
    temp_fract VAR WORD    ' Word for fraction

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

    ADCON1 = %10000000    ' Right justifies 10-bit value of x
                          ' in 16-bit WORD. Adds "0" in the
                          ' 6 Most Significant bits of the Word,
                          ' shifting the 10-bit value of x to
                          ' the right. This changes the LCD
                          ' values to 0 - 1023.

' The ADCON1 Register is Register 11-2: ADCON1 Register,
' look around page 128 in the 16F877A datasheet.
' For Microchip PIC DATASHEETS, see:
' http://www.microchip.
com/stellent/idcplg?IdcService=SS_GET_PAGE&nodeId=2046
' Select 8-bit PIC Microcontrollers, then the device from the
' drop down menu. Now download the 16F877A Datasheet.

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

    PAUSE 1000            ' Pause to allow LCD to setup
```

loop:

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ADCIN 0, x           ' Read analog voltage on AN0(RA0)
                    ' and stores it as x.

LCDOUT $FE,1,"POT =",DEC x
                    ' Clears LCD screen, displays
                    ' "POT =" and the 10-bit value of x

x = x * 49/10

temp_int = x/1000

temp_fract = x//1000

LCDOUT $FE,$c0,"Voltage = ",DEC temp_int, ".",DEC3 temp_fract

PAUSE 500           ' Pause 1/2 second

GOTO loop           ' Go to loop label

END
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