

Introduction

This application reads the A/D and displays the calibrated reading in engineering units on a LCD. In this app I'm reading 0-5 volts to the A/D and displaying micro amps but it works the same for volts, ohms, psi, ect. whatever engineering units you want. Since the right justify bit is set in ADSETUP. I get a reading from 0 to FFFF (0 - 65535) This makes it easy to scale. So at 49000 A/D reading my amp meter read 1000 micro amps at 41000 (about) A/D reading my amp meter read 600 micro amps so these are my cal values used in the below formula.

$$\text{Slope} = (\text{hiMeter} - \text{lowMeter}) / (\text{hiAD} - \text{lowAD})$$

$$\text{Offset} = \text{lowMeter} - (\text{Slope} * \text{lowAD})$$

low meter and high meter are your hi and low actual readings (cal points) in engineering units
 lowAD is the A/D reading from the PIC A/D at the low meter point
 HiAD is the A/D reading from the PIC A/D at the High meter point

When the slope and offset are applied to the A/D reading the result is displayed in micro amps. The trick here is the use of floating point math. As you see below the slope in this instance is 0.0605 so the math needs to be done in float as shown below. also note that the offset is negative so I had to declare it as an S word (signed word). If it were positive I make it a long.

```
Slope          var    long
Offset         var    long
temp1          var    long
temp2          var    long
temp3          var    long
AdRead         var    long
adhi           var    long
adlow          var    long
sethserial H9600calmode var    byte
myswitch      var    portb.bit5
```

```
AN0 con 0      ;this sets the pin AN0 / RA0
CLK con 2      ;CLK options are 0, 1, 2, 3 (0-2 are based on int cycles)
calMode       =    0
'Slope        =    0.171
'offset       =    - 8333
```

```
ADSETUP con %10001110 ;sets up the ADCON1 register right justify
```

```
input B5
```

```
readdm 0x00,   [ slope.byte0]      ;read in the slope and offset from eeprom
readdm 0x01,   [ slope.byte1]
readdm 0x02,   [ slope.byte2]
readdm 0x03,   [ slope.byte3]
readdm 0x04,   [offset.byte0]
```



```
readdm 0x05, [offset.byte1]
readdm 0x06, [offset.byte2]
readdm 0x07, [offset.byte3]
```

```
Pause 500 ;Allows the LCD to initialize
```

```
LCDWRITE a4\a3\a5, portc.nib0, [INITLCD1, INITLCD2, TWOLINE,CLEAR, HOME, SCR]
LCDWRITE a4\a3\a5, portc.nib0, ["Unicorp Systems"]
Pause 3000
```

Main

```
gosub getAD
if myswitch = 1 then ;check if cal button is high
    calmode = 1
endif

if calMode = 0 then gosub norm
if calMode = 1 then gosub cm
if calMode = 2 then goto Wrcal
```

```
goto main
```

getAD

```
temp2 = 0
temp1 = 0
ADRead = 0
```

```
for temp1 = 1 to 64 ;this loop is to get a full
16bit value
```

```
ADIN AN0,CLK,ADSETUP,temp2
ADRead = ADRead + temp2
```

```
next
```

```
temp2 = 0
temp1 = 0
temp1 = (float ADRead fmul Slope) ;floating point math
temp2 = ( temp1 fadd float offset) ;temp2 will be in engineering units
;0-5 volts,ohms,amps,ect...it whatever
;the high and low cal untis are in
```

```
return
```

norm

```
LCDWRITE a4\a3\a5, portc.nib0, [clear]
LCDWRITE a4\a3\a5, portc.nib0, [" uAmps : ",dec int temp2]
```

```
pause 500
return
```



SendRaw

```
pause 100
HSEROUT [dec int temp2] 'if I want to send to a pc
goto main
```

cm 'cal mode

```
LCDWRITE a4\a3\a5, portc.nib0, [clear]
LCDWRITE a4\a3\a5, portc.nib0, [" Cal mode"]
temp2 = 0
temp1 = 0

pause 1000
goto calHi
```

calHi

```
do 'loop and get A/D till button is pressed
gosub getAD
adhi = ADRead
LCDWRITE a4\a3\a5, portc.nib0, [clear]
LCDWRITE a4\a3\a5, portc.nib0, ["H-AD: ",dec ADRead]
LCDWRITE a4\a3\a5, portc.nib0, [scram+$40," Push Button"]
pause 250
while myswitch = 0
pause 1000
```

calLo

```
do 'loop and get A/D till button is pressed
gosub getAD adlow = ADread
LCDWRITE a4\a3\a5, portc.nib0, [clear]
LCDWRITE a4\a3\a5, portc.nib0, ["L-AD: ",dec AdRead]
LCDWRITE a4\a3\a5, portc.nib0, [scram+$40," Push Button"]
pause 250
while myswitch = 0
```

```
temp2 = adhi - adlow          'calculate slope and offset
slope = float 450 fdiv float temp2
temp1 = slope finul float adlow
temp3 = float 550 fsub temp1
offset = int temp3
```

```
writedm 0x00,[ slope.byte0]    'store slope and offset in eeprom
writedm 0x01,[ slope.byte1]
writedm 0x02,[ slope.byte2]
writedm 0x03,[ slope.byte3]
writedm 0x04,[ offset.byte0]
writedm 0x05,[ offset.byte1]
```



```
LCDWRITE a4\a3\a5, portc.nib0, [clear]
LCDWRITE a4\a3\a5, portc.nib0, ["Slope: ",real slope]
LCDWRITE a4\a3\a5, portc.nib0, [sccram+$40,"Offset:",hex offset]
```

```
pause 10000
```

```
calmode =0
```

```
return 'to main loop
```



About This AppNote

Author : DMtulsa

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