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'PicBasic Pro program of DISPLAY TENPERATURE
'ON LCD via I2C for PIC16F877

'INCLUDE                "modedefs.bas"

'DEFINE A/D CONVERTER---------------------------
DEFINE OSC 20
DEFINE ADC_BITS 10      '
DEFINE ADC_CLOCK 3      'INTERNAL CR OSCILLATOR
DEFINE ADC_SAMPLE 50    'SAMPLING TIME 50US

TRISA=%11111111 'SET PORTA.2 TO THERMO INPUT VIA AMP
TRISB=%00000000 'SET PORTB ALL TO OUTPUT
TRISC=%10000000 'SET PORTC.7 TO SERIAL INPUT AND THE OTHER TO I2C
TRISD=%00000000 'SET PORTD ALL TO OUTPUT
TRISE=%00000000 'SET PORTE ALL TO OUTPUT
'ADCON1=7       'SET PORTA ALL TO DIGITAL
ADCON0 = %11000001      'GONFIGURE AND TURN ON A/D MODULE
ADCON1 = %10000010      'SET PORTA ANALOG AND RIGHT JUSTIFY RESULT

VARS:
        VOLT VAR WORD   'VALUE OF EACH DIGIT
        DNUM VAR BYTE   'TEXT OF NUMBERS
        DNUM1 VAR BYTE  'TEXT OF DIGIT OF TEN
        DNUM2 VAR BYTE  'TEXT OF DIGIT OF ONE
        DNUM3 VAR BYTE  'TEXT OF DIGIT OF DECIMAL
        B0 VAR WORD     'ADC VALUE
        B00 VAR WORD    'VALUE OF DIGIT OF TEN
        B01 VAR WORD    'VALUE OF DIGIT OF ONE
        B02 VAR WORD    'VALUE OF DIGIT OF DECIMAL
        B03 VAR WORD    '
        B010 VAR WORD   '
        B020 VAR WORD   '
        B030 VAR WORD   '

'DEFINE I2C PORT
SCL VAR PORTC.3 'DEFINE CLOCK FOR I2C
SDA VAR PORTC.4 'DEFINE DATA FOR I2C

SLAVEADDR VAR BYTE
DAT VAR BYTE    'CONTROL BYTE FOR DATA
CONT VAR BYTE   'CONTROL BYTE FOR CONTROL CODES

SLAVEADDR = $7C 'SLAVE ADDRESS"0111110"+WRITE"0" REF P12 ON ST7032DS
DAT=%01000000   'SEND DATA TO BE DISPLAYED
CONT=0          'SEND COMMAND
PAUSE 100

'INITIALIZE-------------------------------------------------
I2CWRITE SDA,SCL,SLAVEADDR,CONT,[%01111100]     '[$7C]Slave Address + Write
PAUSE 1
I2CWRITE SDA,SCL,SLAVEADDR,CONT,[%10000000]     '[$80]Control byte
'bit7=1:able to send data without start & slave address
PAUSE 1
I2CWRITE SDA,SCL,SLAVEADDR,CONT,[%00111001]     '[$39]Function set
'bit4=1:interface data 8bits, bit3=1:2 lines, bit0=1:extend instruction
PAUSE 1
I2CWRITE SDA,SCL,SLAVEADDR,CONT,[%00010100]     '[$14]Internal osc freq
'bit3=0:bias volts=VOUT/5, bit2-0:disp freq=183Hz
PAUSE 1
I2CWRITE SDA,SCL,SLAVEADDR,CONT,[%01111100]     '[$7C]Contrast
'bit3-0=1100:LSB4bit of contrast
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 63: PAUSE 1
 64: I2CWRITE SDA,SCL,SLAVEADDR,CONT,[%01011101]  '[$5E]Power/ICON/Contrast
 65: 'bit3=1:icon on, bit2=1:volt boost on, bit1-0=10:MSB2bit of contrast
 66: PAUSE 1
 67: I2CWRITE SDA,SCL,SLAVEADDR,CONT,[%01101101]     '[$6D]Follower control
 68: 'bit3=1:drive volts buffer on, bit2-0=101:V0=Vrefx2.5
 69: PAUSE 250
 70: I2CWRITE SDA,SCL,SLAVEADDR,CONT,[%00001100] '[$0C] Display on, cursor off
 71: 'bit2=1:entire display on, bit1=0:cursol off, bit0=0:blink off
 72: PAUSE 1
 73: I2CWRITE SDA,SCL,SLAVEADDR,CONT,[%00000110]     '[$06]Entry mode
 74: 'bit1,0=1,0:cursor move to right & text no shift
 75: PAUSE 1
 76: 'END INITIALIZE-----------------------------------------------
 77:
 78: MAIN1:
 79: 'CALCULATE TEMPERATURE---------------------------------------
 80:         ADCIN 2, B0     'GET AN2 50mV/C AT PORTA FROM THERMO AMP2
 81:         PAUSEUS 60
 82:         B0 = B0*10              '
 83:         B00 = B0/1023           'VALUE OF DIGIT OF TEN
 84:         B010 = B0//1023         '
 85:         B01 = B010*10/1023      'VALUE OF DIGIT OF ONE
 86:         B020 = B010*10//1023    '
 87:         B02 = B020*10/1023      'VALUE OF DIGIT OF DECIMAL
 88:         B030 = B020*10//1023    '
 89:         B03 = B030*10/1023      '
 90: 'END CALCULATION---------------------------------------------
 91:
 92: 'DISPLAY TEMPERATURE-----------------------------------------
 93: I2CWRITE SDA,SCL,SLAVEADDR,CONT,[3,"*"]         'DISPLAY TEXT IN 2 LINES
 94: PAUSE 1
 95: I2CWRITE SDA,SCL,SLAVEADDR,CONT,[$01]           'CLEAR, PROMPT ON 1ST LINE
 96: PAUSE 1
 97: I2CWRITE SDA,SCL,SLAVEADDR,DAT,["TEMPERATURE:"] 'TEXT TO BE DISPLAYED
 98: PAUSE 1
 99: I2CWRITE SDA,SCL,SLAVEADDR,CONT,[$C0]           'PROMPT ON 2ND LINE
100: PAUSE 1
101: VOLT=B00 : GOSUB DISP_FIG : IF DNUM=$30 THEN    'DIGIT OF TEN
102: DNUM=$20 : ENDIF : DNUM1=DNUM                   'ZERO SUPPRESS
103: VOLT=B01 : GOSUB DISP_FIG : DNUM2=DNUM          'DIGIT OF ONE
104: VOLT=B02 : GOSUB DISP_FIG : DNUM3=DNUM          'DIGIT OF DECIMAL
105: I2CWRITE SDA,SCL,SLAVEADDR,DAT,[DNUM1,DNUM2,".",DNUM3,$20,$DF,"C"]
106: PAUSE 1000
107: I2CWRITE SDA,SCL,SLAVEADDR,CONT,[3,"/"]         'DISPLAY TEXT IN W HEIGHT
108: PAUSE 1
109: I2CWRITE SDA,SCL,SLAVEADDR,CONT,[$01]           'CLEAR, PROMPT ON 1ST LINE
110: PAUSE 1
111: I2CWRITE SDA,SCL,SLAVEADDR,DAT,[DNUM1,DNUM2,".",DNUM3,$20,$DF,"C"]
112: PAUSE 1000
113: GOTO MAIN1
114: 'END DISPLAY TEMPERATURE-------------------------------------
115:
116: DISP_FIG:       'DISPLAY ONE DIGIT-----------------
117:         SELECT CASE VOLT
118:         CASE 0 : DNUM=$30       'DISPLAY "0"
119:         CASE 1 : DNUM=$31       'DISPLAY "1"
120:         CASE 2 : DNUM=$32       'DISPLAY "2"
121:         CASE 3 : DNUM=$33       'DISPLAY "3"
122:         CASE 4 : DNUM=$34       'DISPLAY "4"
123:         CASE 5 : DNUM=$35       'DISPLAY "5"
124:         CASE 6 : DNUM=$36       'DISPLAY "6"
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125:          CASE 7 : DNUM=$37        'DISPLAY "7"
126:          CASE 8 : DNUM=$38        'DISPLAY "8"
127:          CASE 9 : DNUM=$39        'DISPLAY "9"
128:          END SELECT
129:          PAUSE 6          'DELAY
130: RETURN
131: END
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