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;
; Program   : Interface
; Description : Demonstrate interfacing ADC0832 with PIC16F628
; Filename  : imp1.asm
,*****
LIST      P=16F628,W=-302

;----- BYTE DEFINE -----;
STATUS EQU  0X03           ; Bank 0
PORTA  EQU  0X05
PORTB  EQU  0X06
CMCON  EQU  0X1F
TRISA  EQU  0X85           ; Bank 1
TRISB  EQU  0X86

;----- RAM -----;
SAVE   EQU  0X70
COUNT EQU  0X71
TEMP   EQU  0X72
MDELAY EQU  0x73           ;DELAY_TIME
XDELAY EQU  0x74           ;DELAY_TIME
X      EQU  0x75
Y      EQU  0x76

;----- BIT DEFINE -----;
C      EQU  0
Z      EQU  2
RP0    EQU  5
W      EQU  0
F      EQU  1
CS     EQU  2             ; RA2
CLK    EQU  1             ; RA1
DI     EQU  0             ; RA0

;-----RS-232-----;
PIR1   EQU  0x0C           ; Bank 0
RCSTA  EQU  0x18
RCREG  EQU  0x1A

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TXREG EQU 0x19
TRISB EQU 0x86 ; Bank 1
TXSTA EQU 0x98
SPBRG EQU 0x99
TXIF EQU 4 ; Bit
TXEN EQU 5
SYNC EQU 4
BRGH EQU 2
SPEN EQU 7
CREN EQU 4
FERR EQU 2
OERR EQU 1
RCIF EQU 5
INDF EQU 0x00
FSR EQU 0x04
STATUS EQU 0x03
PR0 EQU 5
F EQU 1
W EQU 0

;-----PROGRAM-----;
    __CONFIG    0X3F61
    ORG    0X0000

;----- INITIAL -----;
    CLRF    X
    CLRF    Y

;-----NEW-----
    BSF    STATUS,RP0 ; Bank 1
    MOVLW B'00001111' ; PB7-PB4 AS OUTPUT
    MOVWF TRISB
    BCF    STATUS,RP0 ; Bank 0
    BSF    PORTB,5 ; ON RB5

    BSF    STATUS,RP0 ; Bank 1
    MOVLW .25

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MOVWF SPBRG                ; baudrate = 9600 bps
BSF    TXSTA,BRGH          ; HI SPEED baudrate
BANKSEL    RCSTA          ; Bank 0
BSF    RCSTA,SPEN         ; Serial port enable
BSF    RCSTA,CREN         ; Begin receive
WAIT   BTFFS  PIR1,RCIF   ; **If have data then skip
      GOTO   WAIT         ; **No data then waiting
MOVFW  RCREG              ; Move data to w
MOVWF  MDELAY             ; Move data to delay
;-----END NEW-----
START0 BCF    STATUS,RP0   ; Bank 0<<NEW
      MOVLW .7
      MOVWF CMCON          ; RA3-RA0 as digital I/O
BSF    STATUS,RP0        ; Bank 1
      MOVLW B'11111001'    ; RA2-RA1 = OUTPUT
      MOVWF TRISA
      CLRF  TRISB
;-----CH0-----
START1 BCF    STATUS,RP0   ; Bank 0
      MOVLW B'00001100'    ; START
      MOVWF PORTA
      MOVLW 0x20           ;DATA 0x20
      MOVWF FSR
BSF    PORTB,5           ;OFF RB5
BSF    PORTB,7           ;ON RB7
      NOP
;-----SET COMMAND -----;
CONVERT   BSF    STATUS,RP0 ; Bank 1
      BCF    TRISA,0       ; RA0 = OUTPUT
      BCF    STATUS,RP0    ; Bank 0

      BCF    PORTA,CS      ; CS LOW
      NOP
      BSF    PORTA,DI; START BIT

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NOP
BSF  PORTA,CLK
NOP                                ; 1'ST CLOCK
BCF  PORTA,CLK
NOP
; CHANGE NEXT LINE FOR SELECT MODE
BSF  PORTA,DI                      ; 0=DIFF<<, 1=SINGLE
NOP
BSF  PORTA,CLK
NOP                                ; 2'ND CLOCK
BCF  PORTA,CLK
NOP
BCF  PORTA,DI                      ; SELECT CH0
NOP
BCF  PORTA,CLK
NOP                                ; 3'RD CLOCK
BCF  PORTA,CLK
NOP
;----- START CONVERSION -----
BSF  PORTA,CLK                      ; RISING CLOCK : START CONVERSION
CALL SERIN                          ; READ SERIAL ADC SUB
BSF  PORTA,CLK
NOP                                ; LAST CLOCK
BCF  PORTA,CLK
NOP
BSF  PORTA,CS                      ; CS HIGH
;----- DISPLAY DATA -----
;-----IN-DATA-----
MOVF  SAVE,W                        ; READ VALUE
MOVWF INDF
INCF  FSR
CALL  DELAY1                        ;DELAY1
BTFSS FSR,4
CALL  CONVERT                        ; READ AGAIN

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        GOTO  DISPLAY
;----- READ SERIAL ADC SUBROUTINE -----
SERIN  BSF    STATUS,RP0        ; Bank 1
        BSF    TRISA,0          ; RA0 = INPUT
        BCF    STATUS,RP0        ; Bank 0
        CLRF   SAVE             ; CLEAR OLD DATA
        MOVLW 0X09              ; 8 BIT COUNTER
        MOVWF  COUNT
GETBIT  BCF    PORTA,CLK        ; FALLING 4'TH CLOCK
        NOP                    ; END OF CONVERSION
        MOVF   PORTA,W          ; READ MSB FISRT
        MOVWF  TEMP
        RRF    TEMP,F           ; TEMP => CARRY FLAG
        RLF    SAVE,F          ; CARRY FLAG => SAVE
        DECFSZ COUNT,F         ; COUNTER = 8 ?
        GOTO   SHIFT           ; NO READ AGAIN
;----- 11 CLOCK FOR LSB FIRST VALUE -----
        MOVLW 0X0B
        MOVWF  COUNT           ; 11 CLOCK
CLOCK  BSF    PORTA,CLK
        NOP                    ; CLOCK
        BCF    PORTA,CLK
        DECFSZ COUNT,F         ; CLOCK = 11 ?
        GOTO   CLOCK
        RETURN
SHIFT  BSF    PORTA,CLK        ; READ AGAIN
        GOTO   GETBIT
;-----DISPLAY-RS232_CH0-----;
DISPLAY  BCF    PORTB,7        ; OFF RB7<<
        BSF    STATUS,PR0        ; Bank 1
        BSF    TRISB,2          ; RB2 as input

        MOVLW .25
        MOVWF  SPBRG           ; Baudrate = 9600 bps

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BSF    TXSTA,BRGH        ; Hi-speed
BSF    TXSTA,TXEN       ; TX enable
BANKSEL    RCSTA        ; Bank 0
BSF    RCSTA,SPEN      ; Serial port enable
MOVLW 0x20
MOVWF FSR
LOOP1  MOVF  INDF,W
      CALL  SEND_DATA
      INCF  FSR,1
      BTFSS FSR,4
      GOTO  LOOP1
      GOTO  $            ; Endless loop
SEND_DATA  BTFSS  PIR1,TXIF  ; Skip if TXREG empty
          GOTO  $-1        ; Not empty then wait
          MOVWF TXREG      ; Send data to RS-232
          RETURN
;-----DELAY1-----
;-----CALL = 2 cycle-----
DELAY1  MOVF  MDELAY,0
          MOVWF XDELAY      ;1 cycle
LOOP2  DECFSZ XDELAY,1
          GOTO  LOOP2
          RETURN          ;2 cycle
END

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