

C:\Users\Radka\Documents\vskola\sap\sap2_jandora1\YD14SAP_DIR.ASM

```
*****
; Reset vektor
;*****
      ORG 0x0000
      goto   Program      ;Start programu
;*****
; Vektor pro preruseni s vysokou prioritou
;*****
      ORG 0x0008
      goto   TOCODE       ;Obsluha T0 / vysoka priorita
;*****
; Vektor pro preruseni s nizkou prioritou
;*****
      ORG 0x0018
      goto   T1CODE       ;Obsluha T1 / nizka priorita
;*****
```

```
*****
;*****
;*****
;***** HLAVNI PROGRAM *****
;*****
;*****
Program:
```

```
      clrf   BSR           ; bank selektor ukazuje na banku 0x00

;*****
; Vychodi nastaveni programu
;*****

      bcf    StopRun       ; citac po startu stoji
      bsf    UpDn          ; citani nahoru
      clrf   Counter      ; vynuluj citac / neni nutne
      clrf   clip         ; vynuluj filtracni citac / neni nutne
      call   CLRRES       ; vynuluj RESULT / neni nutne
      call   CLRAOP       ; vynuluj AOP / neni nutne
```

```
;*****
; Nastaveni I/O t.j. vystup pro citac a vstupy pro tlacitka
;*****
```

```
      ; Vsechno vstupy
      movlw  b'11111111'
      movwf  TRISA
```

```
      ; Port RA konfigurovat jako digitalni I/O
      BSF   WDTCON, AD SHR
      MOVLW 0xFF
      MOVWF ANCON0
      BCF   WDTCON, AD SHR
```

```
      ; Vsechno vstupy
      movlw  b'11111111'
      movwf  TRISB
```

```
      ; Vsechno vystupy
      movlw  b'00000000'
      movwf  TRISD
      clrf   PORTD
```

```
;*****
; Nastaveni casovace T0
;*****
```

```
      ; Povolit preddelic pro T0
      bcf    TOCON, PSA
```

```
      ; Preddelic pro T0=64
      bsf    TOCON, TOPS2
      bcf    TOCON, TOPS1
      bsf    TOCON, TOPS0
```

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```
bcf      TOCON, T08BIT

; Zdroj hodin pro T0 bude interni (sysclock= XTAL / 4)
bcf      TOCON, TOCS

;Prednastavit citac T0
movlw   TOH
movwf   TMR0H
movlw   TOL
movwf   TMR0L

; Spustit citani
bsf     TOCON, TMR0ON

;*****
; Nastaveni casovace T1
;*****

; povolit 16bit operace na T1
bsf     T1CON, RD16

; zdroj hodin pro T1 z jineho zdroje nez oscilator
bcf     T1CON, T1RUN

; nastaveni preddelice pro T1 na hodnotu 8
bsf     T1CON, T1CKPS1
bsf     T1CON, T1CKPS0

; timer1 oscilator vypnut
bcf     T1CON, T1OSCEN

; synchronizace s externim vstupem vypnuta
bsf     T1CON, T1SYNC

; zdroj hodin pro T1 bude interni (sysclock= XTAL/4)
bcf     T1CON, TMR1CS

;Prednastavit citac T1
movlw   T1H
movwf   TMR1H
movlw   T1L
movwf   TMR1L

; Spustit citani
bsf     T1CON, TMR1ON

;*****
; Nastaveni preruseni a jejich priorit pro jednotlivy zdroje T0/T1
;*****

; Dve urovne priorit povoleny
bsf     RCON, IPEN

; Povolit IRQ od T0
; Zvolit prioritu IRQ_T0
bsf     INTCON, TMR0IE
bsf     INTCON2, TMR0IP

; Povolit IRQ od T1
; Zvolit prioritu IRQ_T1
bsf     PIE1, TMR1IE
bsf     IPR1, TMR1IP

; Povolit preruseni s vysokou urovni
; Povolit preruseni s nizkou urovni
bsf     INTCON, GIEH
bsf     INTCON, GIEL

;*****
; Nekonecna smycka - CPU cecka na interrupt
;*****
cekej:  goto  cekej
;*****
```

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```
;*****  
;*****  
;***** OBSLUHA T0 *****  
;*****  
;*****  
TOCODE: movlw TOL ; Prednastavit citac T0  
 movwf TMR0L  
;*****  
 btfss StopRun ; Citani Start/Stop  
 goto stuj  
 btfsc UpDn ; Citani Up/Dn  
 incf Counter  
 btfss UpDn  
 decf Counter  
;*****  
; y=K2*x^2+K1*x+K0  
;*****  
 call CLRRES  
 call PLNM2  
 call PLNM1  
 call PLNM0  
;*****  
 movff Counter, PORTD ; zobrazit citac na LEDKY  
;*****  
stuj: bcf INTCON, TMR0IF ; smazat priznak preruseni  
 retfie FAST ; navrat z preruseni  
;*****
```

```
;*****  
;***** Podprogramy pro T0 *****  
;*****
```

```
;*****  
; RESULT=RESULT+K0  
;*****  
PLNM0: call CLRAOP  
 movlw K0  
 movwf AOP07  
 call RPLUSA  
 return
```

```
;*****  
; RESULT=RESULT+K1*x  
;*****  
PLNM1: call CLRAOP  
 movlw K1  
 mulwf Counter  
 movff PRODH, AOP15  
 movff PRODL, AOP07  
 call RPLUSA  
 return
```

```
;*****  
; RESULT=RESULT+K2*x^2  
;*****  
PLNM2: call XNA2  
 call CLRAOP  
 movlw K2  
 mulwf XnaDruhouL  
 movff PRODH, AOP15  
 movff PRODL, AOP07  
 call RPLUSA  
 call CLRAOP  
 movlw K2  
 mulwf XnaDruhouH  
 movff PRODH, AOP23  
 movff PRODL, AOP15  
 call RPLUSA  
 return
```

```
;*****  
; x=Counter^2  
;*****  
XNA2: movf Counter, W  
 mulwf Counter
```

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```
        movff    PRODL,XnaDruhoul
        return
;*****
; RESULT=0
;*****
CLRRES:  clrf    RESULT23
        clrf    RESULT15
        clrf    RESULT07
        return
;*****
; AOP=0
;*****
CLRAOP:  clrf    AOP23
        clrf    AOP15
        clrf    AOP07
        return
;*****
; RESULT=RESULT+AOP
;*****
RPLUSA:  movf    AOP07,W
        addwf   RESULT07,F
        movf    AOP15,W
        addwfc  RESULT15,F
        movf    AOP23,W
        addwfc  RESULT23,F
        return
;*****

;*****
;*****
;*****  OBSLUHA T1 *****
;*****
T1CODE:  movff   STATUS,STEMP    ; zapamatuj stav registru STATUS
        movff   WREG,WTEMP      ; zapamatuj stav registru WREG
        movff   BSR,BTEMP       ; zapamatuj stav registru BSR
;*****
        movlw   T1L              ; prednastavit citac T1
        movwf   TMR1L
;*****
        btfss  STOPSTART        ; tlacitko START/STOP ?
        goto   skip00
        tstfsz clip
        goto   hold00
        btg    StopRun
hold00:  movlw   TTLAC
        movwf   clip
        goto   skip02
;*****
skip00:  btfss  DIR              ; tlacitko DIR ?
        goto   skip01
        tstfsz clip
        goto   hold01
        btg    UpDn
hold01:  movlw   TTLAC
        movwf   clip
        goto   skip02
;*****
skip01:  tstfsz clip              ; filtracni citac
        decf   clip,F
;*****
skip02:  movff   BTEMP,BSR        ; vrat zpet hodnotu registru BSR
        movff   WTEMP,WREG      ; vrat zpet hodnotu registru WREG
        movff   STEMP,STATUS    ; vrat zpet hodnotu registru STATUS
        bcf    PIR1,TMR1IF      ; smazat priznak preruseni
        retfie                    ; navrat z preruseni
;*****
```

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```
;*****  
;*****  
;*****  
; Konec programu  
;*****  
      END
```

11. června 2010
12:15

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```
*****
; Reset vektor
*****
ORG 0x0000
goto Program ;Start programu
*****
; Vektor pro preruseni s vysokou prioritou
*****
ORG 0x0008
goto T0CODE ;Obsluha T0 / vysoka priorita
*****
; Vektor pro preruseni s nizkou prioritou
*****
ORG 0x0018
goto T1CODE ;Obsluha T1 / nizka priorita
*****

*****
*****
*****
***** Hlavni program *****
*****
*****
Program:

    clrf   BSR                ; bank selektor ukazuje na banku 0x00
*****
; Vychazi nastaveni programu
*****

    bcf   StopRun            ; citac po startu stoji
    bsf   UpDn               ; citani nahoru
    clrf  Counter           ; vynuluj citac / není nutné
    clrf  clip               ; vynuluj filtrační citac / není nutné
    call  CLRRES             ; vynuluj RESULT / není nutné
    call  CLRAOP             ; vynuluj AOP / není nutné

*****
; Nastaveni I/O t.j. vystup pro citac a vstupy pro tlacitka
*****

; Vsechno vstupy
movlw   b'11111111'
movwf   TRISA

; Port RA konfigurovat jako digitalni I/O
BSF     WDTCON, ADSHR
MOVLW  0xFF
MOVWF  ANCON0
BCF     WDTCON, ADSHR

; Vsechno vstupy
movlw   b'11111111'
movwf   TRISB

; Vsechno vystupy
movlw   b'00000000'
movwf   TRISD
clrf    PORTD

*****
; Nastaveni casovace T0
*****

; Povolit preddelic pro T0
bcf     TOCON, PSA

; Preddelic pro T0=64
bsf     TOCON, TOPS2
bcf     TOCON, TOPS1
bsf     TOCON, TOPS0

; T0 bude pracovat jako 16bit
```

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```
bcf    TOCON, T08BIT

; Zdroj hodin pro T0 bude interni (sysclock= XTAL / 4)
bcf    TOCON, TOCS

;Prednastavit citac T0
movlw  T0H
movwf  TMR0H
movlw  T0L
movwf  TMR0L

; Spustit citani
bsf    TOCON, TMR0ON

;*****
; Nastaveni casovace T1
;*****

; povolit 16bit operace na T1
bsf    T1CON, RD16

; zdroj hodin pro T1 z jineho zdroje nez oscilator
bcf    T1CON, T1RUN

; nastaveni preddelice pro T1 na hodnotu 8
bsf    T1CON, T1CKPS1
bsf    T1CON, T1CKPS0

; timer1 oscilator vypnut
bcf    T1CON, T1OSCEN

; synchronizace s externim vstupem vypnuta
bsf    T1CON, T1SYNC

; zdroj hodin pro T1 bude interni (sysclock= XTAL/4)
bcf    T1CON, TMR1CS

;Prednastavit citac T1
movlw  T1H
movwf  TMR1H
movlw  T1L
movwf  TMR1L

; Spustit citani
bsf    T1CON, TMR1ON

;*****
; Nastaveni preruseni a jejich priorit pro jednotlivy zdroje T0/T1
;*****

; Dve urovne priorit povoleny
bsf    RCON, IPEN

; Povolit IRQ od T0
; Zvolit prioritu IRQ_T0
bsf    INTCON, TMR0IE
bsf    INTCON2, TMR0IP

; Povolit IRQ od T1
; Zvolit prioritu IRQ_T1
bsf    PIE1, TMR1IE
bsf    IPRI1, TMR1IP

; Povolit preruseni s vysokou urovni
; Povolit preruseni s nizkou urovni
bsf    INTCON, GIEH
bsf    INTCON, GIEL

;*****
; Nekonecna smycka - CPU cekaj na interrupt
;*****
cekaj: goto cekaj
;*****
```

```

;*****
;*****
;*****      OBSLUHA T0 *****
;*****
;*****
T0CODE: movlw   T0L           ; Prednastavit citac T0
        movwf   TMR0L
;*****
        btfss   StopRun      ; Citani Start/Stop
        goto    stuj
        btfsc   UpDn          ; Citani Up/Dn
        incf    Counter
        btfss   UpDn
        decf    Counter
;*****
; y=K2*x^2+K1*x+K0
;*****
        call    CLRRES
        call    PLNM2
        call    PLNM1
        call    PLNM0
;*****
        movff   Counter, PORTD ; zobrazit citac na LEDKY
;*****
stuj:   bcf     INTCON, TMR0IF ; smazat priznak preruseni
        retfie  FAST           ; navrat z preruseni
;*****

;*****
;*****      Podprogramy pro T0 *****
;*****

;*****
; RESULT=RESULT+K0
;*****
PLNM0:  call    CLRAOP
        movlw   K0
        movwf   AOP07
        call    RPLUSA
        return
;*****
; RESULT=RESULT+K1*x
;*****
PLNM1:  call    CLRAOP
        movlw   K1
        mulwf   Counter
        movff   PRODH,AOP15
        movff   PRODL,AOP07
        call    RPLUSA
        return
;*****
; RESULT=RESULT+K2*x^2
;*****
PLNM2:  call    XNA2
        call    CLRAOP
        movlw   K2
        mulwf   XnaDruhoul
        movff   PRODH,AOP15
        movff   PRODL,AOP07
        call    RPLUSA
        call    CLRAOP
        movlw   K2
        mulwf   XnaDruhoulH
        movff   PRODH,AOP23
        movff   PRODL,AOP15
        call    RPLUSA
        return
;*****
; x=Counter^2
;*****
XNA2:   movf    Counter,W
        mulwf   Counter
        movff   PRODH,XnaDruhoulH

```

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```
      movff   PRODL,XnaDrouhouL
      return
;*****
; RESULT=0
;*****
CLRRES: clrf   RESULT23
        clrf   RESULT15
        clrf   RESULT07
        return
;*****
; AOP=0
;*****
CLRAOP: clrf   AOP23
        clrf   AOP15
        clrf   AOP07
        return
;*****
; RESULT=RESULT+AOP
;*****
RPLUSA: movf   AOP07,W
        addwf  RESULT07,F
        movf   AOP15,W
        addwfc RESULT15,F
        movf   AOP23,W
        addwfc RESULT23,F
        return
;*****

;*****
;*****
;*****
;*****
;*****
TI0CODE: movff  STATUS,STEMP      ; zapamatuj stav registru STATUS
        movff  WREG,WTEMP        ; zapamatuj stav registru WREG
        movff  BSR,BTEMP         ; zapamatuj stav registru BSR
;*****
        movlw  T1L               ; prednastavit citac T1
        movwf  TMR1L
;*****
        btfs  STOPSTART          ; tlacitko START/STOP ?
        goto  skip00
        tstfsz clip
        goto  hold00
        btg   StopRun
hold00:  movlw  TTLAC
        movwf  clip
        goto  skip02
;*****
skip00: btfs  DIR                 ; tlacitko DIR ?
        goto  skip01
        tstfsz clip
        goto  hold01
        btg   UpDn
hold01:  movlw  TTLAC
        movwf  clip
        goto  skip02
;*****
skip01:  tstfsz clip              ;filtracni citac
        decf  clip,F
;*****
skip02:  movff  BTEMP,BSR         ; vrat zpet hodnotu registru BSR
        movff  WTEMP,WREG        ; vrat zpet hodnotu registru WREG
        movff  STEMP,STATUS      ; vrat zpet hodnotu registru STATUS
        bcf   PIR1,TMR1IF        ; smazat priznak preruseni
        retfie                    ; navrat z preruseni
;*****
```

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```
;*****  
;  
;  
; Konec programu  
;*****  
      END
```