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;*****************************************
;**** LAB3 delay time Program title:  Running LEDS  ********
;**** Programmer: Mr. Chatchai   ***********
;*****************************************

        PROCESSOR PIC16F628
        #include <P16F628.INC>
        __CONFIG    _CP_OFF & _MCLRE_OFF & _INTRC_OSC_NOCLKOUT & _LVP_OFF &
        _WDT_OFF

;****** Define general purpose registers for temporary variables
        cblock  0x20
            temp
            temp1
            count
            count0
            count1
            count2
        endc
;***********************************************************
        ORG 0x00        ; Reset Vector

        banksel TRISB   ; Switch to bank1
        clrw
        movwf   TRISB   ; Make PortB an output port
        banksel PORTB   ; Switch back to bank0
        movwf   PORTB   ; Turn-off all LEDS

Main_loop:          ; Main loop begins here
        movlw   0x00    ; clear file register 'temp'
        movwf   temp
Again:                  ; repeat this loop 8 times
        movf    temp,w      ; use 'temp' to get a LED pattern from
        call    LED_PATTERN ; LED_PATTERN look-up table
        movwf   PORTB       ; move the obtained LED pattern to PORTB
        call    Delay800mS  ; Delay for 0.8 second

        incf    temp,f      ; increment 'temp' by one

        movf    temp,w
        sublw   .8      ; check if [temp] == 8 ?
        btfss   STATUS,Z
        goto    Again       ; if 'no' repeat this loop again
        goto    Main_loop   ; if 'yes' clear 'temp' back to zero


;******************* Subroutines ****************************

;=========================================================
;* Running LED patterns using a look-up table
;=========================================================
LED_PATTERN:
        addwf   PCL,F
        retlw   B'00000000'     ; Pattern 0
        retlw   B'10000001'     ; Pattern 1
        retlw   B'01000010'
        retlw   B'00100100'
        retlw   B'00011000'
        retlw   B'00100100'
        retlw   B'01000010'
        retlw   B'10000001'     ; Pattern 7

;=========================================================
; Delay subroutine for 0.8 second = 800000uS = 800000 cycles
;=========================================================
Delay800mS:
        movlw   .255            ; 1 cyc
        movwf   count1          ; 1 cyc
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loop1:
        movlw   .241                ; 1 cyc * count1
        movwf   count0          ; 1 cyc * count1
loop2:
        nop                     ; 1 cyc * count1 * count0
        nop                     ; 1 cyc * count1 * count0
        nop                     ; 1 cyc * count1 * count0
        nop                     ; 1 cyc * count1 * count0
        nop                     ; 1 cyc * count1 * count0
        nop                     ; 1 cyc * count1 * count0
        nop                     ; 1 cyc * count1 * count0
        nop                     ; 1 cyc * count1 * count0
        nop                     ; 1 cyc * count1 * count0
        nop                     ; 1 cyc * count1 * count0
        decfsz  count0,F        ; 1 cyc * count1 * count0
        goto    loop2           ; 2 cyc * count1 * count0
        decfsz  count1,F        ; 1 cyc * count1
        goto    loop1           ; 2 cyc * count1
        return                  ; 1 cyc
        ; total = 3 + 5*count1  + 13*count1*count0
        ; count1 = 255
        ; 800,000 = 3+5*255+13*255*count0
        ; count0 = 240.94 = 241
        ; 10 nop


        END
```