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; filename: concert.asm

; This is a demo for driving an FDS-185 display from Surtronic BV as found in a surplus
; store (Baco IJmuiden). Used in buses for line number/destination display. This
; display is a 48x80 pixel LED display, organized as 16 rows by 240 columns (30 bytes).
; The columns are driven by 30 TPIC6B595 shift registers, the rows by 16 high side
; MOSFETs. Data is shifted from top left to bottom right, MSB of row 16 in the bottom
; right corner.

; v0.0  260523  Start project
; v0.1  260524  Add ROWDATA
; v0.2  260525  Brightness Control (LDR)
; v0.3  260528  Better Brite (EN)

        LIST    P=16F1827, F=INHX32
        #include <p16f1827.inc>
        ERRORLEVEL -302         ; sod message about using proper bank

        __CONFIG _CONFIG1, _WDTE_OFF & _BOREN_OFF & _CLKOUTEN_ON & _FOSC_INTOSC
        __CONFIG _CONFIG2, _PLLEN_ON

; Equates
RESET_V         EQU     0x00            ; Address of RESET Vector

; Registers
FLAGS           EQU     0x70            ; Various flags
CTR             EQU     0x71            ; Used to clockout data
INDX            EQU     0x72            ; Index for rowdata
BRT             EQU     0x73            ; Brightness control register
BRT_SET         EQU     0x74            ; Set value derived from LDR
BRT_CTR         EQU     0x75            ; Counter to prevent brite flicker

; Defines
#define         STROE   LATB,1          ; Strobe for '595
#define         EN      LATA,7          ; Output Enable for '595 (active LOW)
#define         A0      LATB,3          ; Row select A for '238
#define         A1      LATA,3          ; Row select B for '238
#define         A2      LATA,2          ; Row select C for '238
#define         TOP     LATA,4          ; Rows 1-8, active LOW ('238)
#define         BOT     LATB,0          ; Rows 9-16, active LOW ('238)
#define         TETS    LATA,1          ; Test pin for scope trigger
; SDO1 RB4 not defined
; SCK1 RB2 not defined

        ORG     0
        GOTO    INIT
        ORG     4

; Interrupts
        RETFIE                          ; There are no interrupts

INIT
; Init stuff
        CLRF    STATUS                  ; Do initialization
        CLRF    BSR                     ; Select Bank 0
        CLRF    INTCON                  ; Clear int-flags, disable interrupts
        CLRF    PCLATH                  ; Keep in lower 2KByte
        BANKSEL TRISA                   ; Select Bank 1
        CLRF    TRISA                   ; RA7-0 Outputs
        BSF     TRISA,0                 ; RA0 Input
        CLRF    TRISB                   ; RB7-0 Outputs
        MOVLW   B'00000110'             ; Timer0, prescaler 1:128
        MOVWF   OPTION_REG
```

```
        MOVLW   B'11110000'
        MOVWF   OSCCON                  ; 32 MHz intosc
        MOVLW   B'00000010'
        MOVWF   WDTCON                  ; WDT 2 ms, disabled
        MOVLW   B'00000001'
        MOVWF   ADCON0                  ; AN0, ADC Enabled
        MOVLW   B'00100000'
        MOVWF   ADCON1
        BANKSEL ANSELA
        MOVLW   B'00000001'
        MOVWF   ANSELA                  ; RA0 Analog input
        BANKSEL SSP1STAT                ; Select Bank 4
        MOVLW   B'01000000'
        MOVWF   SSP1STAT
        MOVLW   B'00100000'
        MOVWF   SSP1CON1                ; SPI Master Mode, 4 MHz clock
        BANKSEL PORTA                   ; Select Bank 0
        CLRF    PORTA
        CLRF    PORTB
        CLRF    FLAGS
        MOVLW   0x1D
        MOVWF   BRT_SET                 ; Preload BRT Set value
        BANKSEL LATA                    ; Select Bank 2

MAIN
        BSF     EN                      ; Blank display
        BSF     TETS
        BCF     TETS                    ; Scope trigger
        CALL    GETBRT                  ; Get new BRT set value (LDR)
        MOVLW   0x1E
        MOVWF   CTR
        CLRF    INDX
        MOVFW   INDX
        CALL    ROWDATA1
        CALL    OUTDATA                 ; OUT Row 1 (000)
        DECFSZ  BRT,F
        GOTO    $+2
        BCF     EN
        INCF    INDX,F
        DECFSZ  CTR,F
        GOTO    $-8
        BSF     EN                      ; Blank display
        MOVFW   BRT_SET
        MOVWF   BRT
        BSF     STROE
        BCF     STROE
        BCF     A0
        BCF     A1
        BCF     A2
        BCF     TOP
        BSF     BOT
        MOVLW   0x1E
        MOVWF   CTR
        MOVFW   INDX
        CALL    ROWDATA1
        CALL    OUTDATA                 ; OUT Row 2 (001)
        DECFSZ  BRT,F
        GOTO    $+2
        BCF     EN
        INCF    INDX,F
        DECFSZ  CTR,F
        GOTO    $-8
        BSF     EN                      ; Blank display
```

```
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BSF     A0
MOVLW   0x1E
MOVWF   CTR
MOVFW   INDX
CALL    ROWDATA1
CALL    OUTDATA                 ; OUT Row 3 (010)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
MOVFW   BRT_SET
MOVWF   BRT
MOVLW   0x1E
MOVWF   CTR
BSF     STROE
BCF     STROE
BCF     A0
BSF     A1
MOVLW   0x1E
MOVWF   CTR
MOVFW   INDX
CALL    ROWDATA1
CALL    OUTDATA                 ; OUT Row 4 (011)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BSF     A0
MOVLW   0x1E
MOVWF   CTR
MOVFW   INDX
CALL    ROWDATA1
CALL    OUTDATA                 ; OUT Row 5 (100)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BCF     A0
BCF     A1
BSF     A2
MOVLW   0x1E
MOVWF   CTR
```

```
MOVFW   INDX
CALL    ROWDATA1
CALL    OUTDATA                 ; OUT Row 6 (101)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BSF     A0
MOVLW   0x1E
MOVWF   CTR
MOVFW   INDX
CALL    ROWDATA1
CALL    OUTDATA                 ; OUT Row 7 (110)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BCF     A0
BSF     A1
MOVLW   0x1E
MOVWF   CTR
MOVFW   INDX
CALL    ROWDATA1
CALL    OUTDATA                 ; OUT Row 8 (111)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BSF     A0
MOVLW   0x1E
MOVWF   CTR
CLRF    INDX                    ; Second page
MOVFW   INDX
CALL    ROWDATA2
CALL    OUTDATA                 ; OUT Row 9 (000)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
```

```
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BCF     A0
BCF     A1
BCF     A2
BSF     TOP
BCF     BOT
MOVLW   0x1E
MOVWF   CTR
MOVFW   INDX
CALL    ROWDATA2
CALL    OUTDATA                 ; OUT Row 10 (001)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BSF     A0
MOVLW   0x1E
MOVWF   CTR
MOVFW   INDX
CALL    ROWDATA2
CALL    OUTDATA                 ; OUT Row 11 (010)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BCF     A0
BSF     A1
MOVLW   0x1E
MOVWF   CTR
MOVFW   INDX
CALL    ROWDATA2
CALL    OUTDATA                 ; OUT Row 12 (011)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BSF     A0
MOVLW   0x1E
MOVWF   CTR
```

```
MOVFW   INDX
CALL    ROWDATA2
CALL    OUTDATA                 ; OUT Row 13 (100)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BCF     A0
BCF     A1
BSF     A2
MOVLW   0x1E
MOVWF   CTR
MOVFW   INDX
CALL    ROWDATA2
CALL    OUTDATA                 ; OUT Row 14 (101)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BSF     A0
MOVLW   0x1E
MOVWF   CTR
MOVFW   INDX
CALL    ROWDATA2
CALL    OUTDATA                 ; OUT Row 15 (110)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
BSF     EN                      ; Blank display
MOVFW   BRT_SET
MOVWF   BRT
BSF     STROE
BCF     STROE
BCF     A0
BSF     A1
MOVLW   0x1E
MOVWF   CTR
MOVFW   INDX
CALL    ROWDATA2
CALL    OUTDATA                 ; OUT Row 16 (111)
DECFSZ  BRT,F
GOTO    $+2
BCF     EN
INCF    INDX,F
DECFSZ  CTR,F
GOTO    $-8
```

```
        BSF     EN                      ; Blank display
        MOVFW   BRT_SET
        MOVWF   BRT
        BSF     STROE
        BCF     STROE
        BSF     A0
        GOTO    MAIN

; Subroutines
GETBRT
        DECFSZ  BRT_CTR,F
        RETURN
        MOVLW   0x1D
        MOVWF   BRT_SET                 ; Preload BRT Set value
        BANKSEL ADCON0
        BSF     ADCON0,GO
        BTFSC   ADCON0,GO
        GOTO    $-1
        MOVLW   0xCF
        BANKSEL ADRESH
        SUBWF   ADRESH,W
        BTFSC   STATUS,C
        RETURN
        DECF    BRT_SET,F               ; Set level 0x1C
        MOVLW   0xBF
        SUBWF   ADRESH,W
        BTFSC   STATUS,C
        RETURN
        DECF    BRT_SET,F               ; Set level 0x1B
        MOVLW   0xAF
        SUBWF   ADRESH,W
        BTFSC   STATUS,C
        RETURN
        DECF    BRT_SET,F               ; Set level 0x1A
        MOVLW   0xA7
        SUBWF   ADRESH,W
        BTFSC   STATUS,C
        RETURN
        DECF    BRT_SET,F               ; Set level 0x19
        MOVLW   0x9F
        SUBWF   ADRESH,W
        BTFSC   STATUS,C
        RETURN
        DECF    BRT_SET,F               ; Set level 0x18
        MOVLW   0x8F
        SUBWF   ADRESH,W
        BTFSC   STATUS,C
        RETURN
        DECF    BRT_SET,F               ; Set level 0x17
        MOVLW   0x87
        SUBWF   ADRESH,W
        BTFSC   STATUS,C
        RETURN
        DECF    BRT_SET,F               ; Set level 0x16
        MOVLW   0x7F
        SUBWF   ADRESH,W
        BTFSC   STATUS,C
        RETURN
        DECF    BRT_SET,F               ; Set level 0x15
        MOVLW   0x77
        SUBWF   ADRESH,W
        BTFSC   STATUS,C
        RETURN
```

```
DECF    BRT_SET,F               ; Set level 0x14
MOVLW   0x6F
SUBWF   ADRESH,W
BTFSC   STATUS,C
RETURN
DECF    BRT_SET,F               ; Set level 0x13
MOVLW   0x67
SUBWF   ADRESH,W
BTFSC   STATUS,C
RETURN
DECF    BRT_SET,F               ; Set level 0x12
MOVLW   0x5F
SUBWF   ADRESH,W
BTFSC   STATUS,C
RETURN
DECF    BRT_SET,F               ; Set level 0x11
MOVLW   0x5B
SUBWF   ADRESH,W
BTFSC   STATUS,C
RETURN
DECF    BRT_SET,F               ; Set level 0x10
MOVLW   0x57
SUBWF   ADRESH,W
BTFSC   STATUS,C
RETURN
DECF    BRT_SET,F               ; Set level 0x0F
MOVLW   0x53
SUBWF   ADRESH,W
BTFSC   STATUS,C
RETURN
DECF    BRT_SET,F               ; Set level 0x0E
MOVLW   0x4F
SUBWF   ADRESH,W
BTFSC   STATUS,C
RETURN
DECF    BRT_SET,F               ; Set level 0x0D
MOVLW   0x4B
SUBWF   ADRESH,W
BTFSC   STATUS,C
RETURN
DECF    BRT_SET,F               ; Set level 0x0C
MOVLW   0x47
SUBWF   ADRESH,W
BTFSC   STATUS,C
RETURN
DECF    BRT_SET,F               ; Set level 0x0B
MOVLW   0x43
SUBWF   ADRESH,W
BTFSC   STATUS,C
RETURN
DECF    BRT_SET,F               ; Set level 0x0A
MOVLW   0x3F
SUBWF   ADRESH,W
BTFSC   STATUS,C
RETURN
DECF    BRT_SET,F               ; Set level 0x09
MOVLW   0x3B
SUBWF   ADRESH,W
BTFSC   STATUS,C
RETURN
DECF    BRT_SET,F               ; Set level 0x08
MOVLW   0x37
SUBWF   ADRESH,W
```

```
        BTFSC   STATUS,C
        RETURN
        DECF    BRT_SET,F               ; Set level 0x07
        MOVLW   0x33
        SUBWF   ADRESH,W
        BTFSC   STATUS,C
        RETURN
        DECF    BRT_SET,F               ; Set level 0x06
        MOVLW   0x2F
        SUBWF   ADRESH,W
        BTFSC   STATUS,C
        RETURN
        DECF    BRT_SET,F               ; Set level 0x05
        MOVLW   0x27
        SUBWF   ADRESH,W
        BTFSC   STATUS,C
        RETURN
        DECF    BRT_SET,F               ; Set level 0x04
        RETURN

OUTDATA
        BANKSEL SSP1BUF                 ; Select Bank 4
        MOVWF   SSP1BUF
        BANKSEL PIR1                    ; Select Bank 0
        BTFSS   PIR1,SSP1IF
        GOTO    $-1
        BCF     PIR1,SSP1IF
        BANKSEL LATA                    ; Select Bank 2
        RETURN

ROWDATA1
; 240 bytes called by INDX
; Row 1
        BRW
        RETLW   0x45
        RETLW   0x29
        RETLW   0x31
        RETLW   0x92
        RETLW   0x10
        RETLW   0x00
        RETLW   0x04
        RETLW   0xB5
        RETLW   0xEA
        RETLW   0x9A
        RETLW   0xD0
        RETLW   0x00
        RETLW   0x00
        RETLW   0x3A
        RETLW   0x5D
        RETLW   0x17
        RETLW   0x10
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
```

```
        RETLW   0x00

; Row 2
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x04
        RETLW   0xA5
        RETLW   0x28
        RETLW   0x8A
        RETLW   0x90
        RETLW   0x00
        RETLW   0x00
        RETLW   0x0A
        RETLW   0xC5
        RETLW   0x11
        RETLW   0x10
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00

; Row 3
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x03
        RETLW   0xA5
        RETLW   0x28
        RETLW   0xBA
        RETLW   0x90
        RETLW   0x00
        RETLW   0x00
        RETLW   0x3B
        RETLW   0x4C
        RETLW   0xA3
        RETLW   0x10
        RETLW   0x00
        RETLW   0x03
        RETLW   0x9D
        RETLW   0xD9
        RETLW   0x26
        RETLW   0x60
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
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        RETLW   0x00
        RETLW   0x00

; Row 4
        RETLW   0x1F
        RETLW   0x08
        RETLW   0x7C
        RETLW   0x21
        RETLW   0xF0
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x22
        RETLW   0x44
        RETLW   0xA1
        RETLW   0x10
        RETLW   0x00
        RETLW   0x01
        RETLW   0x24
        RETLW   0x45
        RETLW   0x69
        RETLW   0x10
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00

; Row 5
        RETLW   0x24
        RETLW   0x94
        RETLW   0x92
        RETLW   0x52
        RETLW   0x48
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x3A
        RETLW   0x5C
        RETLW   0x47
        RETLW   0x70
        RETLW   0x00
        RETLW   0x01
        RETLW   0x1C
        RETLW   0xC5
        RETLW   0xA9
        RETLW   0x10
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
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        RETLW   0x00
        RETLW   0x00
        RETLW   0x00

; Row 6
        RETLW   0x4A
        RETLW   0x49
        RETLW   0x29
        RETLW   0x24
        RETLW   0xA4
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x97
        RETLW   0x70
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x01
        RETLW   0x24
        RETLW   0x45
        RETLW   0x29
        RETLW   0x10
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00

; Row 7
        RETLW   0x84
        RETLW   0x3E
        RETLW   0x10
        RETLW   0xF8
        RETLW   0x42
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0xB1
        RETLW   0x10
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x01
        RETLW   0x25
        RETLW   0xD9
        RETLW   0x26
        RETLW   0x60
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
```

```
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00

; Row 8
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0xD3
        RETLW   0x30
        RETLW   0x00
        RETLW   0x00
        RETLW   0x39
        RETLW   0x90
        RETLW   0x9C
        RETLW   0x90
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00

ROWDATA2
; 240 bytes called by INDX
; Row 9
        BRW
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x91
        RETLW   0x10
        RETLW   0x00
        RETLW   0x00
        RETLW   0x10
        RETLW   0x50
        RETLW   0xA4
        RETLW   0x50
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
```

```
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00

; Row 10
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x97
        RETLW   0x70
        RETLW   0x00
        RETLW   0x00
        RETLW   0x13
        RETLW   0x50
        RETLW   0x9C
        RETLW   0x70
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
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        RETLW   0x70
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
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        RETLW   0x83

; Row 11
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        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x12
        RETLW   0x52
        RETLW   0xA4
        RETLW   0x90
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
```

```
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        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x82

; Row 12
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        RETLW   0x00
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        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
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        RETLW   0x00
        RETLW   0x00
        RETLW   0x11
        RETLW   0x8C
        RETLW   0xA5
        RETLW   0x10
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0xE6
        RETLW   0x90
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0xEE
        RETLW   0x91
        RETLW   0x26
        RETLW   0x44

; Row 13
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        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x44
        RETLW   0xC7
        RETLW   0x31
        RETLW   0x8E
        RETLW   0x70
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
```

```
        RETLW   0x00
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        RETLW   0x90
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x42
        RETLW   0x91
        RETLW   0x69
        RETLW   0x44

; Row 14
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        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x6D
        RETLW   0x29
        RETLW   0x0A
        RETLW   0x52
        RETLW   0x90
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0xEE
        RETLW   0x70
        RETLW   0x00
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        RETLW   0x00
        RETLW   0x46
        RETLW   0xF1
        RETLW   0xAF
        RETLW   0x28

; Row 15
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        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x55
        RETLW   0xE7
        RETLW   0x6A
        RETLW   0x4E
        RETLW   0x70
        RETLW   0x00
        RETLW   0x03
        RETLW   0xA4
        RETLW   0xC8
        RETLW   0xBA
        RETLW   0x90
        RETLW   0x00
        RETLW   0x00
```

```
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        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x42
        RETLW   0x91
        RETLW   0x29
        RETLW   0x28

; Row 16
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        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x45
        RETLW   0x29
        RETLW   0x4A
        RETLW   0x52
        RETLW   0x10
        RETLW   0x00
        RETLW   0x04
        RETLW   0xAD
        RETLW   0x2D
        RETLW   0x8A
        RETLW   0xB0
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x00
        RETLW   0x4E
        RETLW   0x91
        RETLW   0x29
        RETLW   0x10

; End Subroutines

        END
```