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; The processor clock speed is 16MHz.Cycle time is .750mS.
; Demo software to display a bonsai tree bitmap image and 4
; lines of text on a 320 x 240 LCD.

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    org 00h
    ljmp start ;program start
    org 100h

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; Initialize the 32241
; Text page 0000h 04afh
; Graphics page 04b0h 2a2fh

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start:          mov r1,#40h          ;system set
                lcall comm32
                mov dptr,#msg1      ;ss param
                lcall data32
                mov r1,#44h         ;scroll
                lcall comm32
                mov dptr,#msg2      ;scroll param
                lcall data32
                mov r1,#5dh         ;csr form
                lcall comm32
                mov dptr,#msg3      ;csr param
                lcall data32
                mov r1,#4ch         ;csrdir
                lcall comm32
                mov r1,#5ah         ;hdot scr
                lcall comm32
                mov dptr,#msg18     ;hdot param
                lcall data32
                mov r1,#5bh         ;overlay
                lcall comm32
                mov dptr,#msg4      ;ovrly param
                lcall data32
                mov r1,#59h         ;disp on/off
                lcall comm32
                mov dptr,#msg5      ;disp param
                lcall data32

; clear the text page
    lcall clrtext

; display bitmap
    mov r1,#46h          ;set cursor
    lcall comm32
    mov dptr,#msg6
    lcall data32
    mov r1,#42h         ;mwrite
    lcall comm32
    mov dptr,#msg12
    lcall data32

; display text
    mov r1,#46h          ;set cursor

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lcall comm32
mov dptr,#msg7
lcall data32
mov r1,#42h ;mwrite
lcall comm32
mov dptr,#msg14
lcall data32
mov r1,#46h ;set cursor
lcall comm32
mov dptr,#msg8
lcall data32
mov r1,#42h ;mwrite
lcall comm32
mov dptr,#msg15
lcall data32
mov r1,#46h ;set cursor
lcall comm32
mov dptr,#msg9
lcall data32
mov r1,#42h ;mwrite
lcall comm32
mov dptr,#msg16
lcall data32
mov r1,#46h ;set cursor
lcall comm32
mov dptr,#msg10
lcall data32
mov r1,#42h ;mwrite
lcall comm32
mov dptr,#msg17
lcall data32
sjmp $ ;stop

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;*****
;SUBROUTINES
; comm32 sends the byte in R1 to the 32241 display as a
; command

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comm32:          setb p3.2 ;a0=1=command

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comm321:        mov a,r1 ;get data byte
                mov p1,a
                clr p3.0 ;CS the display
                clr p3.1 ;strobe
                setb p3.1
                setb p3.0
                ret

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; write32 sends the byte in R1 to the
; 32241 display as a data byte.

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write32:        clr p3.2 ;a0=0=data
                sjmp comm321

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; data32 sends the message pointed to

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; by the DPTR to the 32241 display.

data32:          clr a ;get the byte
                movc a,@a+dptr
                cjne a,#0a1h,data321;done?
                ret

data321:         mov r1,a
                lcall write32 ;send it
                inc dptr
                sjmp data32 ;next byte

; Clear text RAM on the 3224

clrtext:         mov r1,#46h ;set cursor
                lcall comm32
                mov dptr,#msg13 ;cursor param
                lcall data32
                mov r1,#42h ;mwrite
                lcall comm32
                mov dptr,#msg11 ;all spaces
                lcall data32
                mov r1,#46h ;set cursor
                lcall comm32
                mov dptr,#msg6
                lcall data32
                ret

;*****
; TABLES AND DATA
; Initialization parameters for 3224.

msg1:           db 30h,87h,07h,27h ;system set
                db 39h,0efh,28h,0h,0a1h

msg2:           db 0,0,0efh,0b0h ;scroll
                db 04h,0efh,0,0
                db 0,0,0a1h

msg3:           db 04h,86h,0a1h ;csr form

msg4:           db 01h,0a1h ;overlay param

msg5:           db 16h,0a1h ;disp on/off

msg6:           db 0b0h,04h,0a1h ;set cursor to

                ;graphics page

msg7:           db 31h,2h,0a1h ;set cursor

                ;text page
                ;1st line

msg8:           db 59h,2,0a1h ;2nd line

msg9:           db 81h,2,0a1h ;3rd line

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msg10:                db 0a9h,2,0a1h ;4th line

; 1200 spaces for text page clear The following table is
; not listed here, except for the first 8 bytes, but
; consists of 1200 bytes all of which are 20h

msg11:                db ' '
                    db 01ah

msg18:                db 0,01ah ;hscr param

; 320x240 bonsai tree graphic
; The following table is not listed here. It consists of
; 9600 bytes, which constitute a full screen bit map image
; of a bonsai tree. You may add a few bytes before the
; 01ah termination byte for testing purposes or include a
; complete bitmap image

msg12:                db 01ah

msg13:                db 0,0,01ah ;set cursor to text page

msg14:                db 'AZ Displays'
                    db 0a1h

msg15:                db 'Complete LCD Solutions'
                    db 0a1h

msg16:                db '75 Columbia'
                    db 0a1h

msg17:                db 'Aliso Viejo'
                    db 0a1h

end
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