

Software:

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$MOD751

; *****
; *
; *      Tianma 320 x 240 programming code
; *
; *****

; 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.

    org    00h
    ljmp   start          ;program start

    org 100h

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

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        ;csdir
    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

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

; *****
; SUBROUTINES

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

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

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

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

; data32 sends the message pointed to
; by the DPTR to the 32241 display.

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

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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

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
; puposes or include a complete
; bitmap image

msg12:
    db      01ah

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

msg14:
    db      'HANTRONIX'
    db      0a1h

msg15:
    db      'Crystal Clear and'
    db      0a1h

msg16:
    db      'Visibly Superior'
    db      0a1h

msg17:
    db      'LCD Modules'
    db      0a1h

end

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