

Eastern Mediterranean University

Department Of Electrical & Electronics Engineering

Course: Microprocessor I

Instructor: *Prof. Dr. Hasan Demirel*

Project: Oscilloscope via parallel port

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Abstract:

The project main aim is implementing oscilloscope with desktop PC processor via parallel port.

Components:

a) Hardware:

- 1) ADC 0804 IC
- 2) Parallel port

b) Software:

EMU8086 Assembler

Functionality:

After conversion of analog signal into digital through the IC, parallel port will read the IC output, and it will plot a graph according to the value read. A custom mini graph library was developed to achieve the line graphing.

Code:***GRAPH.mac***

```
CLEAR MACRO R1, C1, R2, C2
    MOV AH, 06H
    MOV CL, C1
    MOV CH, R1
    MOV DL, C2
    MOV DH, R2
    MOV BH, 07H
    INT 10H
```

ENDM

```
CLEAR_SCREEN MACRO
    CLEAR 0,0, 18H, 4FH
ENDM
```

```
SET_CURSOR MACRO R,C
    MOV DL, C
    MOV DH, R
    MOV AH, 02H
    MOV BH, 0
    INT 10H
ENDM
```

```
MODE_CGA_TXT MACRO
    MOV AH,0
    MOV AL,03H
    INT 10H
```

```
ENDM
```

```
MODE_MONO MACRO
    MOV AH,0
    MOV AL,07H
    INT 10H
ENDM
```

```
MODE_GRAPH MACRO
    MOV AH,0
    MOV AL,13H
    INT 10H
ENDM
```

```
PLOT_POINT MACRO X,Y,COLOR
    LOCAL SET_WHITE, OVR
    AND AX, 0
    MOV AH, 0CH
    MOV CX, Y
    MOV DX, X
    MOV BX, COLOR
    CMP BX, 'b'
    JE SET_WHITE
SET_WHITE: MOV AL, 01H
            JMP OVR
OVR: INT 10H
ENDM
```

```
POINT MACRO X,Y
    MOV BX, X
    MOV AX, Y
    PLOT_POINT BX,AX, 'b'
ENDM
```

DELAY.mac

```
DELAY MACRO
  LOCAL w1

  MOV CX, BASE_DELAY_AMNT

  ;PUSH AX

  w1:
    IN AL, 61H
    AND AL, 10H
    CMP AL, AH
    JE w1
    MOV AH, AL
    LOOP w1
  ; POP AX

ENDM
```

```
SET_DELAY MACRO DTIME
  LOCAL w, PASS1
  ;
  PUSH AX
  MOV CX, DTIME
  CMP CX, 0
  JE PASS1
  w:
    PUSH CX
    DELAY
    ;DISPLAY _DELAYIN_
    POP CX
    LOOP w

  PASS1::
  POP AX

ENDM
```

TEST.asm

org 100h

```
SET_READ_MODE MACRO
    MOV DX, 037AH
    IN AL, DX
    OR AL, 00100000B
    OUT DX, AL
ENDM
```

```
READ MACRO VAL
    MOV DX, 0378H
    IN AL, DX
    MOV VAL, AL
ENDM
```

```
; add your code here
    INCLUDE "GRAPHICS.mac"
    INCLUDE "DELAY.mac"
        .MODEL SMALL
        .STACK 64
        ;
        .DATA
        ;
BASE_DELAY_AMNT DW    0FFFH
        ;
        .CODE
MAIN    PROC FAR
        MOV AX, @DATA
        MOV DS, AX
        ;
        CLEAR_SCREEN
        SET_READ_MODE
        MODE_GRAPH
```

```
J:  READ BL
    AND BX,0
    PLOT_POINT SI,BX,'b'
    INC SI
    CMP SI, 255
    JNE P
    AND SI, 0
    P::
    JMP J
        ;
        MOV AH, 4CH
        INT 21H
MAIN    ENDP
        ;
        END MAIN
```

ret

