Dhaka University of Engineering & Technology (DUET), Gazipur

Department of Computer Science and Engineering (CSE)

Course Title: Microprocessor & Interfacing Sessional (CSE 3812)

Lab: 04

Getting Familiar with Dot-Matrix Display of MDA-8086 Kit.

Objectives:

To understand MDA 8086 trainer Kit Command to control its Dot-Matrix display.

Basic Theory:

The Dot Matrix inside the MDA-8086 trainer kit can be used to display any pattern of LEDs in the dot matrix display. This requires PIO 8255 PPI ports which are already connected to the Dot Matrix internally. Through the code we can access these ports and provide binary or hex value to switch the required LEDs on and off. In order to turn an LED ON, a logical 0 should be provided to the row and a logical 1 should be provided to the column because of the following arrangement. Any particular shape or design can be formed by turning on the required LEDs on the Dot Matrix display.

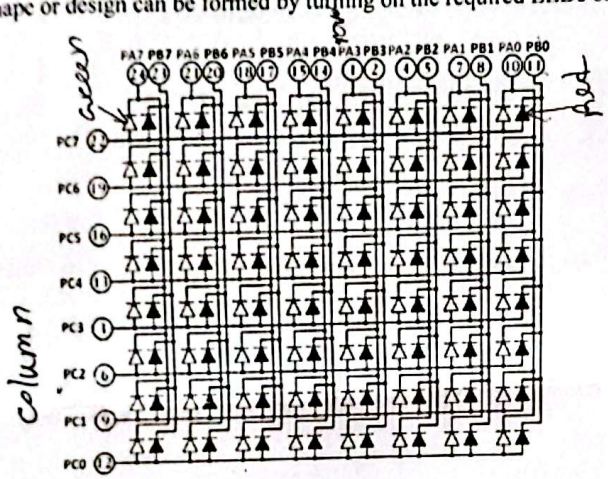

Figure: DOT Matrix Display (Rows- Columns) Organization

Dot-Matrix display data generation rules: As a different Programmable Peripheral Interface (PPI) 8255 is used for Dot Matrix display, the address of the ports is also different. Hence, the addresses are:

Port A: 18h Port B:1Ah Port C:1Ch Control Reg:1Eh

In Dot Matrix display, Port C will be used for the value of the COLUMNS and Port A or B will be used for the value of the ROWS. In-case of Ports C, pass LOGIC '1' signal for the particular column. In-case of Port A or B pass LOGIC '0' signal for the particular row.

Port A is used for displaying GREEN light and port B for displaying RED light. Column 0 is the LSB of Port C and Column 7 is the MSB of Port C. Row 0 is the MSB of Port A or B and Row 7 is the LSB.

Example 1: To illuminate the TOP RIGHT-MOST LED with GREEN light the values are:

For port C = 10000000
For port A = 01111111
For port B = 11111111

Example 2: To illuminate Column LEDs from left-to-right with an interval the code is:

```
CODE SEGMENT
ASSUME CS: CODE, DS: CODE

PPIC_C   EQU 1EH          ; Control register address
PPIC     EQU 1CH          ; Port C address
PPIB     EQU 1AH          ; Port B address
PPIA     EQU 18H          ; Port A address

ORG      1000H            ;The code is placed at offset 1000h
MOV      AL, 10000000B    ;Mode set for Control Word to control 8255 PPI
```

```
        OUT         PPIC_C, AL

        MOV         AL, 11111111B       ; Turning of Port A
        OUT         PPIA, AL

        MOV         AL, 00000000B       ; Passing data to Port B
        OUT         PPIB, AL

L1:     MOV         AL, 00000001B       ; Passing data to Port C
L2:     OUT         PPIC, AL
        CALL        TIMER
        CLC
        ROL         AL,1                ; Changing data of Port C
        JNC          L2
        JMP         L1
        INT         3

TIMER:      MOV         CX, 0FFFFH
TIMER1:     NOP
            NOP
            NOP
            NOP
            LOOP  TIMER1
            RET

CODE ENDS
END
```

Task to do:

Write an assembly language program to illuminate rows from Top-to-Bottom with alternate colors LEDs.

Led - Port B

Dot - matrix display (8X8)

column → port C

row → Port A, B

green

red

PortB = 1111 1111

PortC = 1000 0000

PortA = 0111 1111