



EXPERIMENT REPORT OF ASSEMBLY LANGUAGE

Assignment 2 Experiment 3

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Problem Description:

Chapter 4 Experiment 3 Display devices Interfacing

(2) Digital tube display control.

In this experiment, a digital tube constructed by 6 nixie tubes are provided as a display, as shown in figure4.2. These six nixie tubes share a group of common inputs: pinA, B, C,...P,...U,DP. By providing a high voltage at these pins, the display fields of all the tubes will be turned on. Thus if we want to display only one digit number, we should active only one tube but not all of them before we send pattern_code to the common input pins. The tube selective pins are on the right side: pin1,2,...5. By providing a GND voltage to one of the selective pins, and high voltage to others, we can active only one nixie tube for display. In the digital tube display in Figure4.2, pin1 will active the tube on the leading left side, and pin6 will active the tube on the most right side. As a result, if you want to display 6 digits, you should active tube1 in the first place, and output pattern_code of the first digit to the digital tube display, then turn off tube1, and turn on tube2, output the pattern_code of the second digit. And so on till you display the sixth digit. Then roll back to display the first digit with tube1, and repeat continuously.

In the hardware schematic design of assignment2 (figure4.3), the digital tube display is connected to the ports of a piece of 8255. PortB is used to send pattern_code, and PortC is used to send tube-active-code.

There is a variable DATA1 defined in the DATA segment. It contains 6 digits and is stored in the DATA segment in unpacked BCD format. Please write a program and display

DATA1 with the digital tube display. A template of the program is provided in file 8255Tube.asm. And port numbers and pattern_codes table are defined in the template code file.

Goal:

We have digital tube constructed by 6 nixie tubes are provided as a display. We want to display only one digit number, we should active only one tube but not all of them before we send pattern_code to the common input pins. The tube selective pins are on the right side. display 6 digits, we have to active tube1 in the first place, and output pattern_code of the first digit to the digital tube display, then turn off tube1, and turn on tube2, output the pattern_code of the second digit. And so on till you display the sixth digit. Then roll back to display the first digit with tube1, and repeat continuously.

Code:

```
.MODEL SMALL

.STACK 32

.DATA

PORT_A EQU 40H

PORT_B EQU 42H

PORT_C EQU 44H

PORT_CTRL EQU 46H

CTRLWORLD_8255 = 10000000B      ;BOTH PORT WILL OUTPUT IN MOD0

;PATTERN TABLE GIVEN TO US ,BY THE TEACHER

PATTERN_TABLE DB 3FH, 06H, 0DBH, 0CFH

                DB 0E6H, 0EDH, 0FDH, 07H

                DB 0FFH, 0EFH, 0F7H, 0FCH

                DB 03DH, 0DEH, 0F9H, 0F1H

;DATA1      DB 1,2,3,4,5,6      ;UNPACKED BCD NUMBER WILL BE DISPLAYED

DATA1      DB 5,6,7,8,9,0      ;UNPACKED BCD NUMBER WILL BE DISPLAYED

.CODE

MAIN PROC FAR
```

```

MOV AX, @DATA

MOV DS, AX

;TODO1:PROGRAM 8255

MOV DX, PORT_CTRL

MOV AL, 10000000B      ;MOV AL, CTRLWORD_8255

OUT DX, AL

;TODO2:

LOOP1:

    MOV CX, 6           ;6 UNPACKED BCD TO BE DISPLAY

    MOV SI, OFFSET DATA1 ;SI WILL BE POINTED

    MOV AH, 00H

    MOV AL, 0FEH        ;

    ;TODO3:BEGIN TO DISPLAY

LOOP2:

    ;

    MOV DX, PORT_C

    OUT DX, AL          ;

    PUSH AX              ;PUSH AX IN THE STACK

    ;TODO3

    MOV BX, OFFSET PATTERN_TABLE ;BX POINTS TO THE PATTERN TABLE

    MOV AL, BYTE PTR [SI] ;LOADING A BCD NUMBER

    XLAT                 ;WE ARE RETRIEVE PATTERN-CODE

    MOV DX, PORT_B

    OUT DX, AL

    CALL DELAY

    ;TODO3-3:           ;MOVE TO NEXT BCD NUMBER AND RETRIEVE TUBE-ACTIVE-CODE FROM
STACK,THEN MOVE TO NEXT TUBE BY ROL

    INC SI              ;MOVE TO NEXT BCD NUMBER

    POP AX

    ROL AL, 1           ;CONSTRUCT NEXT TUBE-ACTIVE-CODE

    LOOP LOOP2          ;

```

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        JMP LOOP1

        MOV AX, 4C00H        ;RETURN TO DOS
        INT 21H

MAIN ENDP

;;=====

;SUBROUTINE:DELAY
;DELAY FOR SOME MILLISECONDS
DELAY  PROC NEAR

        PUSH BX;            ;PUSH BX IN THE STACK

        PUSH CX;            ;PUSH CX IN THE STACK

        MOV BX, 0FH

LOOP_OUT:                ;LABEL OF OUTERLOOP

        MOV CX, 0FFH

LOOP_INNER:                ;LABEL OF INNERLOOP

        LOOP LOOP_INNER

        DEC BX

        JNZ LOOP_OUT

        POP CX                ;POP CX FROM THE STACK

        POP BX                ;POP BX FROM THE STACK

        RET

DELAY  ENDP

END MAIN                    ;THIS IS THE PROGRAM EXIT POINT

```

Debugging:

This is a new IDE for me ,I have never used it before .So,at the beginning ,I couldn't understand the use of so many features.Eventually,after watching video.

Attachment:

- 1) Experiment-3(assignment-1).mkv
- 2) 8255Tube.asm
- 3) 8255Tube.DSN
- 4) Exp-3_ assignment2.pdf

Acknowledgement:

I complete this assignment by myself by using online videos and taking help from online. The most useful help from teacher's hint given in question, the theory class and the lecture note from the practical class