**Microprocessor Lab-work #2.1uvision**

**Use of discrete LEDs** 100-11-14

[1] **Subject and goals**

(a) The access of every individual LED for ON/OFF control in the 2 sets of discrete LED modules.

(b) Organized display patterns in static or dynamic form can be achieved as required.

[2] **Preparations**

(a) **Refer to the ckt schematic diagram**:

(a.1) how ON/OFF control of the LED module is to be done?

(a.2) functions of TTL 74244 and its role in the ckt?

(a.3) functions of the *array resistors* RN4 and RN6, and their roles in the ckt?

(a.4) data path from 51CPU to the discrete LED modules?

(b) **Datasheets reading**:

(b.1) TTL 74244

(c) **Readiness-evaluation:**

Can you or can you not

(c.1) check the discrete LED module to see if it’s working or not by manual wiring the circuitry?

(c.2) carry out trouble shooting along the path way when the lab-work isn’t going as expected? How will you do that?

[3] **Lab-work for all:**

The task here is to use the two discrete LDE modules for dynamic display patterns as graphically depicted below.

phase 1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |

module1 ( right to left flickering )

module2 ( ON-OFF switching )

|  |  |
| --- | --- |
| **ON** | **OFF** |

phase 2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |

module1 ( left to right flickering )

module2 ( ON-OFF switching )

|  |  |  |  |
| --- | --- | --- | --- |
| **OFF** | **ON** | **OFF** | **ON** |

phase 3

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |

module1 ( right to left flickering )

module2 ( ON-OFF switching )

|  |  |
| --- | --- |
| **OFF** | **ON** |

phase 4

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |

module1 ( left to right flickering )

module2 ( ON-OFF switching )

|  |  |  |  |
| --- | --- | --- | --- |
| **ON** | **OFF** | **ON** | **OFF** |

(a) **Operating Procedure**

(a.1) jumper-wiring for ckt setup

Refer to the schematic circuit diagram, do all jumper-wiring necessary for setting up the circuitry as required below.

VCC

bit7 bit0

**51μ*p*** ‘244

RN4/RN5

P0

8

JPx JPy VCC

Vcc

EA

‘244

RN7/RN7

P1

8

JPm JPn

(a.2) code preparation:

\*\* edit the following sample 51 assembly code under µVsion51.

org 0

mov sp, #50H

clr c

mov a, #0feH

mov R7, a

mov a, #0fH

mk1:

cpl a

mov r6, a

mov p1, A

mov a, r7

mov p0, a

call delay

rlc a

mov r7, a

mov a, r6

jc mk1

mov a, #0ccH

mk2:

cpl a

mov r6, a

mov p1, a

mov a, r7

mov p0, a

call delay

rrc a

mov r7,a

mov a, r6

jc mk2

mov a, #0f0H

mk3:

cpl a

mov r6, a

mov p0, a

mov a, r7

mov p1, a

call delay

rlc a

mov r7, a

mov a, r6

jc mk3

mov a, #0ccH

mk4:

cpl a **; XXX**

mov r6, a

mov p0, a

mov a, r7

mov p1, a

call delay

rrc a

mov r7,a

mov a, r6

jc mk4

mov a, #0fH

jmp mk1

delay:

push 5

; push R5???

push 6

push 7

mov r5, #2

dd1:

mov r6, #200

dd2:

mov r7, #250

djnz r7, $

djnz r6, dd2

djnz r5, dd1

pop 7

pop 6

pop 5

ret

end

(a.3) task execution:

\*\* start IDE51 emulation,

\*\* start execution and trouble-shooting if necessary.

(b) **Observations**

(b.1) Through the display of IDE51 in emulation mode, get yourself acquainted with the machine codes of instructions in the sample program.

(b.2) Is the code running well? If not, congratulate you that you have a chance for getting more experience in trouble-shooting.

If so, also congratulate you that you may call it a day

(b.3) *Any possibility of making the codes more concise?*

[4] **Comprehension evaluation**

(a) Can you identify the stack status (where SP is pointing to, contents of the stack, etc.) at any instance during the task execution?

(b) When seeing a specific patterns appearing on the two LED modules, can you tell exactly which instruction line (or some instruction lines) is (are) possibly being executed? And the contents of associated registers?

(c) For the code line marked with **;XXX**, how would the display pattern sequence changed if it is removed?