8086 Experiments with Proteus

Experiment One: IO Address Decoding

1. Goals

You should be familiar with the Proteus software and the IO address decoding; be able to write a program to control the state of LEDs which uses the 74LS244 as the input port of switches and the 74LS273 as the output port for LEDs.

2. Schematic Design

Use the given schematic: 8086_experiment_one.DSN

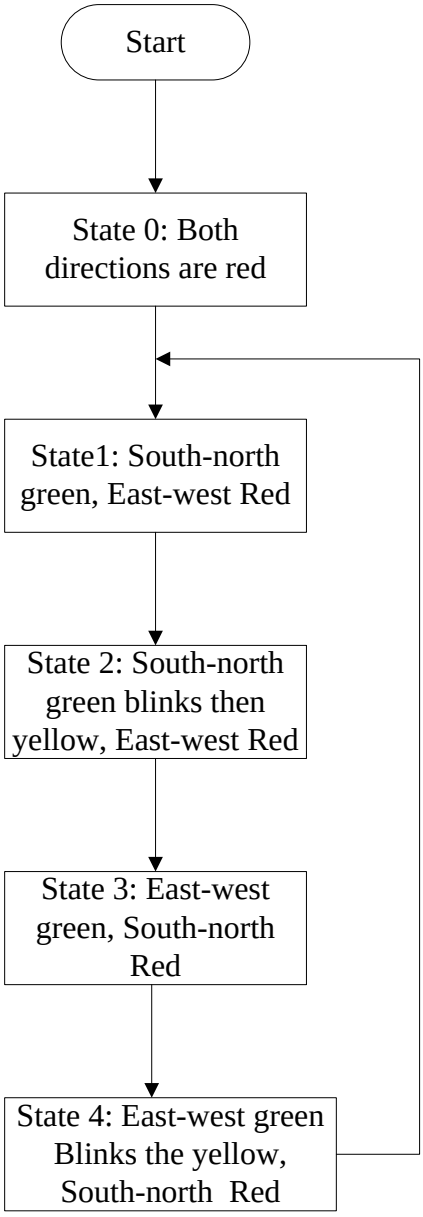
3. Requirements

1) You will learn how to select instruments and how to wire up those instruments in the Proteus software environment. Furthermore, you will learn the methods of loading program in Proteus software environment, and be able to use the MASM assembler to compile 8086 assembly language programs.
2) Given the schematic, write a program to read in the state of the 74LS244, invert the state, and then write to the 74LS273.
3) Write a program to control the colored (i.e., red, green, and yellow) LEDs and simulate the traffic lights at an intersection.
4) If the address of 74LS244 is required to be 90H～97H and that of the 74LS273 is required to be 0A0H～0A7H, please modify the diagram and complete Requirement 2) again.

4. Details of the Experiment

To accomplish Requirement 3), you need to understand how the actual traffic lights change. For example, assume that, in the beginning, all lights are in State 0 in which both red lights in the east-west and the south-north directions are on. Then, it goes to State 1, in which, in the south-north direction, the red light turns off and the green light turns on, and in the east-west direction, the red light keeps on. After a short period of time, it comes to State 2 in which the yellow light in the south-north direction turns on after the green light starts to flash several times and turns off. After a short delay, here comes State 3 in which the red light in the south-north direction turns on and the yellow light turns off. Meanwhile, the green light in the east-west direction turns on and the red light turns off. State 4 is similar with State 2 except that the directions of lights are swapped. After a short delay, it loops back to State 1.

5. Block Diagram



The state of port 273

State	Meaning	The state of 273 D7---D0
State 0	Both directions are red	××110110 36H
State 1	South-north green, east-west red	××110011 33H
State 2	South-north green blinks then yellow, east-west red	South-north green blinks (on and off), east-west red:

		××110011 33H (on) ××110111 37H (off) South-north yellow, east-west red: ××110101 35H
State 3	East-west green, south-north red	××011110 1EH
State 4	East-west green blinks then yellow, south-north red	East-west green blinks (on and off), south-north red: ××011110 1EH (on) ××111110 3EH (off) East-west yellow, south-north red: ××101110 2EH

6. Experimental Results

You should be able to demonstrate your experimental results.