CPE 301   Microprocessor System Design Lab

Fall 2013

Lab # 03

Objective:

To learn about decoders, D-type latches, and shift registers. Get familiar with 74LS138 decoder, 74LS373 octal D-type latch, and 74LS164 shift register. (These should be familiar from CPE 201.)

Procedure:

1) Build a circuit to determine the truth table of the 74LS138 3-to-8 decoder. Connect the 74LS138 outputs to LED's through a 74LS373 octal D latch. Configure LED's to be off when not addressed. Use a 320 ohm resistor to limit the current through the LED. Tie the LE (latch enable) pin of the 74LS373 high and obtain the truth table. Then, tie the LE low (0 volts) and try to change the input combination for the 74LS138. What happened? Why?

2) Connect a switch or push button (0 / +5 volts) to the clock input (CLK) of the 74LS164. Tie pins A and B (serial inputs) high (+5 volts). Tie the clear pin (CLR) high. Why?

Use the LED's and the 74LS373 to see changing the states of the 74LS164 outputs Q0 - Q7. Alternating the input (AB) from high to low, may help in determining the logic of the 74LS164. Explain the results. What function(s) does the 74LS164 provide?

Note: The 74LS138, 74LS164 and 74LS373 will be used in later labs. It is very important to understand their functions and how to use them. You will be expected to completely understand the internal structure and operation of these three integrated circuits.

Other:

Refer to Wakerly or National Semiconductor's WEB pages for 74LSxxx chip pin-outs and chip schematic diagrams, the LED interface, and more. Be prepared for lab (bring schematics). Remember, a LED is a diode and must be connected with the proper polarity.