Physics 120 **Lab Practical Exam** 22 February 2001

Solve the problems below for up to 10 points each. Sketch the circuits, give truth tables and produce timing diagrams as requested. Use logic symbols as opposed to IC pin assignments in drawings.

Construct the circuits. As each is finished, have an instructor verify and initial that the circuit works. Five (of 10) points depend on the circuit operating correctly.

A breadboard with 7402 NOR, 7408 AND, 7404 INVERTER, 7474 flip-flop and 74193 counter is provided. You may use the pin assignments sheets provided.

The exam is timed. You will be told when to start and the time available. You then decide your best strategy on how to proceed. You do not have to do the problems in order.

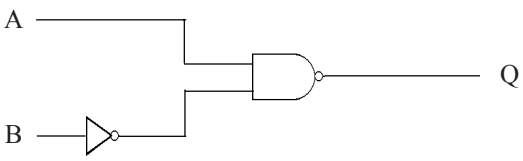
1. Make a 3-input AND gate from the chips available. The inputs should come from logic switches and the output goes to an LED.

truth table

logic drawing of the circuit built

works _____

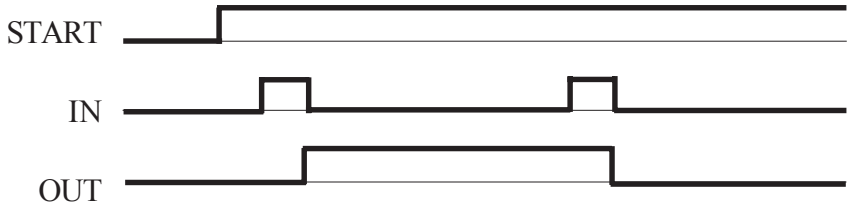
2. Determine the truth table for the circuit below. Then wire the circuit using the IC's available. Inputs A and B originate with logic switches and output Q goes to an LED.



truth table

works _____

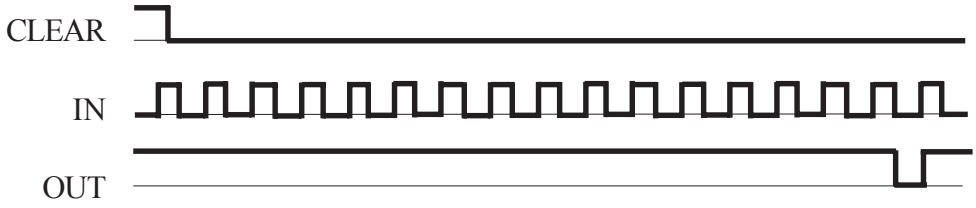
3. Consider the timing diagram below. Design and construct a circuit which generates OUT with the IC's available. Use a digi-designer logic-switch for START and an active-high pulser for IN. Connect OUT to an LED. Don't worry about what happens after the sequence. Sketch the circuit below the timing diagram.



logic drawing of the circuit built

works _____

4. Devise and demonstrate a circuit which does the timing diagram below. CLEAR originates with a logic switch. IN originates with a digi-kit active-high pulser and OUT goes to an LED. Also connect IN to an LED. Sketch your circuit below.



logic sketch of the circuit wired

works _____