I. Organization

A. Discussion of Policies and Procedures
B. Establishment of Lab groups
C. Final Adjustment of Section Assignments
D. Introduction to Laboratory Equipment
E. Discussion of Reports on Subsequent Lab projects

II. Project

Determine the truth table of the Boolean function realized in the following diagram. As an introduction to the digidesigner this simple network will be connected during the laboratory period. With the aid of the Chip pin-out reference sheet provided in the general laboratory instructions, mark the gate pin numbers on the diagram of the Boolean function to be connected. Don’t forget to connect power and ground to your chips (or chip) in the laboratory. Connect the circuit inputs switches and the output of each gate to an LED. Demonstrate that your circuit is working properly.
III. Demonstration of Gate Delay

Although the response of digital circuits seems instantaneous to a human, there are finite delays that can be significant in digital systems designed to carry out millions of operations per second. Using a very fast oscilloscope, the instructor will demonstrate the delay in a chain of inverters, connected as shown below. This chain is driven by a 100 KHz clock generator.

The instructor will first display the trace at points A and B. Note that the pulses are not symmetrical, the rise time (low-to-high transition) being considerably longer than the fall time (high-to-low transition). We are primarily concerned with the propagation delay, the time from a change in the input to a corresponding change in the output. Because the transitions are not instantaneous we have to be quite precise in defining how this time is to be measured. Also, because the transitions are not symmetrical, the delays depend on the direction of transition. The sketch below shows how the transition times are defined. The instructor will measure these times from point A to point B. Taking into account the fact that succeeding inverters are switching in opposite directions, calculate the delay times from point A to point C, assuming that the delay characteristics for all inverters are about the same. The instructor will then measure this delay.

Compare the measured delay with that calculated.

IV. No Lab Report need be submitted for this project