**Introduction**

This first lab will introduce the student to proper lab techniques, the breadboard, chip specifications, wiring, and circuit testing. The skills that the student will obtain from this lab are fundamental and will be used in the labs that follow.

In lab 1, this circuit diagram was given:



**Preliminary Work**

To find the functionality of the circuit we created a truth table, as show below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| A | B | C | X1 | X2 | X3 | F |
| 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 0 | 0 | 1 | 1 | **0** | 1 | 1 |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 | **0** | 0 | 1 |
| 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| 1 | 0 | 1 | 1 | **0** | 1 | 1 |
| 1 | 1 | 0 | **0** | 1 | 0 | 1 |
| 1 | 1 | 1 | **0** | 1 | 0 | 1 |

The next step was to create a chip diagram on how we would approach wiring the circuit.



Then a wire list is derived from the chip diagram.

U1 = SN74LS00

VCC 🡪 U1-14

GND 🡪 U1-7

A 🡪 SW1 🡪 U1-1

B 🡪 SW2 🡪 U1-2, U1-12, U1-13

C 🡪 SW3 🡪 U1-5

(Intermediate outputs)

U1-3 (X1) 🡪 U1-4

U1-6 (X2) 🡪 U1-9

U1-11 (X3) 🡪 U1-10

U1-8 (F) 🡪 LED

**Lab Results**

The circuit was built and compared to the truth table we created in the preliminary work. The circuit was a success. All combinations of input were verified to be correct.

**Observations and Conclusions**

Lab 1 was great for both new and experienced students to get into or back into creating circuits. The equipment is dated and not all chips work. So there may be a lot of testing in the future labs.

**Circuit Modification**

None.