Lab 8 – Circuit Reduction (Part 2)

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The purpose of this lab is to:

Learn how to reduce a circuit design down to the smallest size using the 17 Theorems and [Karnaugh](https://en.wikipedia.org/wiki/Karnaugh_map) maps. Part 2 will explore how to reduce the circuit. You will also need the results of Lab 7.

Select three 10kohm resistors.

Measure and record the resistance of each resistor.

Equipment needed:

1 – Digital Multimeter

3 – 10Kohm

1 – 4 position dip switch

1 – 74LS04 Hex Inverter

1 – 74LS08 Quad AND

1 – 74LS32 Quad OR

Using Multisim simulate Figure 1 for each input and record in Table 1. Then build and test circuit and record in Table 1



POS Solution



SOP Solution



Control Circuit

Figure 1- Lab 8 Schematic

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Simulated | | | | | |  | Test | | | | | |
|  |  |  |  | Output | |  |  |  |  |  | Output | |
| A | B | C | Lab 7 | SOP | POS |  | A | B | C | Lab 7 | SOP | POS |
| 0 | 0 | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 |  | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 0 |  | 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 0 | 0 |  | 0 | 1 | 1 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 | 1 |  | 1 | 0 | 0 | 1 | 1 | 1 |
| 1 | 0 | 1 | 1 | 1 | 1 |  | 1 | 0 | 1 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 | 0 |  | 1 | 1 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 |  | 1 | 1 | 1 | 1 | 1 | 1 |

Table 1 Simulation vs Test

Observations: Even though we managed to reduce the total number of gates, the total number of components needed to implement the circuit remained unchanged.