EECE 144
Fall 2011

Lab Report #5
Section 4
10/5/2011

Submitted by: Jeremiah Mahler

Signature	Printed Name	Date
	Jeremiah Mahler	**Oct 5, 2011**
	Marvanee Johnson	**Oct 5, 2011**

1 Description/Objectives

The objective of this lab is to derive a simplified form of a canonical SOP equation using a Karnaugh Map and to implement it in hardware.

2 Procedure

The canonical SOP form of the equation used in this lab is given in Equation 1.

$$\begin{aligned} f(a,b,c) &= \sum m(0,2,3,4,6) \\ &= m_0 + m_2 + m_3 + m_4 + m_6 \\ &= a'b'c' + a'bc' + a'bc + ab'c' + abc' \end{aligned} \tag{1}$$

The truth table produced from Equation 1 is shown in Figure 1. And the Karnaugh Map produced from the truth table is shown in Figure 2. Using the groupings produced by the Karnaugh Map in Figure 2 results in the simplified form in Equation 2. The implementation of the logic function using gates is shown in Figure 3.

$$f(a,b,c) = c' + a'b \tag{2}$$

Index	a	b	c	f
0	0	0	0	1
1	0	0	1	0
2	0	1	0	1
3	0	1	1	1
4	1	0	0	1
5	1	0	1	0
6	1	1	0	1
7	1	1	1	0

Figure 1: Truth table of Equation 1.

b \ ac	00	01	11	10
0	1	0	0	1
1	1	1	0	1

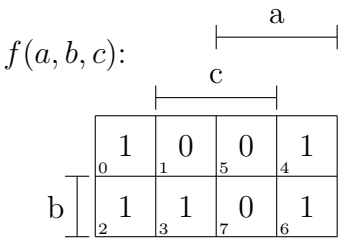

Figure 2: Two equivalent Karnaugh Map representations of Equation 1. The first shows the explicit values of a, b, and c along with red and blue coloring to denote the groupings. The second is a Veitch [1] diagram.

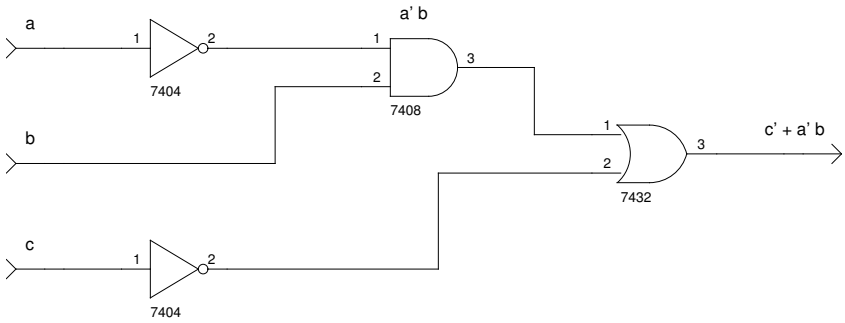

Figure 3: Circuit definition of equation 2.

3 Observations

The output of each logic function implemented in hardware (Figure 3) agreed with the expected values of the truth table (Figure 1).

4 Conclusion

This lab was a success in showing that simplification of a logic function using a Karnaugh map produces produces an equivalent function which can be implemented in hardware.

5 References

[1] E. W. Veitch, "A chart method for simplifying truth functions," in Proceedings of the 1952 ACM national meeting (Pittsburgh), ACM '52, (New York, NY, USA), pp. 127–133, ACM, 1952.