The George Washington University
Department of Electrical and Computer Engineering

ECE 140 Design of Logic Systems LAB

Spring 2006

TERM PROJECT

An Arithmetic Logic Unit (ALU) is a logic circuit that performs various Boolean and arithmetic operations on n-bit operands. ALUs are core elements for any processor. Processors perform memory access, data manipulation and program execution by breaking down the assembly level instructions into operations that they can execute. They employ ALU for all of these operations.

In this project you are required to design an ALU (Arithmetic Logic Unit) that performs eight different operations on the input data. Table 1 specifies the functionality of this design and Figure 1 depicts the block level description of the design.

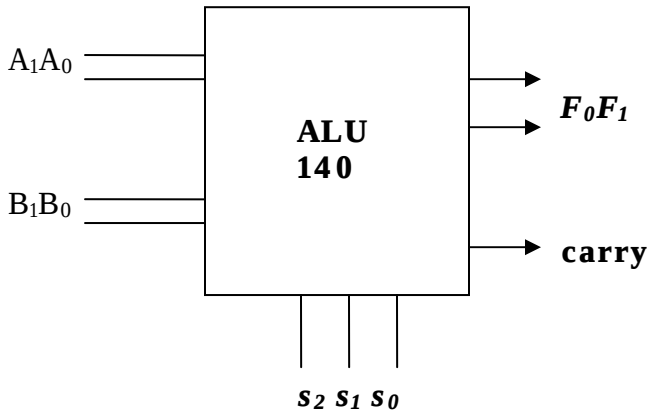

Figure 1. The block diagram of the ALU

Table 1. The functionality of the ALU

OPERATION	**INPUTS** s_2 s_1 s_0	**OUTPUTS** **F**
Clear	000	00
Shift Right	001	$A_1A_0 \rightarrow 0\ A_1$
SUB	010	A - B
ADD	011	A+B

XOR	100	A XOR B
OR	101	A OR B
AND	110	A AND B
Preset	111	11

Tasks to be completed

- Write the VHDL description of the design
- Implement the working design on the GAL chip(s)
- Design a test PCB that includes the GAL chip, a seven segment display to display the results and a DIP switch to control the inputs
- Solder your components on the PCB and test for correct functionality

Project Deliverables:

1. A working design to be demonstrated on the assigned date in the end of the semester.

2. A technical report, which is prepared in a formal report format that is described in the attached document.

3. A power point presentation that summarizes your idea and presents your work to a crowd which will question its functionality and quality. This also has to fit in a formal presentation format.

GOOD LUCK!

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