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Title : A 2-bit Adder Subtractor circuit

Abstract

In digital circuits, a binary Adder-Subtractor is one which is capable of both addition and subtraction of binary numbers in one circuit itself. The operation being performed depends upon the binary value the control signal holds.

The control unit decides which operations an ALU should perform (based on the op code being executed) and sets the ALU operation.

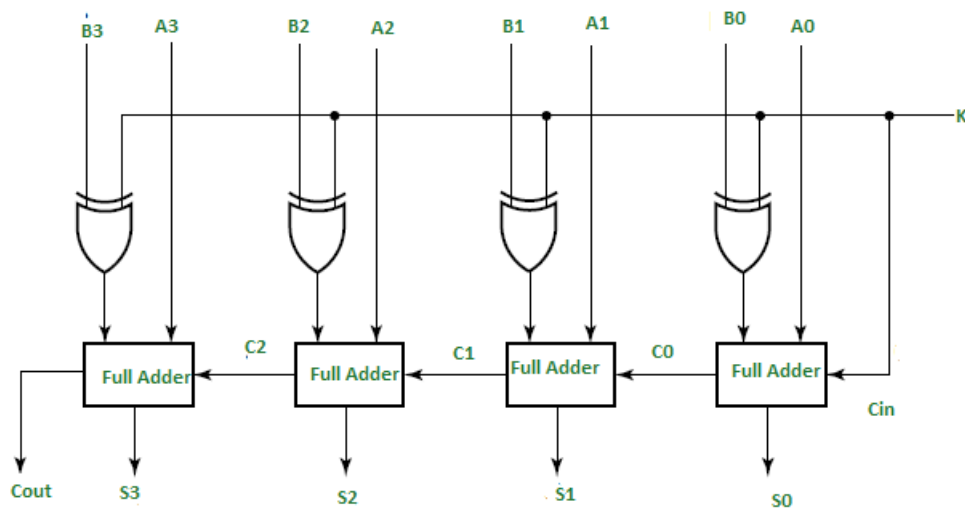
Having an n-bit adder for A and B, then $S = A + B$. Then, assume the numbers are in two's complement. Then to perform $B - A$, two's complement theory says to invert each bit with a NOT gate then add one. This yields $S = B + A + 1$, which is easy to do with a slightly modified adder.

Truth table

(x,y are inputs and p is the control signal)

Inputs			Carry	Sum
x	y	p	C	S
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

Reference Diagram for 4-bit adder subtractor circuit



Schematic diagram on E-Sim

