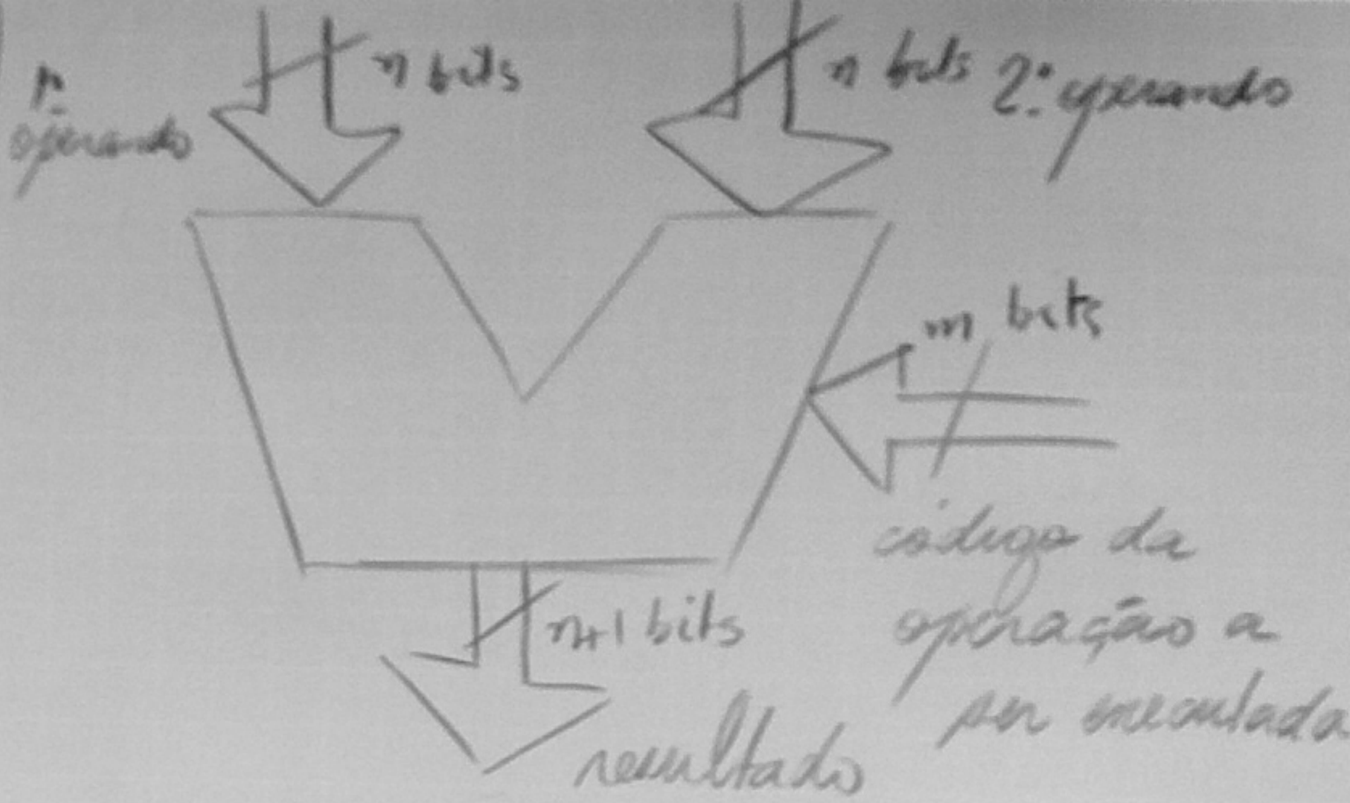
11a -
Unidade Lógica e Aritmética

Na arquitetura de um computador, a ULA é a parte responsável pela realização das operações lógicas e das operações aritméticas.

As ULA mais simples são circuitos combinacionais que aceitam dois operandos, com "n" bits cada um, e um código de operação com "m" bits.

A saída, normalmente, apresenta n+1 bits.



Exercício

Projetar uma ULA

para manipular números de

4 bits, com as seguintes

características:

> números com sinal

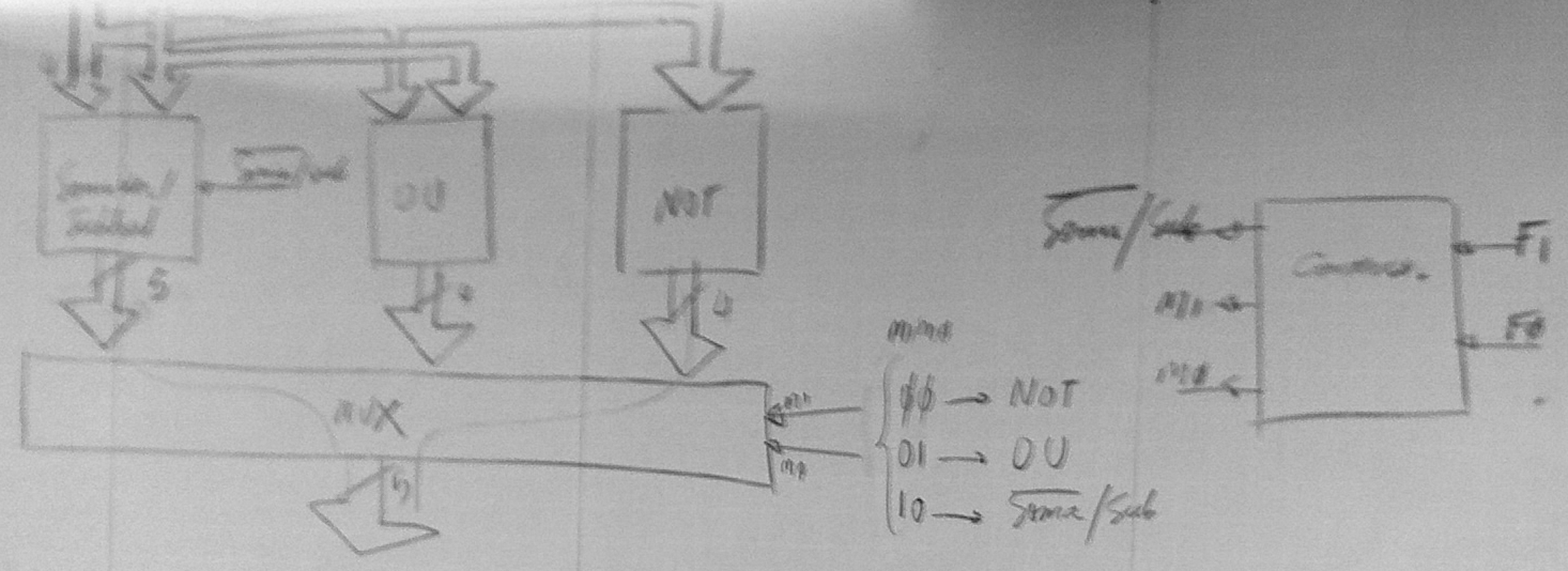
em complemento de

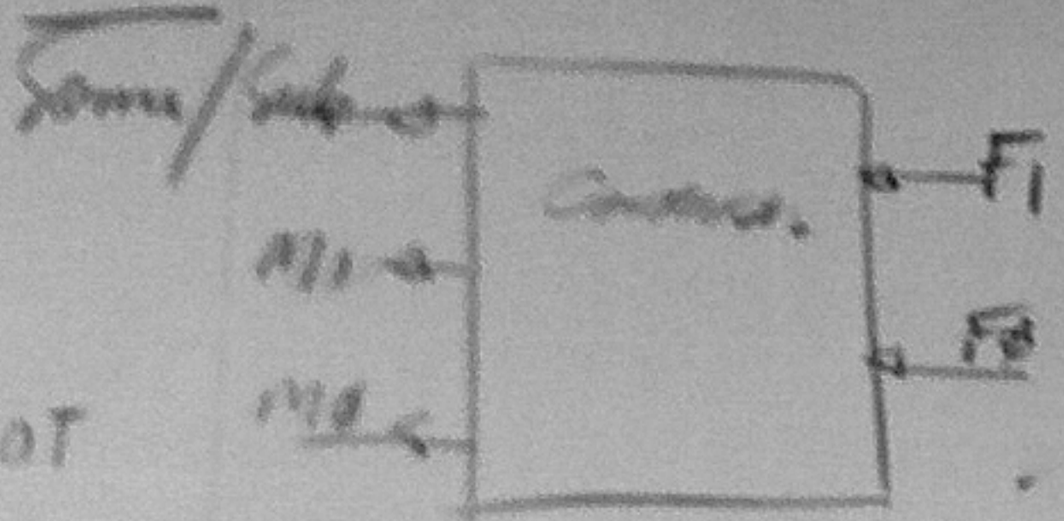
dois: faixa de

-8 a +7

> funções

- adição de números com sinal
- subtração de números com sinal
- função OU (bit a bit)
- função NOT (bit a bit)

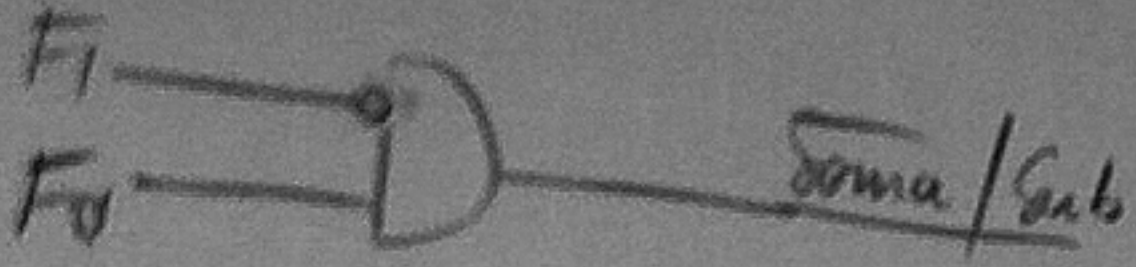

NOT
OU
MUX
00 → NOT
01 → OU
10 → Soma/Sub



→ NOT
→ OU
→ Soma/Sub

F_1	F_0	Soma/Sub	M_1	M_0	
0	0	0	1	0	Soma
0	1	1	1	0	Sub
1	0	X	0	1	OU
1	1	X	0	0	NOT

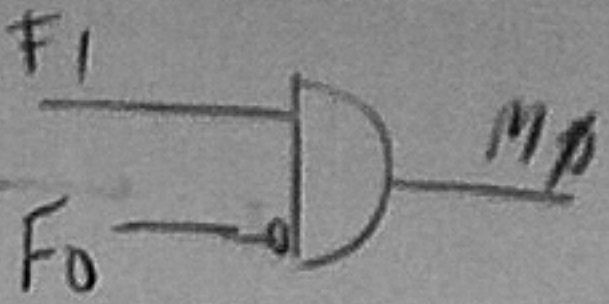
Conexion



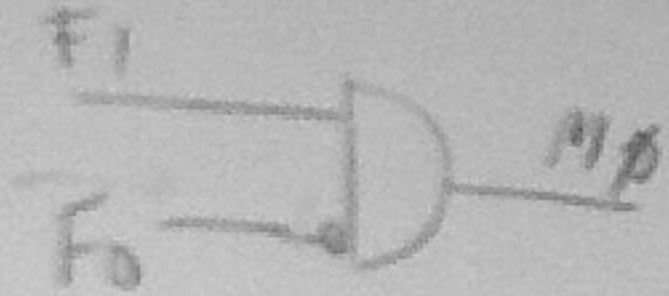
$m_0 = F_1 \bar{F}_0$

$m_1 = \bar{F}_1 \bar{F}_0 + \bar{F}_1 F_0 = \bar{F}_1 (F_0 + \bar{F}_0)$

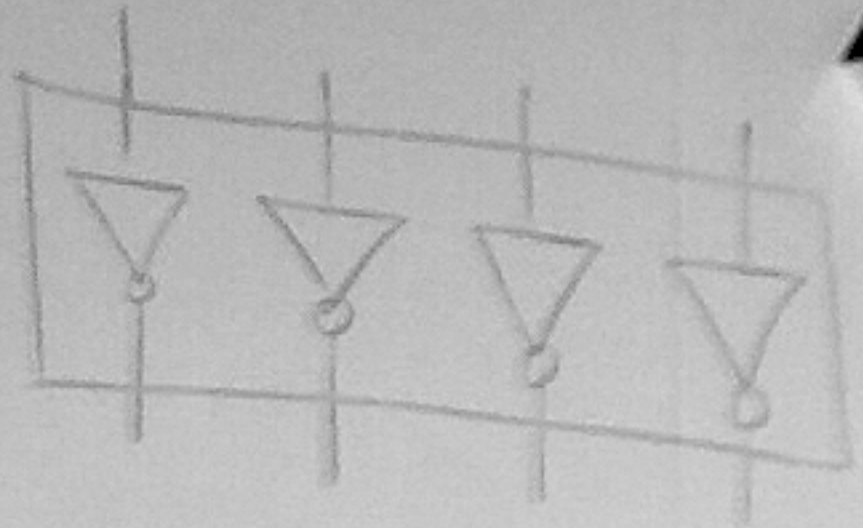
$m_1 = \bar{F}_1$

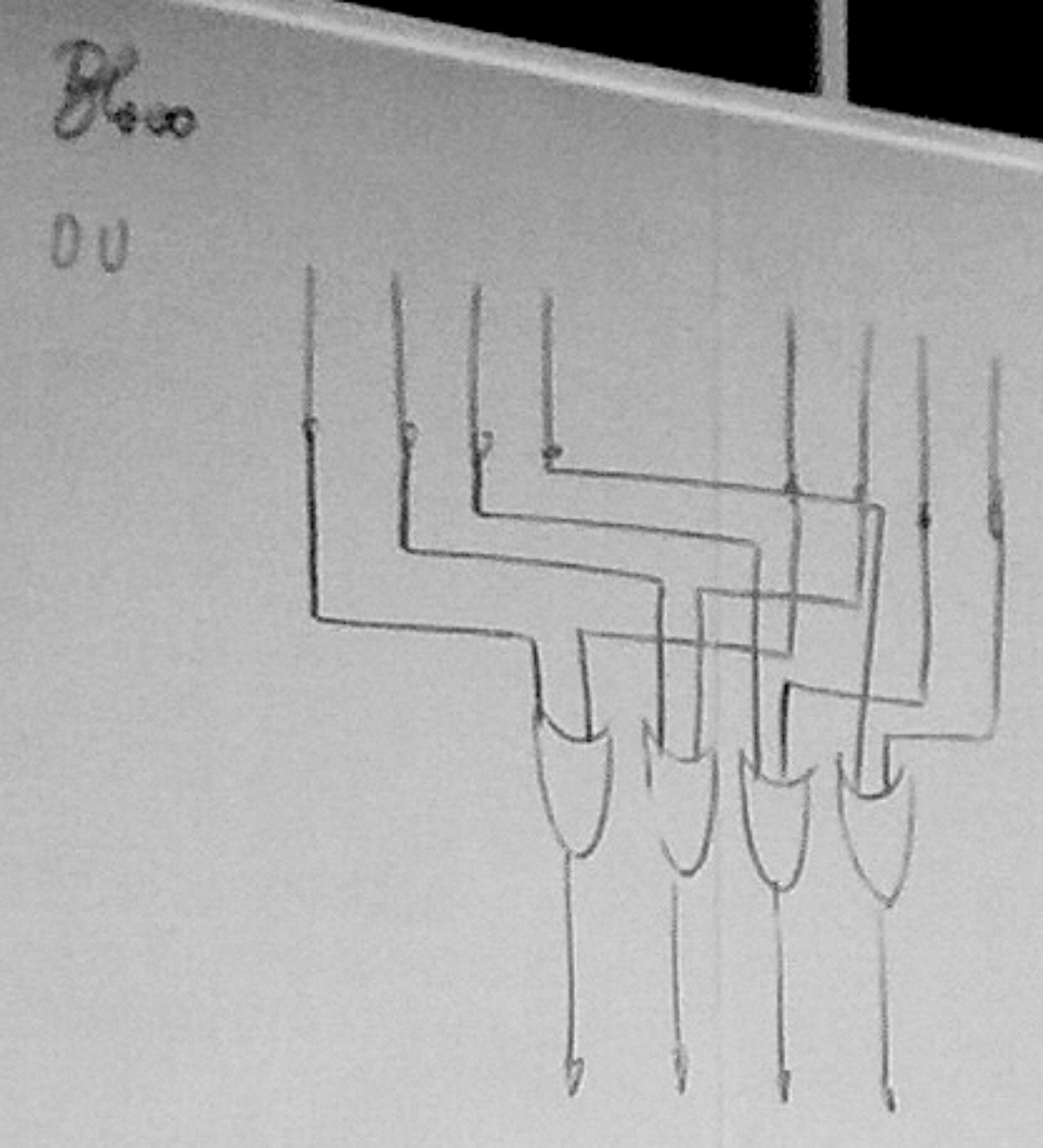


$m_0 = F_1 \overline{F_0}$



BL 100
NOT





Sumador / Restador 2's

A + B — A + B

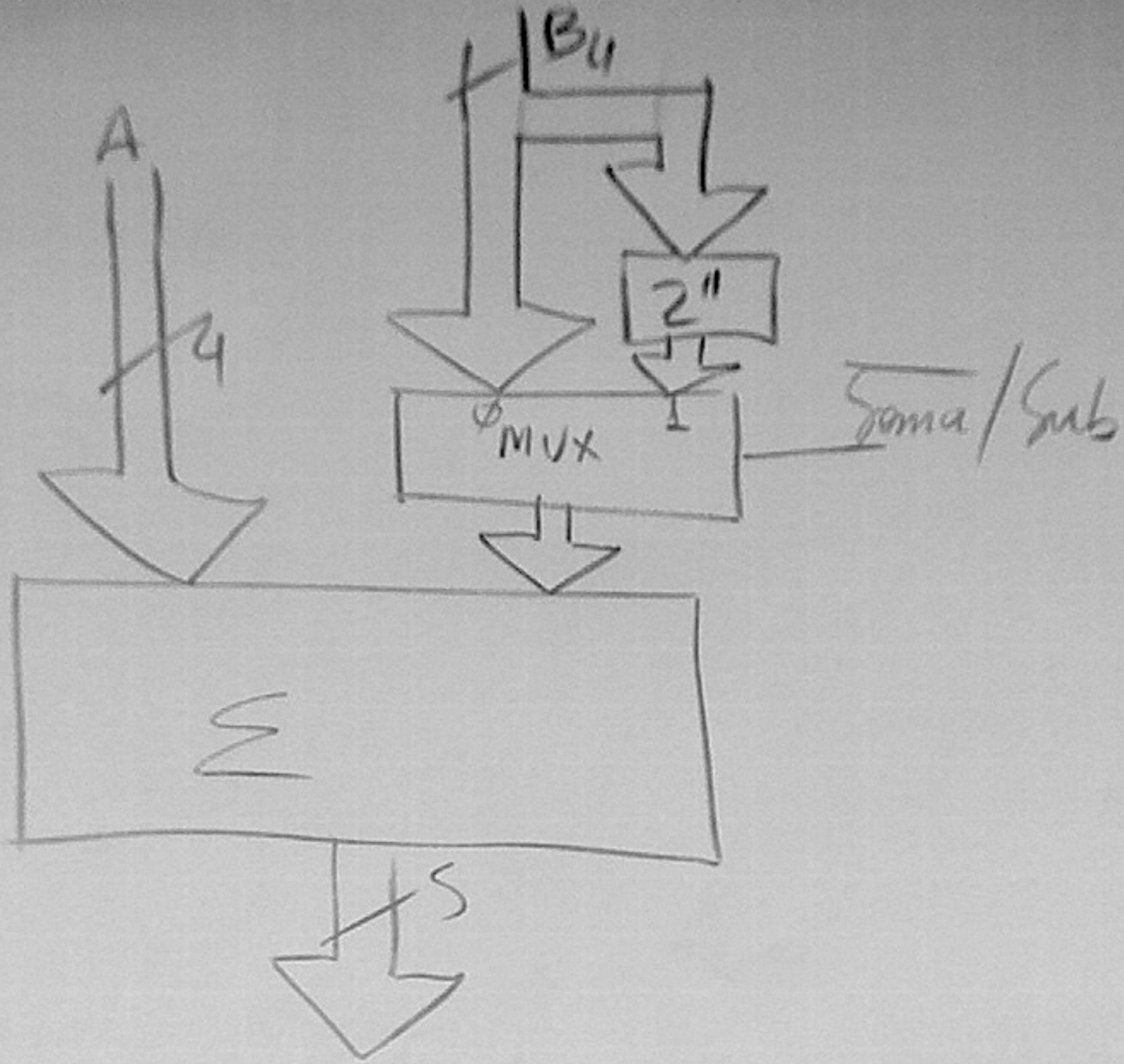
A - B — A + B''

(+)

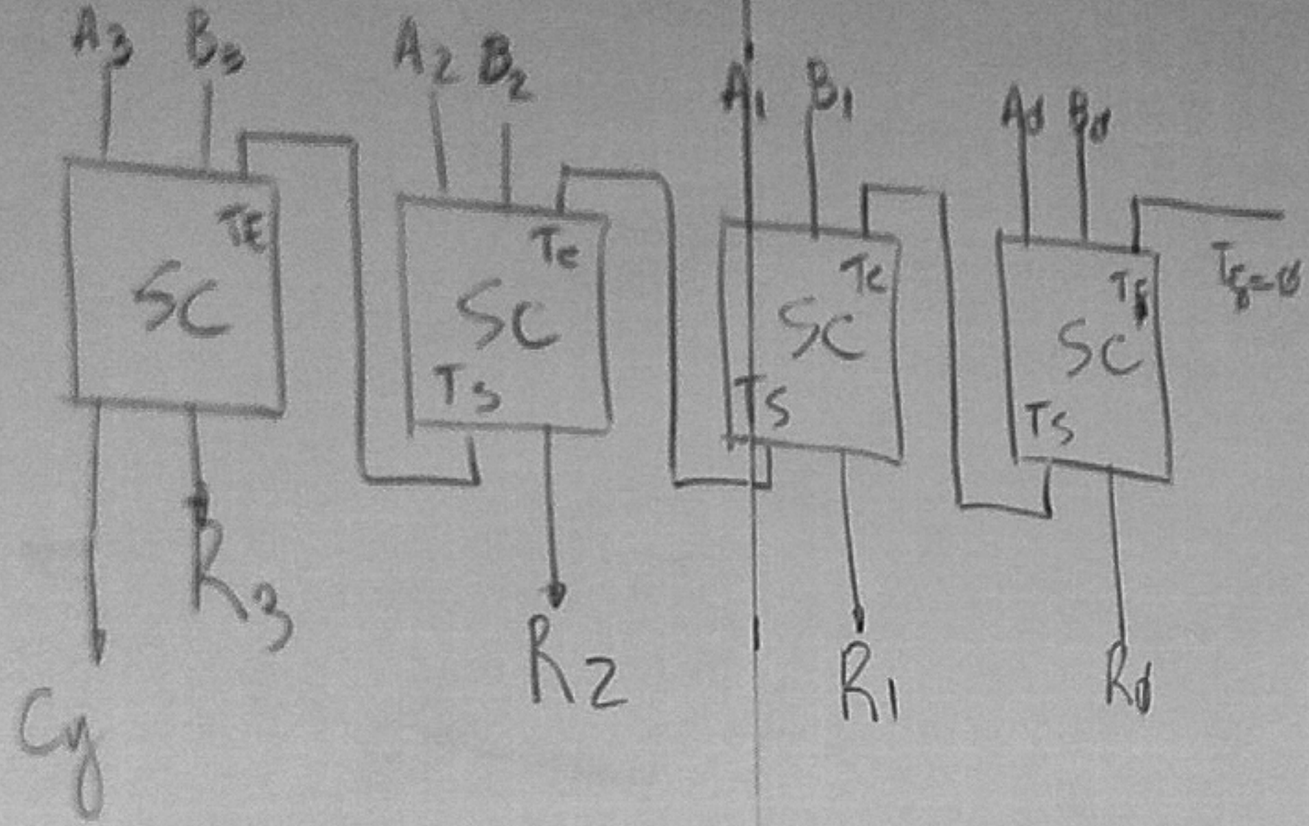
0	0	0	0		0
0	0	0	1		1
0	0	1	0		2
0	0	1	1		3
0	1	0	0		4
0	1	0	1		5
0	1	1	0		6
0	1	1	1		7

(-)

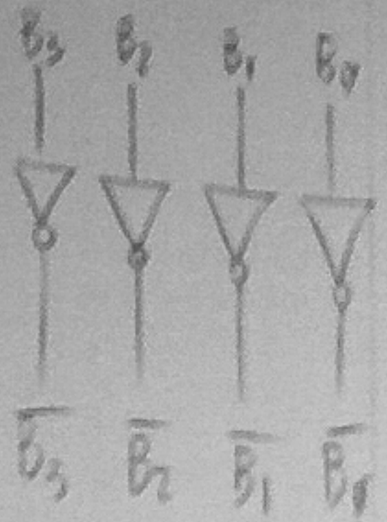
	1	1	1	1	-1
	1	1	1	0	-2
	1	1	0	1	-3
	1	1	0	0	-4
	1	0	1	1	-5
	1	0	1	0	-6
	1	0	0	1	-7
	1	0	0	0	-8


B4
A
4
2"
0
MUX
1
Soma / Sub
Σ
4
S

Bloco E

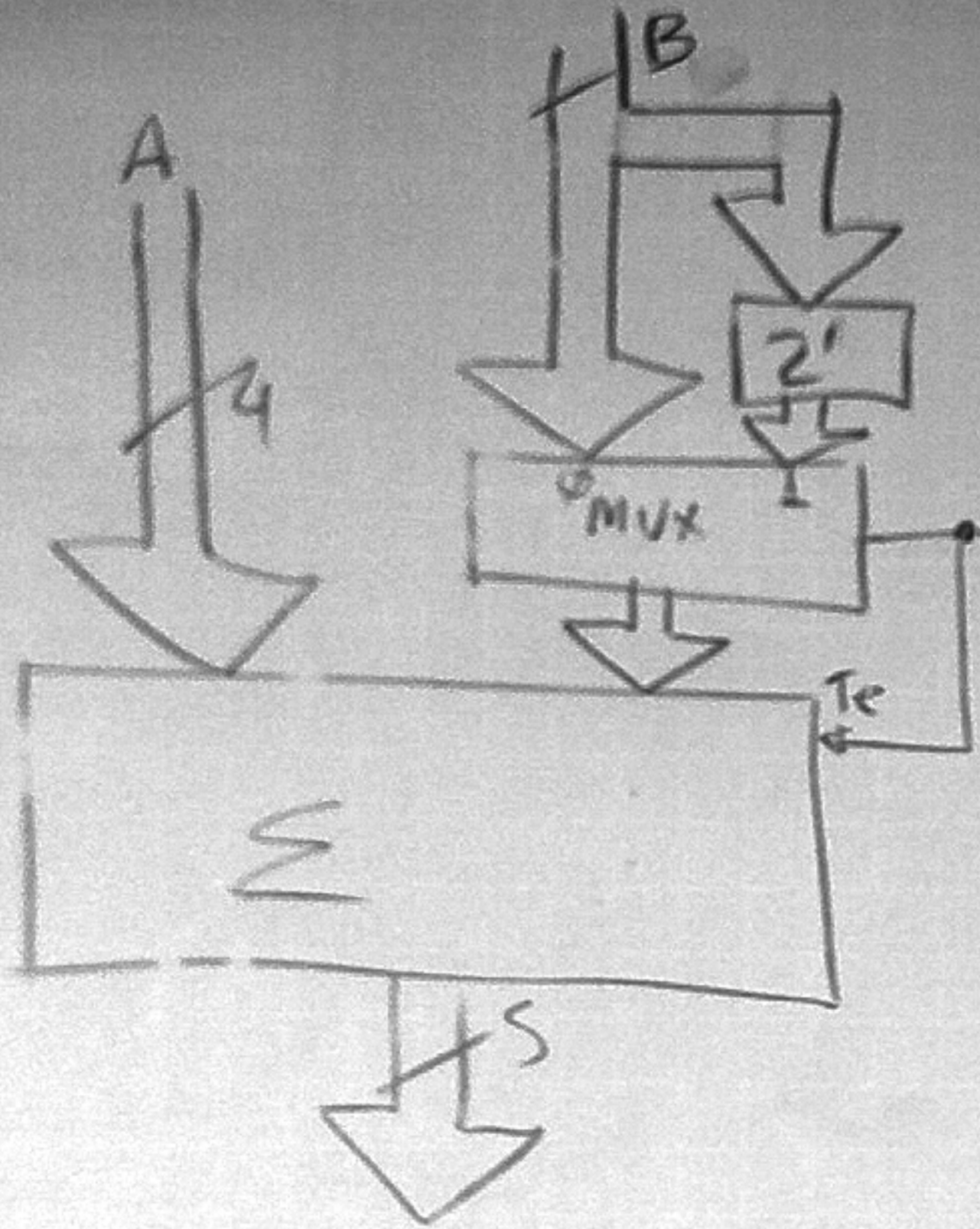


2''



TE=1

Tc1 = Somar/Subt



A 0111 ——→ +7
B 1010 ——→ -6

A+B ——→ 0111
1010
X 0001

A-B