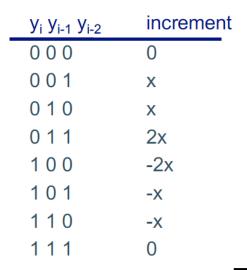
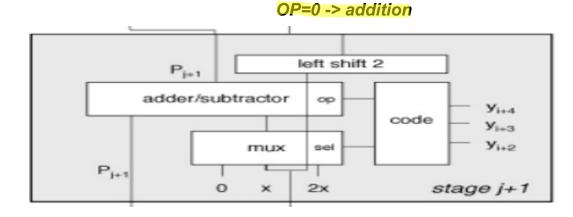
Booth Multiplier Hardware Design

Booth Encoder Hardware Design

OP=1 -> subtraction





Α	В	C	OP	S1	S0
0	0	0	0	0	0
0	0	1	0	0	1
0	1	0	0	0	1
0	1	1	0	1	0
1	0	0	1	1	0
1	0	1	1	0	1
1	1	0	1	0	1
1	1	1	0	0	0

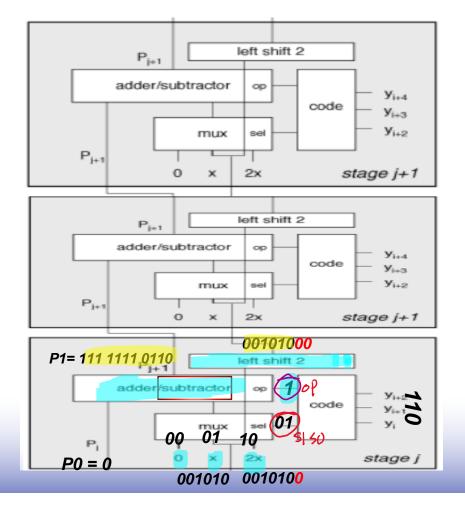
$$X=001010 (10_{10}) \& Y=101011 (-21_{10})$$

$$\begin{split} Y_1Y_0Y_{-1} &= 110, \, P_1 = P_0 - (001010) \\ &= 111 \, 1111 \, 0110 \\ Y_3Y_2Y_1 &= 101, \, P2 = P1 - (00101000) \\ &= 111 \, 1100 \, 1110 \\ Y_5Y_4Y_3 &= 101, \, P3 = P2 - (0010100000) \\ &= 111 \, 0010 \, 1110 \\ &= -210_{10} \end{split}$$

$$X=001010 (10_{10}) & Y=101011 (-21_{10})$$

Step 1	$Y_1Y_0Y_{-1} = 110, P_1 = P_0 - (001010)$
	= 111 1111 0110
	$Y_3Y_2Y_1 = 101, P2 = P1 - (00101000)$
	= 111 1100 1110
	$Y_5Y_4Y_3 = 101, P3 = P2 - (0010100000)$
	= 111 0010 1110
	$=-210_{10}$

y _i y _{i-1} y _{i-2}	increment
000	0
0 0 1	Χ
010	Χ
0 1 1	2x
100	-2x
101	-X
110	-X
111	0

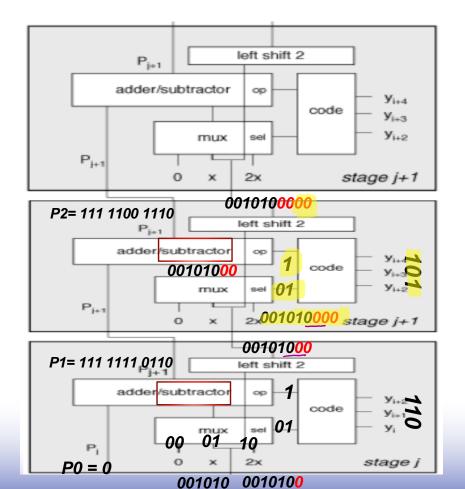


Step 1

OP=1 -> subtraction OP=0 -> addition

$$\begin{array}{c} X{=}001010 \ (10_{10}) \ \& \ Y{=}101011 \ (-21_{10}) \\ & Y_1Y_0Y_{-1} = 110, \, P_1 = P_0 - (001010) \\ & = 111 \ 1111 \ 0110 \\ \hline \textbf{Step 2} \quad Y_3Y_2Y_1 = 101, \, P2 = P1 - (00101000) \\ & = 111 \ 1100 \ 1110 \\ & Y_5Y_4Y_3 = 101, \, P3 = P2 - (0010100000) \\ & = 111 \ 0010 \ 1110 \\ & = -210_{10} \end{array}$$

y _i y _{i-1} y _{i-2}	increment
0 0 0	0
0 0 1	X
0 1 0	X
0 1 1	2x
100	-2x
101	-X
110	-X
111	0

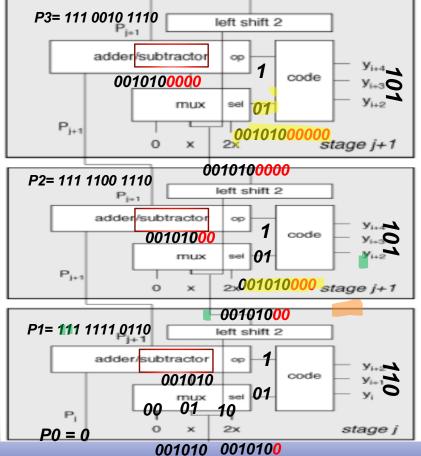


Step 2

OP=1 -> subtraction OP=0 -> addition

V-001010 (10) 8- V-101011 (21)	$y_i y_{i-1} y_{i-2}$	increment
$X=001010 (10_{10}) \& Y=101011 (-21_{10})$	0 0 0 0 0 1 0 1 0 0 1 1 1 0 0 1 0 1 1 1 0	0
$Y_1Y_0Y_{-1} = 110, P_1 = P_0 - (001010)$	0 0 1	X
$= 111 \ 1111 \ 0110$	0 1 0	X
$Y_3Y_2Y_1 = 101, P2 = P1 - (00101000)$	0 1 1	2x
= 111 1100 1110	100	-2x
Step 3 $Y_5Y_4Y_3 = 101$, $P3 = P2 - (0010100000)$	101	-X
= 111 0010 1110	110	-X
$= -210_{10}$	111	0





OP=1 -> subtraction OP=0 -> addition