

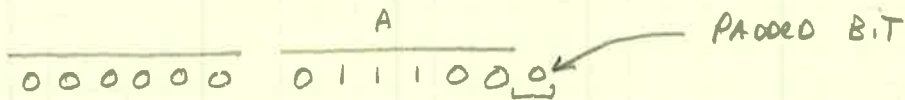
Booth's RADIX-2 Example

Multiply $28_{10} \times (-14_{10})$

Set $A = 28_{10} = 011100_2$
 $B = -14_{10} = 110010_2$
 $(-B) = 14_{10} = 001110_2$

00	Do nothing
01	ADD B
10	SUBtract B
11	Do nothing

- Step 1. Create 12-bit (each operand is 6 bits) RESULT
 2. Place A in the lower 6-bits + 0 in the upper 6-bits.
 3. PAD a LSB with a zero.



Step 4: examine the 2 right-most bits & take action based on the table
 → 00 so do nothing

Step 5: Shift Right preserving the sign bit (Shift #1)

000000 001110 <u>0</u>	00	Do nothing, shift #2
000000 00011 <u>0</u>	10	subtract B (ADD -B) to upper bits
+ 001110 000111		
001110 000111		shift #3
000111 000011 <u>1</u>	11	Do nothing - shift #4
000011 10000 <u>1</u>	11	" " " #5
000001 110000 <u>1</u>	01	ADD B
+ 110010		
110011 110000		SHIFT #6 (Preserve sign bit)
111001 111000		

Final Result = 111001111000_2
 = -392_{10}

Booth RADIX-4 EXAMPLE

28 x (-14)

$A = 28_{10} = 011100_2$
 $B = -14_{10} = 110010_2$
 $2B = -28_{10} = 100100_2$
 $-B = 14_{10} = 001110_2$
 $-2B = 28_{10} = 011100_2$

000	Do nothing
001	+B
010	+B
011	+2B
100	-2B
101	-B
110	-B
111	Do nothing

$$\begin{array}{r}
 000000 \quad 011100_2 \\
 000000 \quad 000111_2 \\
 + \quad 001110 \\
 \hline
 001110 \quad 000111 \\
 000011 \quad 1000011 \\
 + \quad 100100 \\
 \hline
 100111 \quad 100001 \\
 111001 \quad 111000
 \end{array}$$

000 Do nothing
 shift #1
110 Subtract B

011 Shift #2
 Add +2B

Shift #3
 (Preserve Sign-bit)

Result = $111001111000_2 = -392_{10}$

Booth's RADIX-4

B = 3 = 0011

A = -5 = 0101 = 1010 + 1 = 1011

-B = 1100 + 1 = 1101

-2B = 0110 = 1001 + 1 = 1010

4-bit

$$\begin{array}{r}
 00001011 \underline{0} \quad -B \\
 1101 \\
 \hline
 110110110 \\
 111101101 \quad \text{shift} \\
 1101 \quad -B \\
 \hline
 \text{W} 110001101 \\
 111100011 \quad \text{shift}
 \end{array}$$

000	Nothing
001	+B
010	+B
011	+2B
100	-2B
101	-B
110	-B
111	Nothing

= 00001110 + 1 = -15

8 bit

B = -20 = 00010100 = 11101011 + 1 = 11101100

A = -31 = 00011111 = 11100000 + 1 = 11100001

$$\begin{array}{r}
 20 \\
 60 \\
 \hline
 620
 \end{array}$$

-B = 20 = 00010100
 -2B = 40 = 00101000

$$\begin{array}{r}
 00000000 \mid 11100001 \underline{0} \\
 + 11101100 \quad +B \\
 \hline
 11101100 \mid 11100001 \\
 11111011 \mid 001110000 \quad \text{shift} \\
 11111110 \mid 110011100 \quad \text{shift} \\
 + 00101000 \quad -2B \\
 \hline
 \text{W} 00100110 \mid 110011100 \\
 00001001 \mid 101100111 \quad \text{shift} \\
 00000010 \mid 01101100 \quad \text{shift}
 \end{array}$$

= 12 + 96 + 512 = 620