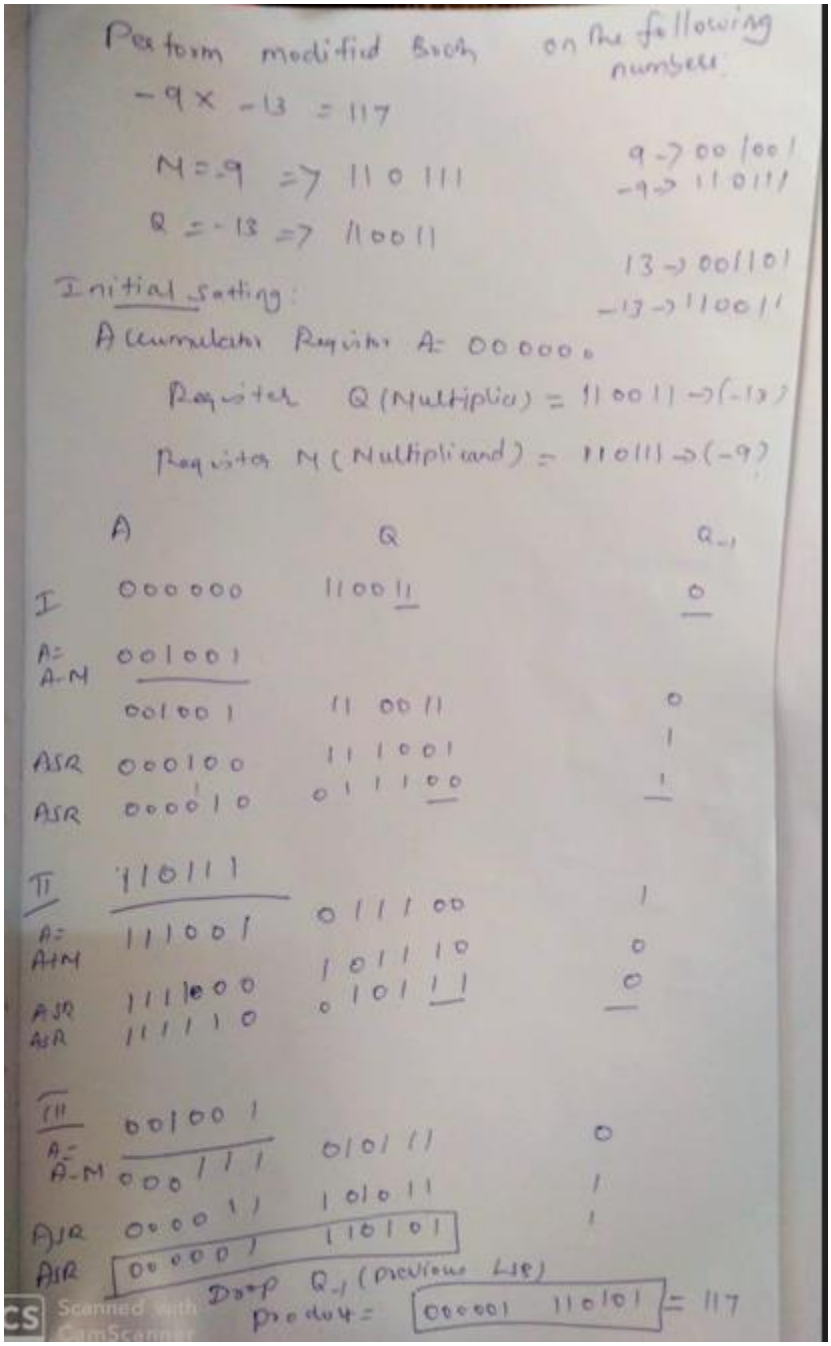
Modified Booth Algorithm

1. M = Multiplicand (n bits), A = 0, Q = Multiplier (n bits)
2. Count = n/2
3. While (Count != 0)
   a. If $Q_1Q_0Q_{-1} = 001$
      i. $A \leftarrow A + M$
   b. Else if $Q_1Q_0Q_{-1} = 010$
      i. $A \leftarrow A + M$
   c. Else if $Q_1Q_0Q_{-1} = 011$
      i. shift left M by 1 bit
      ii. $A \leftarrow A + M$
   d. Else if $Q_1Q_0Q_{-1} = 100$
      i. shift left M by 1 bit
      ii. $A \leftarrow A + \overline{M} + 1$
   e. Else if $Q_1Q_0Q_{-1} = 101$
      i. $A \leftarrow A + \overline{M} + 1$
   f. Else if $Q_1Q_0Q_{-1} = 110$
      i. $A \leftarrow A + \overline{M} + 1$
   g. Arithmetic shift right *A, Q, Q_{-1}*
   h. Arithmetic shift right *A, Q, Q_{-1}*
   i. *Count* ← *Count* – 1

Recoding table

Yi+1	Yi	Yi-1	Partial Products
0	0	0	0*Multiplicand
0	0	1	1*Multiplicand
0	1	0	1*Multiplicand
0	1	1	2*Multiplicand
1	0	0	-2*Multiplicand
1	0	1	-1*Multiplicand
1	1	0	-1*Multiplicand
1	1	1	-0*Multiplicand

Example


Perform modified Booth on the following numbers
-9 x -13 = 117
M=-9 => 11 0 111
Q = -13 => 1100 11
9 -> 00 1001
-9 -> 11 0111
13 -> 00 1101
-13 -> 11 0011
Initial setting:
Accumulator Register A= 000000
Register Q (Multiplier) = 11 0011 -> (-13)
Register M (Multiplicand) = 11 0111 -> (-9)
A
Q
Q-1
I
ASR
ASR
II
ASR
III
ASR
Drop Q-1 (previous LSB)
Product = 000001 110101 = 117