

HomeWork_4

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chapter 3

Exercise 3.9

Writing 151 and 214 as follows:

Decimal	2's complement	Signed Integer
151	10010111	-105
214	11010110	-42

Decimal:

$$-105 + (-42) = -147$$

$-147 < -128$ The result is -128.

Binary:

10010111 + 11010110 produces a *downward overflow*. So $10010111 + 11010110 = -128$ (In Decimal)

Exercise 3.10

Writing 151 and 214 as follows:

Decimal	2's complement	Signed Integer
151	10010111	-105
214	11010110	-42

Decimal:

$$-105 - (-42) = -63$$

Because -63 belongs to the range $[-128 \text{ --- } 127]$. The result is -63.

Binary:

$$10010111 - 11010110 = 11000001. \text{ No overflow. The result is } 11000001 = -63.$$

Exercise 3.12

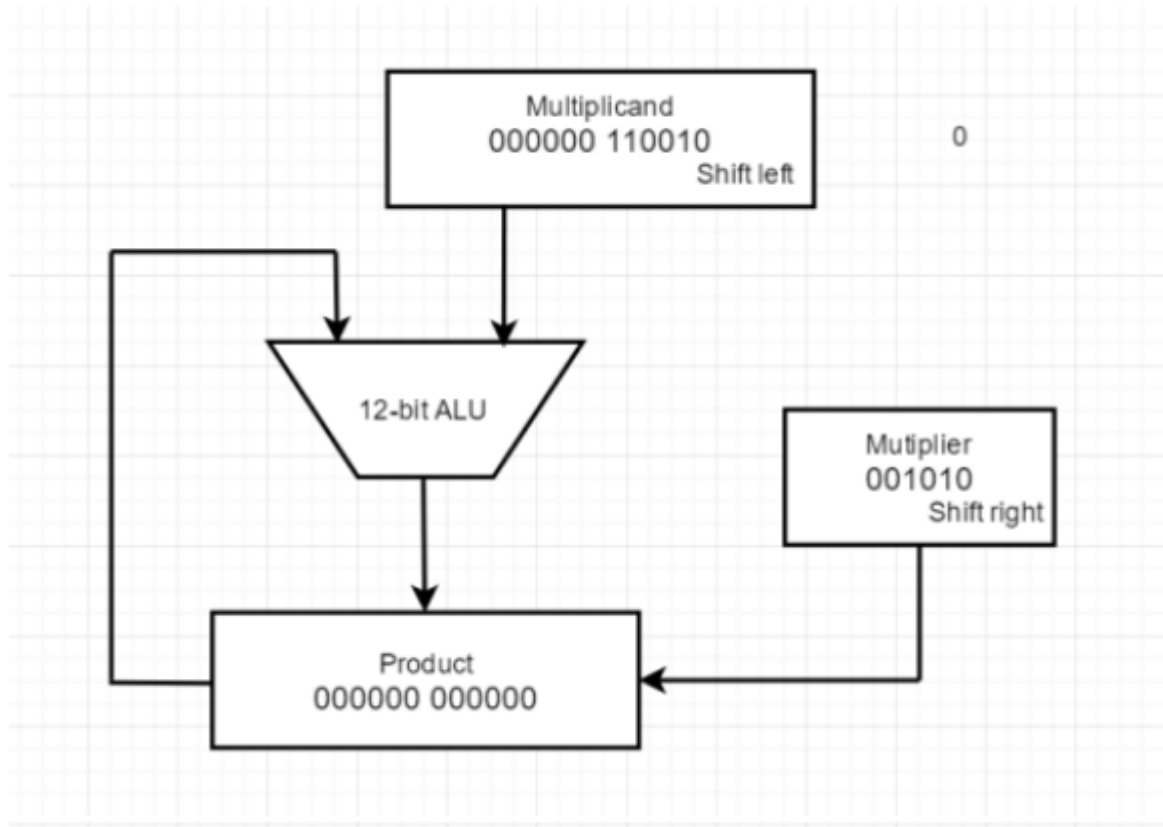
$$62(\text{octal}) = 110010(\text{binary}) \quad 12(\text{octal}) = 001010(\text{binary})$$

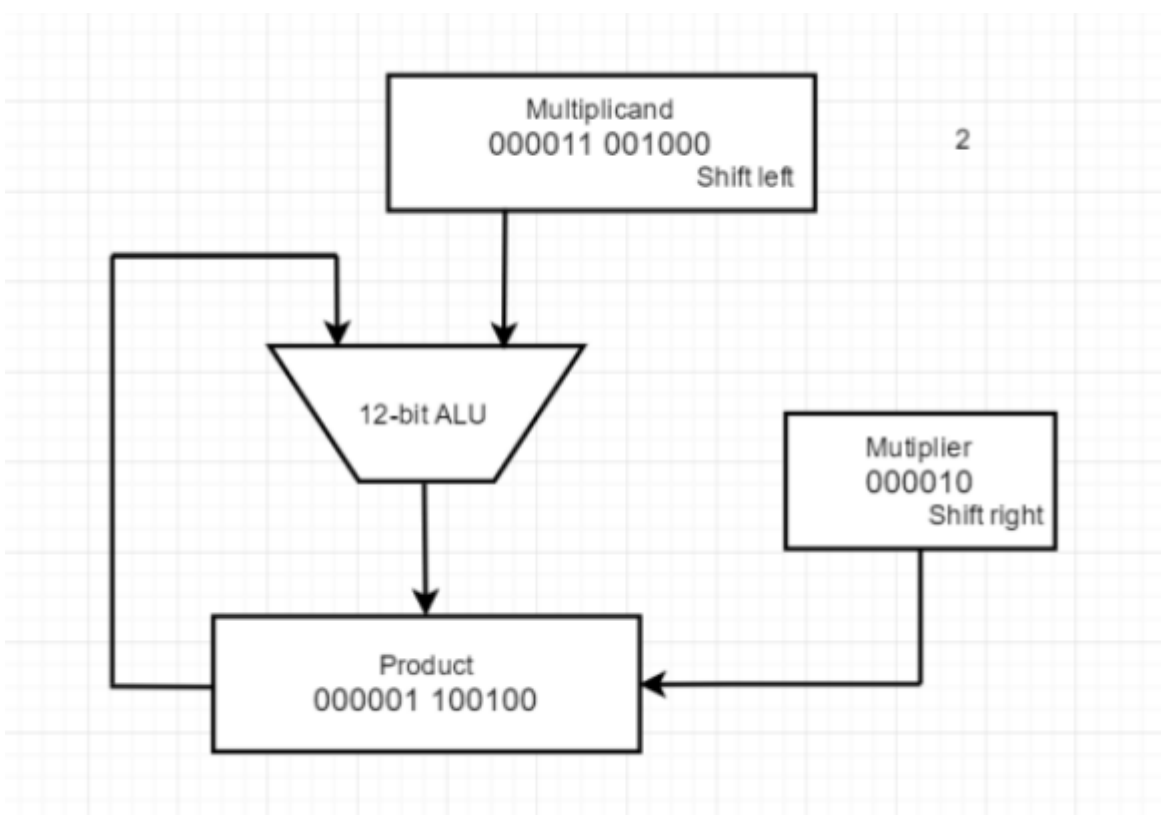
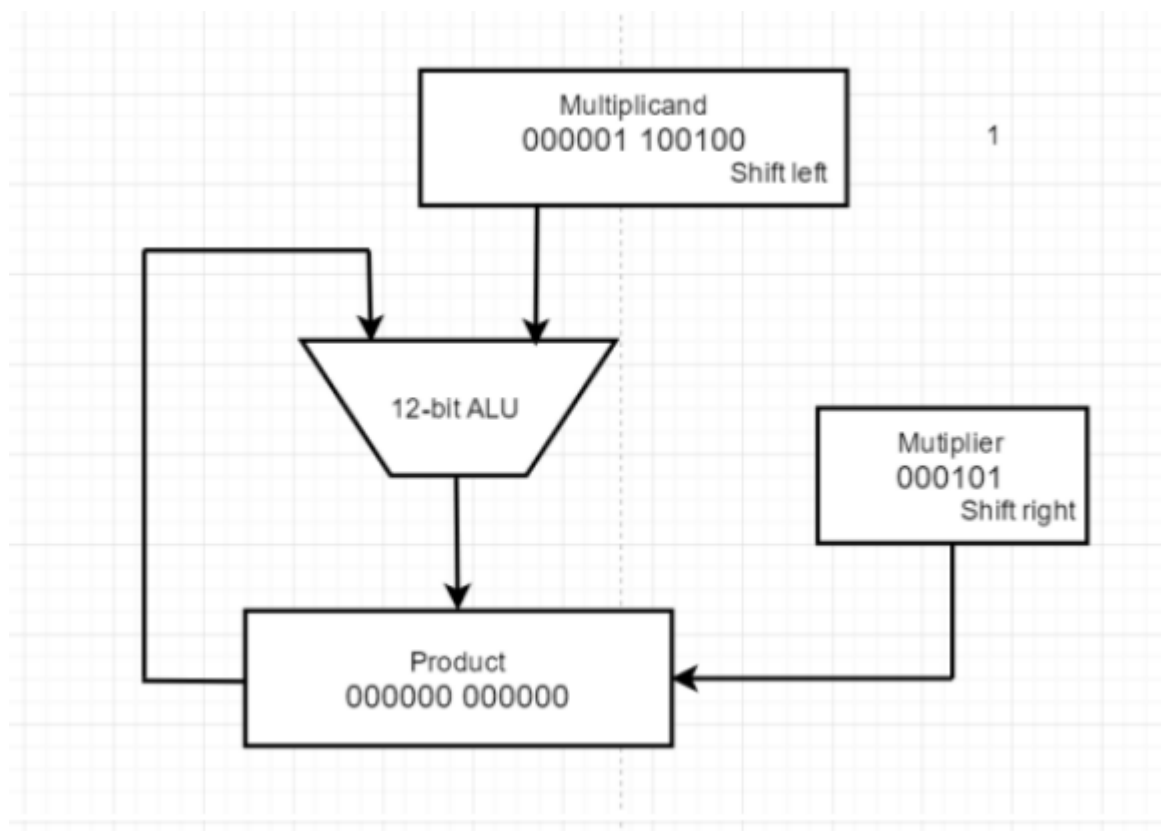
Table :

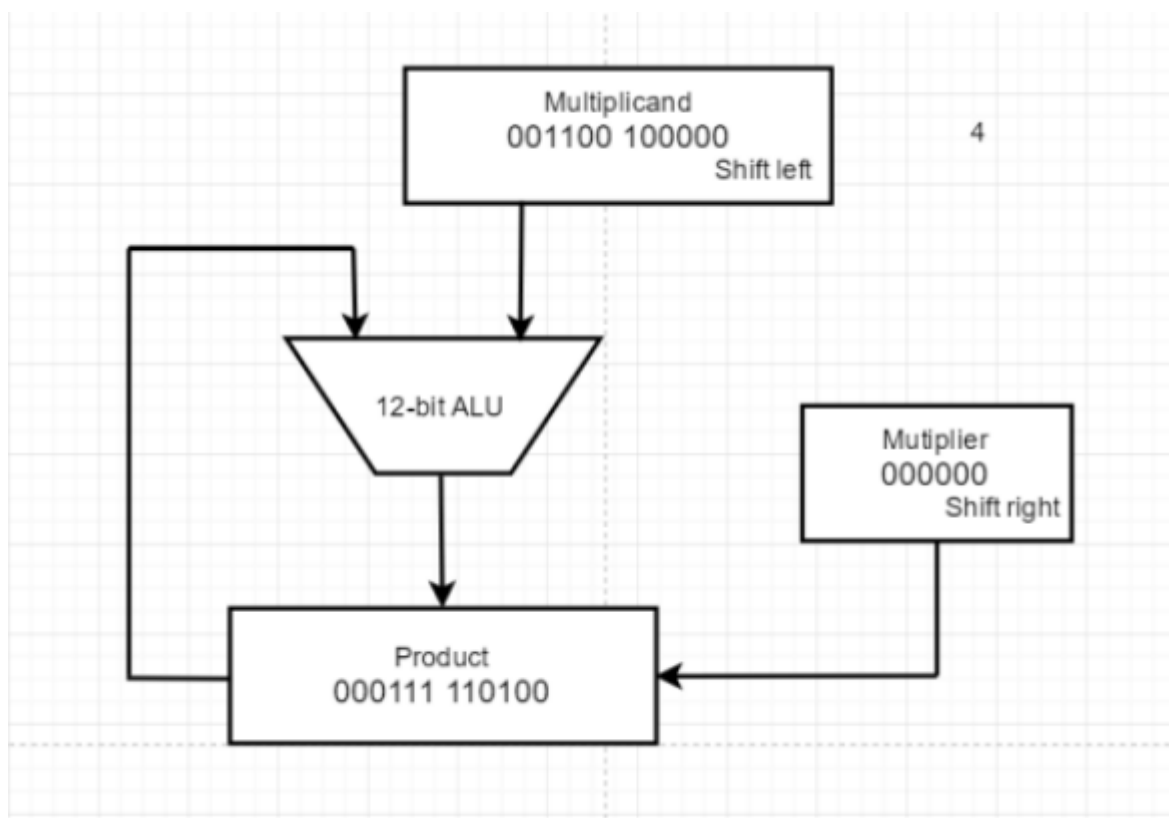
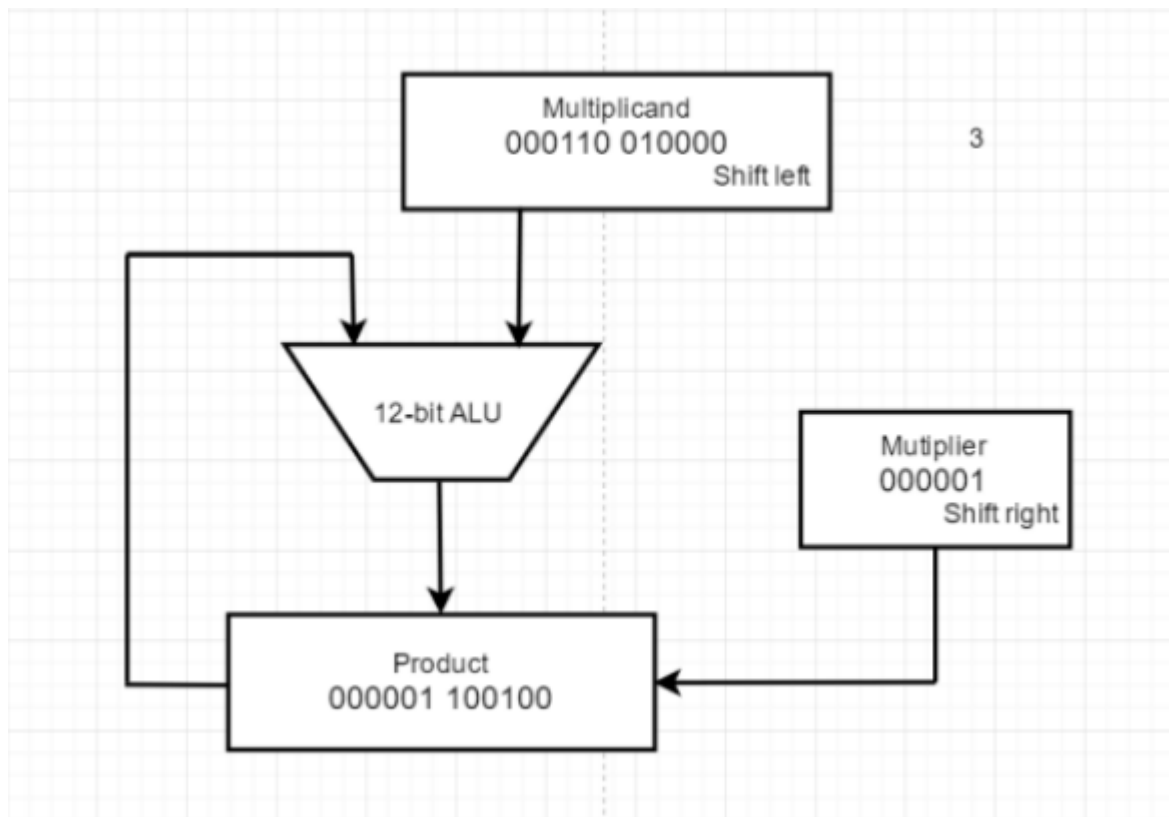
Iteration	Step	Multiplier	Multiplicand	Product
0	Initial	00101 0	000000 110010	000000 000000
1	1:0 => No operation	001010	000000 110010	000000 000000
	2:shift left multiplicand	001010	000001 100100	000000 000000
	3:shift right multiplier	000101	000001 100100	000000 000000
2	1a:1 => Prod=Prod+Mcand	000101	000001 100100	000001 100100
	2:shift left multiplicand	000101	000011 001000	000001 100100
	3:shift right multiplier	000010	000011 001000	000001 100100
3	1:0 => No operation	000010	000011 001000	000001 100100
	2:shift left multiplicand	000010	000110 010000	000001 100100
	3:shift right multiplier	000001	000110 010000	000001 100100
4	1a:1 => Prod=Prod+Mcand	000001	000110 010000	000111 110100
	2:shift left multiplicand	000001	001100 100000	000111 110100
	3:shift right multiplier	000000	001100 100000	000111 110100
5	1:0 => No operation	000000	001100 100000	000111 110100
	2:shift left multiplicand	000000	011001 000000	000111 110100
	3:shift right multiplier	000000	011001 000000	000111 110100
6	1:0 => No operation	000000	011001 000000	000111 110100

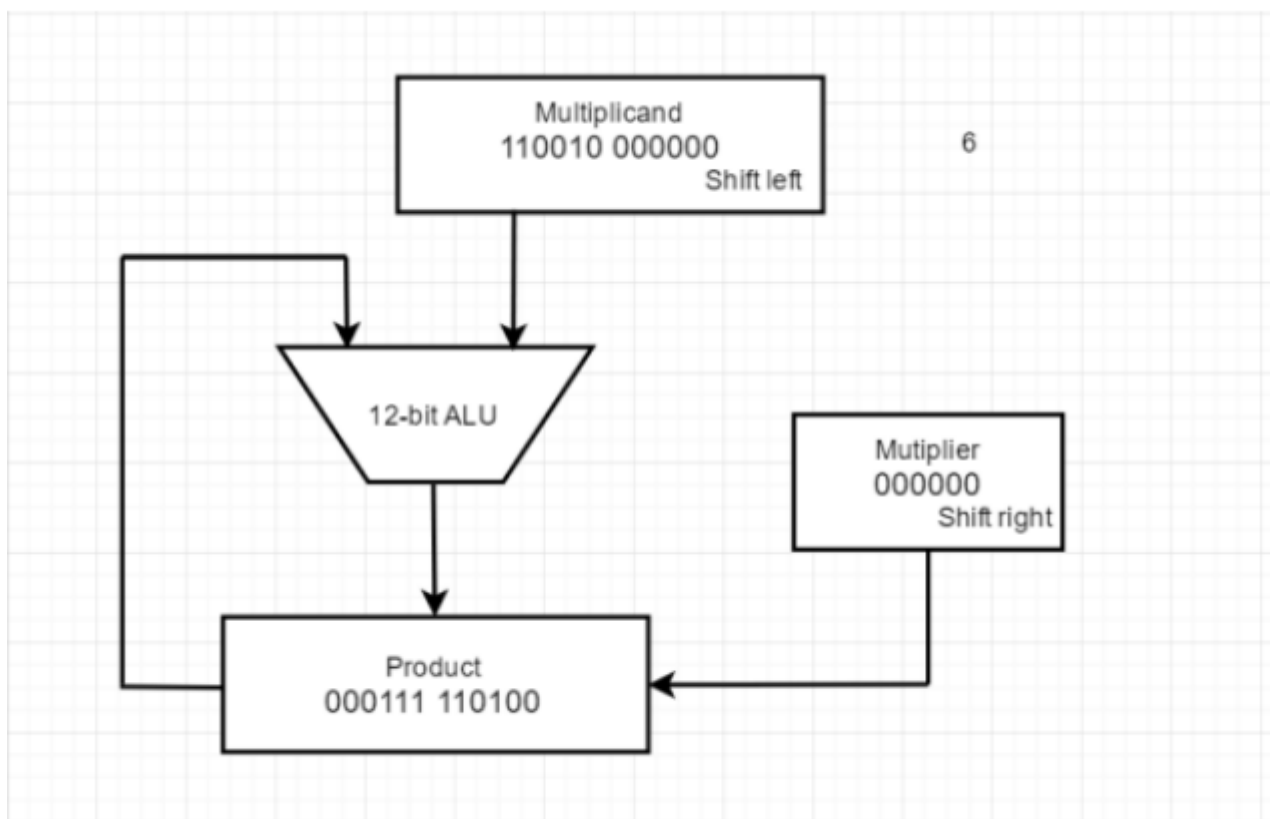
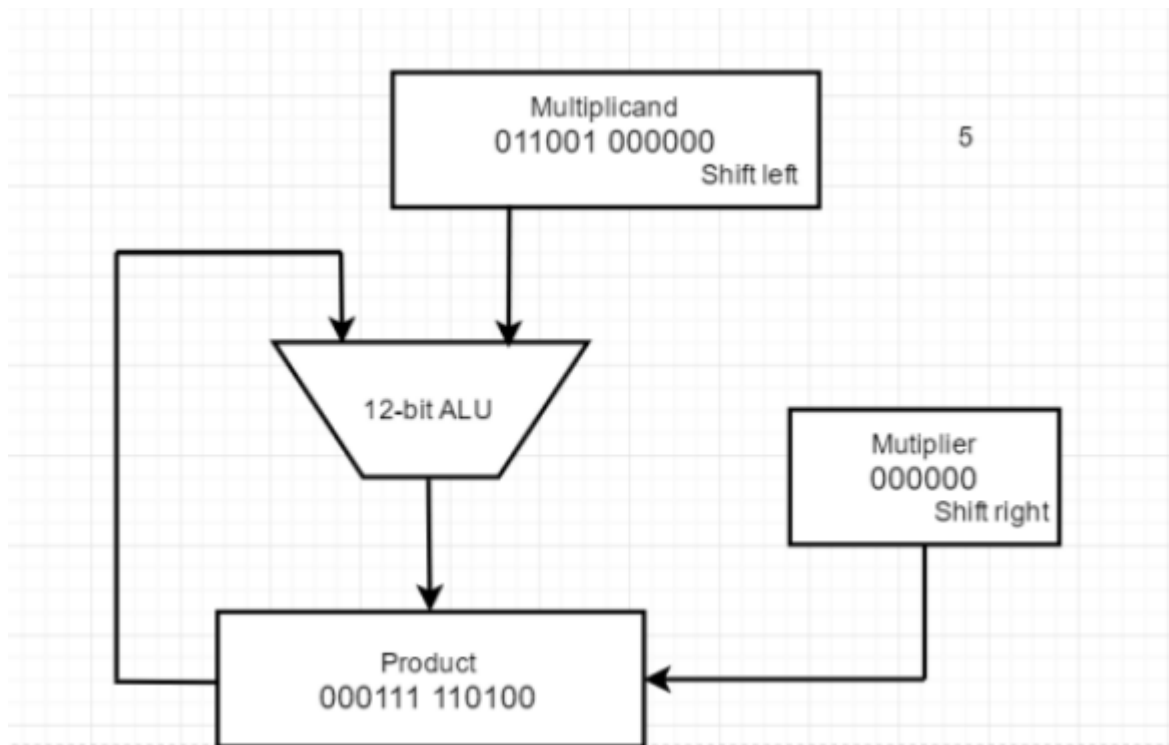
Iteration	Step	Multiplier	Multiplicand	Product
	2:shift left multiplicand	000000	110010 000000	000111 110100
	3:shift right multiplier	000000	110010 000000	000111 110100

Hardware diagram:









Exercise 3.13

62(hex) = 0110 0010(binary) 12(hex) = 0001 0010(binary)

Table :

Iteration	Step	Multiplier	Multiplicand	Product
0	Initial	0001001 0	00000000 01100010	00000000 00000000
1	1:0 => No operation	00010010	00000000 01100010	00000000 00000000
	2:shift left multiplicand	00010010	00000000 11000100	00000000 00000000
	3:shift right multiplier	00001001	00000000 11000100	00000000 00000000
2	1a:1 => Prod=Prod+Mcand	00001001	00000000 11000100	00000000 11000100
	2:shift left multiplicand	00001001	00000001 10001000	00000000 11000100
	3:shift right multiplier	00000100	00000001 10001000	00000000 11000100
3	1:0 => No operation	00000100	00000001 10001000	00000000 11000100
	2:shift left multiplicand	00000100	00000011 00010000	00000000 11000100
	3:shift right multiplier	00000010	00000011 00010000	00000000 11000100
4	1:0 => No operation	00000010	00000011 00010000	00000000 11000100
	2:shift left multiplicand	00000010	00000110 00100000	00000000 11000100
	3:shift right multiplier	00000001	00000110 00100000	00000000 11000100
5	1a:1 => Prod=Prod+Mcand	00000001	00000110 00100000	00000110 11100100
	2:shift left multiplicand	00000001	00001100 01000000	00000110 11100100
	3:shift right multiplier	00000000	00001100 01000000	00000110 11100100
6	1:0 => No operation	00000000	00001100 01000000	00000110 11100100
	2:shift left multiplicand	00000000	00011000 10000000	00000110 11100100
	3:shift right multiplier	00000000	00011000 10000000	00000110 11100100
7	1:0 => No operation	00000000	00011000 10000000	00000110 11100100
	2:shift left multiplicand	00000000	00110001 00000000	00000110 11100100
	3:shift right multiplier	00000000	00110001 00000000	00000110 11100100
8	1:0 => No operation	00000000	00110001 00000000	00000110 11100100
	2:shift left multiplicand	00000000	01100010 00000000	00000110 11100100
	3:shift right multiplier	00000000	01100010 00000000	00000110 11100100

Hardware diagram:

