

EXPERIMENT 3

Multiplication of 16 bit numbers

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Code:

```
16mul.asm
1 ; multiplying 16 bit number
2 ;1ST NUMBER IS 1234
3 ;2ND NUMBER IS 5678
4
5     MOV R7, #0FFH ; LOWER BYTE OF NUMBER 1
6     MOV R6, #0FFH ; UPPER BYTE OF NUMBER 1
7     MOV R5, #0FFH ; LOWER BYTE OF NUMBER 2
8     MOV R4, #0FFH ; UPPER BYTE OF NUMBER 2
9
10 ;multiplying lower byte of 1st operand
11
12     MOV A,R5
13     JZ L8      ; checks if R5 is zero
14     L4: LCALL L1 ; repeated addition loop
15     DJNZ R5,L4
16
17 ;multiplying higher byte of 1st operand
18
19     L8: MOV A,R4
20     JZ L5      ; checks if R4 is zero
21     L6: LCALL L3 ; repeated addition loop
22     DJNZ R4,L6
23
24     L5: MOV 51H, DPL ;moves value of DPTR to these registers
25     MOV 50H, DPH
26     SJMP L9      ; jumps to last line
27
28 ;1st SUBROUTINE
29
30     L1: MOV A,53H
31     ADD A,R7 ; adds lower byte of 2nd operand
32     MOV 53H,A
33     MOV A,52H ; 4th byte of result
34     ADDC A,R6 ; adds higher byte of 2nd operand
35     MOV 52H,A ; 3rd byte of result
36     JNC L2
37     INC DPTR ; 1st and 2nd byte of results
38     CLR C
39     L2: RET
40
41 ; 2ND SUBROUTINE ( multiplying higher byte by 100H)
42
43     L3: MOV R3, #0FFH
44     L7: LCALL L1 ; calls subroutine 255 times
45     DJNZ R3,L7
46     LCALL L1 ; calls subroutine for 256th time
47     RET      ; this sub routine has been executed 100H times
48
49     L9:      ; result is seen at 50H 51H 52H and 53H registers
50     END
```

OUTPUT:

Registers	
Register	Value
Regs	
r0	0x00
r1	0x00
r2	0x00
r3	0x00
r4	0x00
r5	0x00
r6	0xff
r7	0xff
Sys	
a	0x00
b	0x00
sp	0x07
sp_max	0x0b
dptr	0xfffe
PC \$	C:0x003A
states	1115383
sec	0.55769150
psw	0x40

Memory 1	
Address:	i:00
I:0x00:	00 00 00 00 00 00 00 FF FF 16 00 39 00 00 00 00 00
I:0x10:	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
I:0x20:	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
I:0x30:	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
I:0x40:	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
I:0x50:	FF FE 00 01 00 00 00 00 00 00 00 00 00 00 00 00
I:0x60:	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
I:0x70:	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
I:0x80:	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
I:0x90:	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
I:0xA0:	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
T:0xB0:	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

The outputs are found at 50H to 53H registers