

Lab Report 2

Title: 16-bit Arithmetic and Logical Shift Operations Using 8085 Microprocessor

Objective

To perform 16-bit addition, subtraction, and 4-bit right shift operations using the 8085 microprocessor by accessing data from memory locations and registers, and storing the results appropriately.

Questions

Add the 16-bit number in memory location 4000H and 4001H to the 16-bit number in memory location 4002H and 4003H. The most significant eight bits of the two numbers to be added are in memory location 4001H and 4003H. Store the result in memory locations 4004H and 4005H with the most significant byte in memory location 4005H

Program:

```
LDA 4000H  
MOV E,A
```

```
LDA 4001H  
MOV D,A
```

```
LDA 4002H  
MOV C,A
```

```
LDA 4003H  
MOV B,A
```

```
MOV A,E  
ADD C  
MOV L,A
```

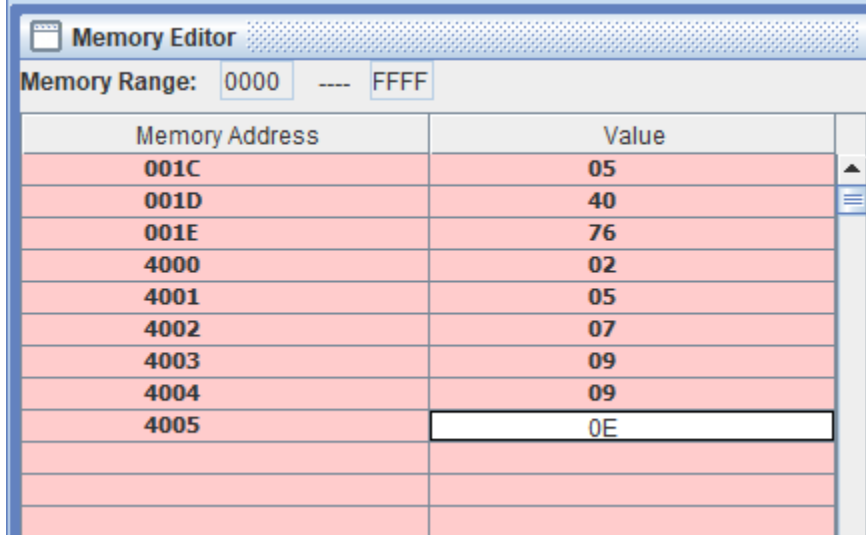
```
MOV A,D  
ADC B  
MOV H,A
```

```
MOV A,L  
STA 4004H  
MOV A,H
```

STA 4005H

HLT

Output



The screenshot shows a 'Memory Editor' window with a 'Memory Range' of 0000 to FFFF. The main table displays memory addresses and their corresponding values. The values for addresses 001C to 001E are 05, 40, and 76 respectively. For addresses 4000 to 4005, the values are 02, 05, 07, 09, 09, and 0E. The value 0E at address 4005 is highlighted with a white background.

Memory Address	Value
001C	05
001D	40
001E	76
4000	02
4001	05
4002	07
4003	09
4004	09
4005	0E

Flowchart:

Start → Load [4000H] → E → Load [4001H] → D
→ Load [4002H] → C → Load [4003H] → B
→ A = E + C → Store in L
→ A = D + B + Carry → Store in H
→ Store L → [4004H], H → [4005H] → Stop

Subtract the 16-bit number in memory locations 4002H and 4003H from the 16 bit number in memory locations 4000H and 4001H. Store the result in memory locations 4004H and 4005H with the most significant byte in memory location 4005H

program

LDA 4000H
MOV E,A

LDA 4001H
MOV D,A

LDA 4002H
MOV C,A

LDA 4003H
MOV B,A

MOV A,E
SUB C
MOV L,A

MOV A,D
SBB B
MOV H,A

MOV A,L
STA 4004H
MOV A,H
STA 4005H

HLT

Flowchart:

Start → Load [4000H] → E → Load [4001H] → D
→ Load [4002H] → C → Load [4003H] → B
→ A = E - C → Store in L
→ A = D - B - Borrow → Store in H
→ Store L → [4004H], H → [4005H] → Stop

Output

The screenshot shows the 'Memory Editor' window with the range set from 0000 to FFFF. The table displays the following data:

Memory Address	Value
0016	7D
0017	32
0018	04
0019	40
001A	7C
001B	32
001C	05
001D	40
001E	76
4000	07
4001	09
4002	02
4003	05
4004	05
4005	04

Write a program to shift eight-bit data four bits right. Assume that the data is in register C

Program:

```
MVI C,05H
MOV A,C
RRC
RRC
RRC
RRC
HLT
```

Register	Value
Accumulator	50
Register B	00
Register C	05
Register D	00
Register E	00
Register H	00

Flowchart:

Start → Load immediate value to C
→ Copy C to A
→ Rotate A right 4 times
→ Stop

Conclusion

In this lab, we successfully performed 16-bit arithmetic operations (addition and subtraction) using the 8085 microprocessor. We also implemented a logical right shift operation using repeated RRC instructions. These exercises demonstrated the handling of multi-byte data and bitwise operations with accuracy and efficiency using simple instruction sequences.