

# **Addition of two 8-bit numbers with carry**

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## ADDITION OF TWO 8-BIT NUMBERS WITH CARRY

### OBJECTIVE

To write an assembly language program to add the two 8-bit numbers with carry.

### ASSEMBLY LANGUAGE PROGRAM

```
C400 MVI C 00      0E ; Initialize C register as 00H
C401              00 ;
C402 LXI H C200   21 ; Load the HL register pair
C403              00 ;
C404              C2 ;
C405 MOV A M      7E ; Move the content of memory location to
                   accumulator
C406 INX H        23 ; Increment the HL register pair
C407 ADD M        86 ; Add the content of memory location with
                   accumulator content
C408 JNC C40C     D2 ; Jump if no carry to (C40C)H memory location
C409              0C ;
C40A              C4 ;
C40B INR C        0C ; Increment the C register
C40C INX H        23 ; Increment the HL register pair
C40D MOV M A      77 ; Move accumulator content to the next memory
                   location
C40E INX H        23 ; Increment the HL register pair
C40F MOV M C      71 ; Move the C register content to memory
                   location
C410 HLT          76 ; Halt the execution
```

### EXECUTION WITH CARRY

```
C200 FF ; Addend(Input data)
C201 45 ; Augend(Input data)
C202 44 ; Sum(Output data)
C203 01 ; Carry(Output data)
```

### MANUAL CALCULATION

```
FF => 1111 1111
45 => 0100 0101
-----
 1 0100 0100
-----
Sum  =  44
Carry = 01
```

### PROGRAM TRACE

Addr	MC	Mnemonic	A	B	C	D	E	H	L	SP	Flag Word
			00	00	00	00	00	00	00	0000	0000 0000
C400	0E	MVI C 00	00	00	00	00	00	00	00	0000	0000 0000
C402	21	LXI H C200	00	00	00	00	00	C2	00	0000	0000 0000
C405	7E	MOV A M	FF	00	00	00	00	C2	00	0000	0000 0000
C406	23	INX H	FF	00	00	00	00	C2	01	0000	0000 0000
C407	86	ADD M	44	00	00	00	00	C2	01	0000	0001 0101
C408	D2	JNC C40C	44	00	00	00	00	C2	01	0000	0001 0101
C40B	0C	INR C	44	00	01	00	00	C2	01	0000	0000 0001
C40C	23	INX H	44	00	01	00	00	C2	02	0000	0000 0001
C40D	77	MOV M A	44	00	01	00	00	C2	02	0000	0000 0001
C40E	23	INX H	44	00	01	00	00	C2	03	0000	0000 0001
C40F	71	MOV M C	44	00	01	00	00	C2	03	0000	0000 0001
C410	76	HLT	44	00	01	00	00	C2	03	0000	0000 0001

### FLAG WORD

S	Z	x	Ac	x	P	x	Cy
0	0	0	0	0	0	0	1

### EXECUTION WITHOUT CARRY

```
C200 02 ; Addend (Input data)
C201 06 ; Augend(Input data)
C202 08 ; Sum(Output data)
C203 00 ; Carry(Output data)
```

### MANUAL CALCULATION

```
02 => 0000 0010
06 => 0000 0110
-----
0 0000 1000
-----
Sum = 08
Carry = 00
```

### PROGRAM TRACE

Addr	MC	Mnemonic	A	B	C	D	E	H	L	SP	Flag Word
			00	00	00	00	00	00	00	0000	0000 0000
C400	0E	MVI C 00	00	00	00	00	00	00	00	0000	0000 0000
C402	21	LXI H C200	00	00	00	00	00	C2	00	0000	0000 0000
C405	7E	MOV A M	02	00	00	00	00	C2	00	0000	0000 0000
C406	23	INX H	02	00	00	00	00	C2	01	0000	0000 0000
C407	86	ADD M	08	00	00	00	00	C2	01	0000	0000 0000
C408	D2	JNC C40C	08	00	00	00	00	C2	01	0000	0000 0000
C40C	23	INX H	08	00	00	00	00	C2	02	0000	0000 0000
C40D	77	MOV M A	08	00	00	00	00	C2	02	0000	0000 0000
C40E	23	INX H	08	00	00	00	00	C2	03	0000	0000 0000
C40F	71	MOV M C	08	00	00	00	00	C2	03	0000	0000 0000
C410	76	HLT	08	00	00	00	00	C2	03	0000	0000 0000

### FLAG WORD

S	Z	x	Ac	x	P	x	Cy
0	0	0	0	0	0	0	0

## REFERENCE

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