

MULTI-BYTE SUBTRACTION

DR. E. SINDHUJA

ASSISTANT PROFESSOR

BON SECOURS COLLEGE FOR WOMEN

- A byte consists of 8 – bit
- Two multibyte hex decimal numbers are to be subtracted.
- Example

EC 8B 94 5A
4B 3C A8 B9

- The above example each number consists of 4 bytes

EC	8B	94	5A
1 byte	1 byte	1 byte	1 byte
4B	3C	A8	B9
1 byte	1 byte	1 byte	1 byte

- An 8-bit microcomputer takes one byte of the numbers at a time and subtract them with borrow.
- A counter is initiated to count the byte.

Manual Calculation

EC	1	1	1	0	1	1	0	0
4B	0	1	0	0	1	0	1	1
–	1	0	1	0	0	0	0	1
A1								

8B	1	0	0	0	1	0	1	1
3C	0	0	1	1	1	1	0	0
–	0	1	0	0	1	1	1	0
4E								

Borrow 1 from 8B

Borrow 1 from 94

94	1	0	0	1	0	1	0	0
A8	1	0	1	0	1	0	0	0
–	1	1	1	0	1	0	1	1
EB								

5A	0	1	0	1	1	0	1	0
89	1	0	1	1	1	0	0	1
–	1	0	1	0	0	0	0	1
A1								

Assembly Language Program

- The count = 04
- The count is placed in memory locations 2500 H
- The 1st number is placed in memory locations 2601 to 2604 H
- The 2nd number is placed in memory locations 2501 to 2504 H
- The result is placed in the memory locations 2501 to 2504 H

2500	04
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2501	B9
2502	A8
2503	3C
2504	4B

2601	5A
2602	94
2603	8B
2604	EC

Address	Machine Code	Label	Mnemonics	Operands	Comments
2400	21, 00, 25		LXI	H,2500H	Address of byte count in H-L pair
2403	4E		MOV	C,M	Byte count in register C
2404	23		INX	H	Address of 1 st byte of 2 nd number
2405	11, 01, 26		LXI	D,2601H	Address of 1 st byte of 1 st number
2408	B7		ORA	A	Clear carry
2409	1A	LOOP	LDAX	D	Get byte of 1 st number in accumulator
240A	9E		SBB	M	Subtract byte of 2 nd number from byte of 1 st number with borrow
240B	77		MOV	M,A	Store result in memory addressed by H-L pair
240C	23		INX	H	Increment the content of the H-L pair
240D	13		INX	D	Increment the content of the D-E pair
240E	0D		DCR	C	Decrement the count
240F	C2, 09, 24		JNZ	LOOP	Is count = 0? Jump to LOOP
2412	76		HLT		Stop

Label	Mnemonics	Operands		
	LXI	H,2500H	2500 (04) → H-L	H-L = 04
	MOV	C,M	M (H-L) → C	C =04
	INX	H	2500 → 2501 (B9)	H-L = B9
	LXI	D,2601H	2601 (5A) → D	D = 5A
	ORA	A	Clear Carry	carry = 0
LOOP	LDAX	D	D → A	A = 5A
	SBB	M	A-M	5A-B9-1 = A1
	MOV	M,A	A → M	M (2501) = A1
	INX	H	2501 → 2502 (A8)	H-L = A8
	INX	D	2601 → 2602(94)	D =94
	DCR	C	C-1	C=03
	JNZ	LOOP		No Zero
	HLT			

LOOP 1

Label	Mnemonics	Operands		
	LXI	H,2500H		
	MOV	C,M		
	INX	H		
	LXI	D,2601H		
	ORA	A		
LOOP	LDAX	D	D → A	A = 94
	SBB	M	A-M	94-A8-1 = EB
	MOV	M,A	A → M	M (2502) = EB
	INX	H	2501 → 2502 (3C)	H-L = 3C
	INX	D	2601 → 2602(8B)	D =8B
	DCR	C	C-1	C=02
	JNZ	LOOP		No Zero
	HLT			

LOOP 2

Label	Mnemonics	Operands		
	LXI	H,2500H		
	MOV	C,M		
	INX	H		
	LXI	D,2601H		
	ORA	A		
LOOP	LDAX	D	D → A	A = 8B
	SBB	M	A-M	8B-3C= 4E
	MOV	M,A	A → M	M (2503) = 4E
	INX	H	2501 → 2502 (4B)	H-L = 4B
	INX	D	2601 → 2602(EC)	D =EC
	DCR	C	C-1	C=01
	JNZ	LOOP		No Zero
	HLT			

LOOP 3

Label	Mnemonics	Operands		
	LXI	H,2500H		
	MOV	C,M		
	INX	H		
	LXI	D,2601H		
	ORA	A		
LOOP	LDAX	D	D → A	A = EC
	SBB	M	A-M	EC-4B= A1
	MOV	M,A	A → M	M (2504) = A1
	INX	H	2501 → 2502 (A8)	H-L = 00
	INX	D	2601 → 2602(94)	D =00
	DCR	C	C-1	C=00
	JNZ	LOOP		Zero
	HLT			Stop

The result placed in the following memory locations

2501	A1
2502	EB
2503	4E
2504	A1

Thank

you

