// Addition - UN/SIGNED MANTISSA AND UN/SIGNED EXPONENT

```
START:  LXI SP,4000
        LXI H,2000
        MOV B,M       // Saving first exponent in B
        INX H
        PUSH H
        MOV A,M       // Saving Second Exponent in A
        CMP B         // Comparing both the exponents
        JZ CONTINUE   // If both the exponents ->Performing Add
// IF both exponents are not equal --> subracting
        MOV C,B       // Transferring A->B and B->A
        MOV B,A
        MOV A,C
        ADI 00
        JM 1COMP
        JP NEXTEXPO

1COMP:      CMA
        ADI 01
        ADI F8
        MOV C,A

NEXTEXPO:   MOV A,B
        ADI 00
        JP SUBRACT
        ANI 07
        ADD C
        JMP GO

SUBRACT:    MOV A,C     // Moving the number in A for Subraction
```

```
        SUB B // Getting the difference

GO:     MOV B,A     // Transferring the result to B
        INX H // HL = 2003H
        PUSH H
        MOV A,M     // M has first number
        ADI 00      // Adding 00 to first number to check sign bit
        JM NEWROTATE        // IF Sign bit=1 then --> NEWROTATE

LOOP:   RAL  // Multiplying 2
        DCR B // Decrementing B
        JNZ LOOP    // If B!=0 --> Repeat
        MOV M,A     // If B!=0 then Moving the new rotated number to M
        JZ NEXT     // If B==0 --> Jump to NEXT

NEWROTATE:      ADI 80          // Making Sign Bit 0
        CMC

LOOP2:  RAL  // Multiplying by 2
        DCR B
        JNZ LOOP2
        ADI 80
        MOV M,A
        JMP NEXT

CONTINUE:       INX H
        PUSH H
        MOV A,M

NEXT:   ADI 00      // For 2's complement if number is -ve or positive
        JM 1TWO     // IF number is negative --> Jumping to 1TWO
```

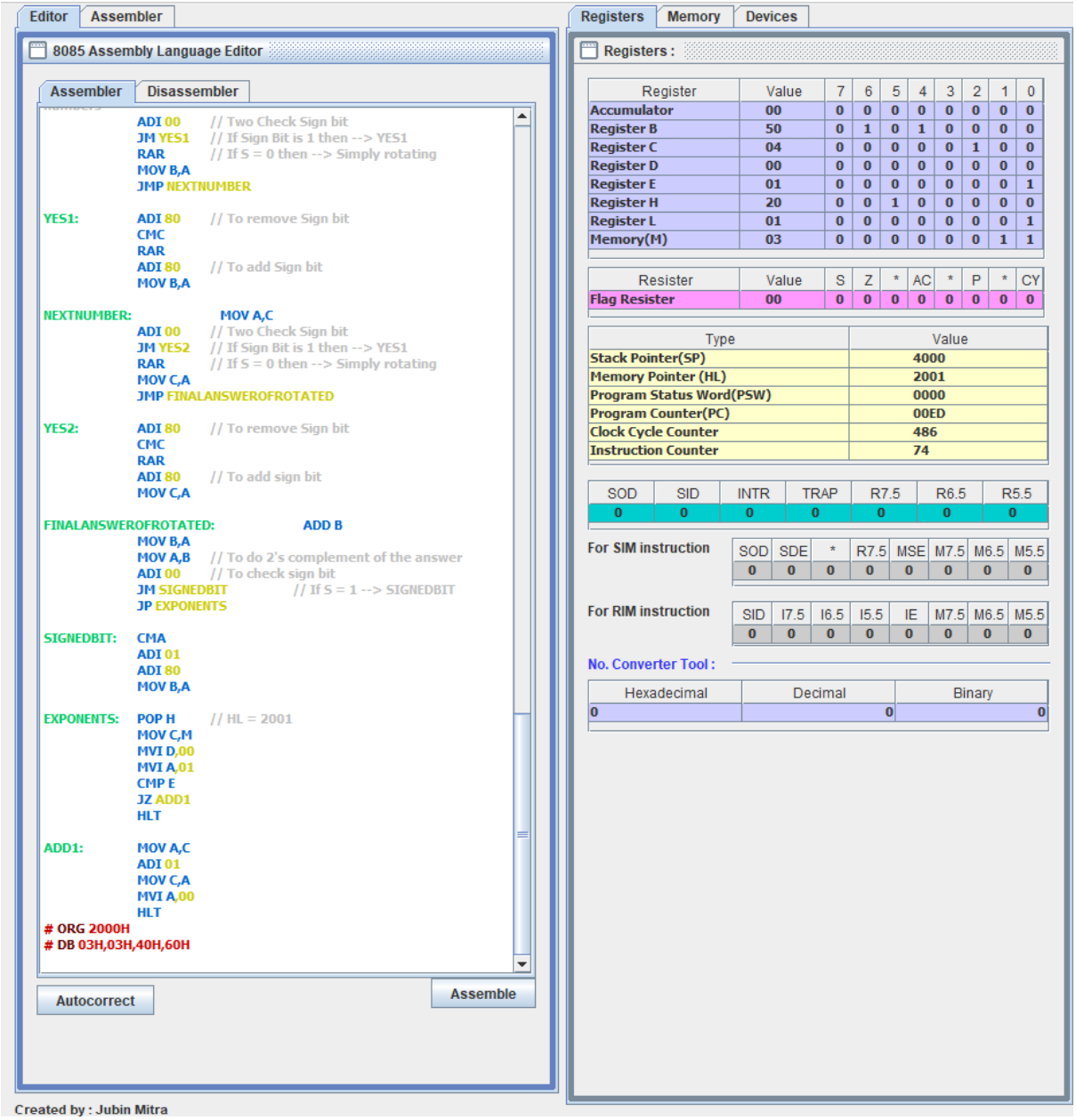
```
        JP SECONDNUMBER

1TWO:   CMA
        ADI 01
        ADI 80
        MOV M,A

SECONDNUMBER:       MOV B,A     // Moving first number to B
        INX H
        PUSH H
        MOV A,M
        ADI 00          // For 2's complement if number is -ve or positive
        JM 2TWO         // IF number is negative --> Jumping to 1TWO
        JP MOVE

2TWO:   CMA
        ADI 01
        ADI 80
        MOV M,A

MOVE:   MOV C,A         // Moving Second Number to C

NOWAD:          POP H// HL = 2002
        MOV A,M         // MOVING FIRST Number to M
        STC
        CMC
        RAL     // For Checking Overflow
        MOV D,A
        POP H// HL = 2003
        MOV A,M
        STC
```

```
        CMC
        RAL    // For Checking
        ADD D          // Adding for getting carry from 7th bit
        JNC NEXT3
        MVI E,01

NEXT3:  MOV A,C        // Adding the unrotated numbers
        ADD B// Adding with B
        MOV D,A
        JC CHECKINGOVERFLOW        // If Carry is Generated --> JMP
        MVI A,00
        CMP E
        JZ OLDADD
        JNZ NEWADD

CHECKINGOVERFLOW:    MVI A,01
        CMP E
        JZ OLDADD
        JNZ NEWADD

OLDADD:          MOV B,D
        MOV A,B        // To do 2's complement of the answer
        ADI 00         // To check sign bit
        JM SIGNEDBIT// If S = 1 --> SIGNEDBIT
        JP EXPONENTS
        HLT

NEWADD:          MVI E,01
        MOV A,B        // For New Addition Dividing by 2 both the numbers
        ADI 00         // Two Check Sign bit
        JM YES1        // If Sign Bit is 1 then --> YES1
```

```
        RAR    // If S = 0 then --> Simply rotating
        MOV B,A
        JMP NEXTNUMBER

YES1:   ADI 80          // To remove Sign bit
        CMC
        RAR
        ADI 80          // To add Sign bit
        MOV B,A

NEXTNUMBER:    MOV A,C
        ADI 00          // Two Check Sign bit
        JM YES2         // If Sign Bit is 1 then --> YES1
        RAR    // If S = 0 then --> Simply rotating
        MOV C,A
        JMP FINALANSWEROFROTATED

YES2:   ADI 80          // To remove Sign bit
        CMC
        RAR
        ADI 80          // To add sign bit
        MOV C,A

FINALANSWEROFROTATED:          ADD B
        MOV B,A
        MOV A,B         // To do 2's complement of the answer
        ADI 00          // To check sign bit
        JM SIGNEDBIT// If S = 1 --> SIGNEDBIT
        JP EXPONENTS

SIGNEDBIT:          CMA
```

```
        ADI 01
        ADI 80
        MOV B,A

EXPONENTS:  POP H// HL = 2001
        MOV C,M
        MVI D,00
        MVI A,01
        CMP E
        JZ ADD1
        HLT

ADD1:   MOV A,C
        ADI 01
        MOV C,A
        MVI A,00
        HLT# ORG 2000H
# DB FAH,FBH,A0H,20H
```

OVERFLOW CASE:



Result is stored in Register B, exponent in Reg C and if there is an overflow condition then in Reg E and in this case, overflow was there. Ergo, Register E has the value 01