Multiplication of two 16-bit numbers

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MULTIPLICATION OF TWO 16-BIT NUMBERS

AIM

To write an assembly language program to multiply two 16-bit numbers and obtain the result

ASSEMBLY LANGUAGE PROGRAM

```
C400 LHLD C660   2A ; Load the HL register pair directly with
C401             60 ; Multiplicand
C402             C6 ;
C403 SPHL        F9 ; Copy the HL register pair content
                      (Multiplicand) to stack pointer
C404 LHLD C662   2A ; Load the HL register pair directly with
C405             62 ; Multiplier
C406             C6 ;
C407 MOV D H     54 ; Move the H register content to D register
C408 MOV E L     5D ; Move the L register content to E register
C409 MVI L 00    2E ; Initialize the L register with 00H
C40A             00 ;
C40B MVI H 00    26 ; Initialize the H register with 00H
C40C             00 ;
C40D MVI B 00    06 ; Initialize the B register with 00H
C40E             00 ;
C40F MVI C 00    0E ; Initialize the C register with 00H
C410             00 ;
C411 DAD SP      39 ; Add stack pointer content with HL register
                      pair
C412 JNC C416    D2 ; If carry = 0, then jump to C416H
C413             16 ;
C414             C4 ;
C415 INX B       03 ; Increment BC register pair
C416 DCX D       1B ; Decrement DE register pair
C417 MOV A E     7B ; Move E register content to accumulator
C418 ORA D       B2 ; OR the D register content with accumulator
C419 JNZ C411    C2 ; If non zero, Jump to C411H
C41A             11 ;
C41B             C4 ;
C41C SHLD C664   22 ; Store the HL register pair content(1st and 2nd
C41D             64 ; byte of Product) to memory at C664H and C665H
C41E             C6 ;
C41F MOV A C     79 ; Move the C register content to accumulator
C420 STA  C666   32 ; Store accumulator content(3rd byte of
C421             66 ; Product ) to memory at C666H
C422             C6 ;
C423 MOV A B     78 ; Move the B register content to accumulator
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```
C424 STA  C667   32 ; Store the accumulator content(4th byte of
C425             67 ; Product) to memory at C667H
C426             C6 ;
C427 HLT         76 ; Halt the execution
```

EXECUTION

```
C660 02 ; LSB of Multiplicand(Input data)
C661 0A ; MSB of Multiplicand(Input data)
C662 02 ; LSB of Multiplier(Input data)
C663 00 ; MSB of Multiplier(Input data)
C664 04 ; 1st byte of Product(Output data)
C665 14 ; 2nd byte of Product(Output data)
C666 00 ; 3rd byte of Product(Output data)
C667 00 ; 4th byte of product(Output data)
```

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	2A	LHLD C660	00	00	00	00	00	0A	02	0000	0000 0000
C403	F9	SPHL	00	00	00	00	00	0A	02	0A02	0000 0000
C404	2A	LHLD C662	00	00	00	00	00	00	02	0A02	0000 0000
C407	54	MOV D H	00	00	00	00	00	00	02	0A02	0000 0000
C408	5D	MOV E L	00	00	00	00	02	00	02	0A02	0000 0000
C409	2E	MVI L 00	00	00	00	00	02	00	00	0A02	0000 0000
C40B	26	MVI H 00	00	00	00	00	02	00	00	0A02	0000 0000
C40D	06	MVI B 00	00	00	00	00	02	00	00	0A02	0000 0000
C40F	0E	MVI C 00	00	00	00	00	02	00	00	0A02	0000 0000
C411	39	DAD SP	00	00	00	00	02	0A	02	0A02	0000 0000
C412	D2	JNC C416	00	00	00	00	02	0A	02	0A02	0000 0000
C416	1B	DCX D	00	00	00	00	01	0A	02	0A02	0000 0000
C417	7B	MOV A E	01	00	00	00	01	0A	02	0A02	0000 0000
C418	B2	ORA D	01	00	00	00	01	0A	02	0A02	0000 0000
C419	C2	JNZ C411	01	00	00	00	01	0A	02	0A02	0000 0000
C411	39	DAD SP	01	00	00	00	01	14	04	0A02	0000 0000
C412	D2	JNC C416	01	00	00	00	01	14	04	0A02	0000 0000
C416	1B	DCX D	01	00	00	00	00	14	04	0A02	0000 0000
C417	7B	MOV A E	00	00	00	00	00	14	04	0A02	0000 0000
C418	B2	ORA D	00	00	00	00	00	14	04	0A02	0100 0100
C419	C2	JNZ C411	00	00	00	00	00	14	04	0A02	0100 0100
C41C	22	SHLD C664	00	00	00	00	00	14	04	0A02	0100 0100
C41F	79	MOV A C	00	00	00	00	00	14	04	0A02	0100 0100
C420	32	STA C666	00	00	00	00	00	14	04	0A02	0100 0100
C423	78	MOV A B	00	00	00	00	00	14	04	0A02	0100 0100
C424	32	STA C667	00	00	00	00	00	14	04	0A02	0100 0100
C427	76	HLT	00	00	00	00	00	14	04	0A02	0100 0100

FLAG WORD

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

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