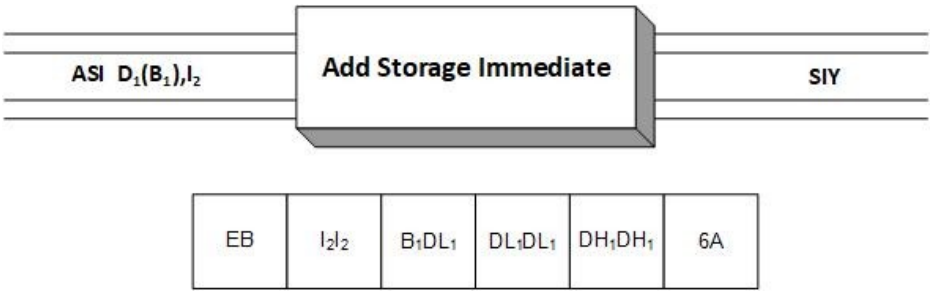

The ASI (Add Storage Immediate) instruction performs 2's complement binary addition. Operand 1 is a 32-bit storage area containing a 2's complement integer. Operand 2 specifies a 2's complement byte stored inside the second byte of the instruction. The two operands are added as 2's complement integers, and the sum is stored in the Operand 1 storage location. The 2's complement byte inside the instruction is not changed. Since ASI has an SIY instruction format, the first operand base/displacement address has a displacement size of 20 bits and is treated as a signed binary integer. $DL_1DL_1DL_1$ contains 12 bits, and DH_1DH_1contains 8 bits. These fields are rearranged as $DH_1DH_1DL_1DL_1DL_1$ to form the 20-bit displacement which is interpreted as a 2's-complement integer. This supports a displacement range from -524,288 to 524,287. Since the displacement can be negative, the base/displacement address can refer to addresses smaller, equal, or larger than the base address.

Consider the following example,

ASI Y,X'FF'

Y DS F(Before) Y (After)
11 22 33 44 11 22 33 43

The contents of the storage immediate byte X'FF' , are added to field Y which contains x'11223344. The sum is x'11 22 33 43' (X'FF' = -1) and destroys the previous value in Y The value in storage immediate byte is unchanged by this operation.

ASI has a two-byte opcode, EB6A, consisting of the first and last bytes of the object code.

The instruction sets the condition code as follows.

Condition Code	Meaning	Test With
0	Result is 0; no overflow	BE,JE,BZ,JZ
1	Result is < 0; no overflow	BL,JL,BM,JM
2	Result is > 0; no overflow	BH,JH,BP,JP
3	Overflow	BO,JO,BNO,JNO

Some Unrelated ASIs:

Assume the following variable values:

```
        DS   0F
DOG     DC   X'00000012' = + 18
CAT     DC   X'7FFFFFFF' = + 2,147,483,647 (largest positive 32-bit value)
PIG     DC   X'FFFFFFFF' = - 1
```

```
        ASI     DOG,B'11111111'
        After: R4 =X'00000011' CC=2 POSITIVE RESULT

        ASI     DOG,X'FF'
        After: R4 =X'00000011' CC=2 POSITIVE RESULT

        ASI     CAT,X'01'
        After: R4 =X'80000000' CC=3 OVERFLOW – Carry into sign bit, no carry out

        ASI     CAT,-1
        After: R4 =X'7FFFFFFE' CC=2 POSITIVE RESULT

        ASI     PIG,-1
        After: R4 =X'FFFFFFFE' CC=1 NEGATIVE RESULT
```

Tips

1. If the fixed-point overflow mask is one, a program interruption for fixed-point overflow occurs. If the fixed-point-overflow mask is zero, a program interruption for fixed-point overflow will not occur. In this case, the programmer should test for overflow. The mask can be controlled with the SPM (Set Program Mask) instruction.