LA R1,D2(X2,B2)

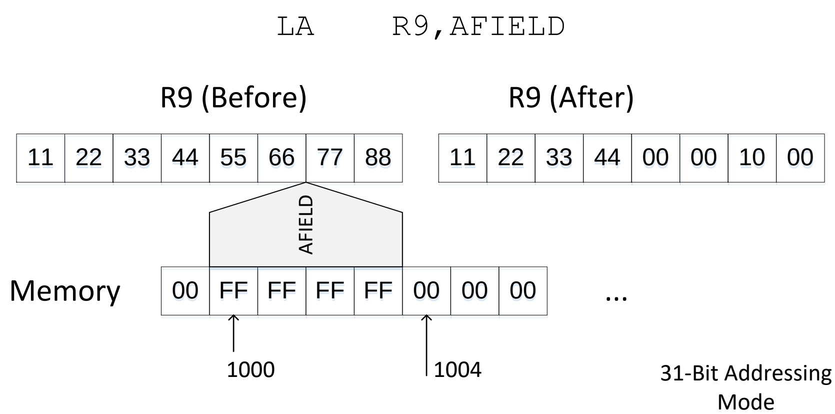
Load Address

RX

Op Code	R_1X_2	B_2D_2	D_2D_2

LA is used to initialize the register specified by operand 1 with the address designated by operand 2. The number of bits that are loaded can be 24, 31, or 64 depending on the addressing mode. Operand 2 may be expressed using explicit notation or symbolic notation, or a combination of both. Remember that each byte in memory is numbered and that the number assigned to a byte is its address. The address of a field is the address of the first byte of the field. Consider the following example,

```
LA    R9,AFIELD
```



The address of the fullword “AFIELD” , x’00001000’, is copied to register 9, destroying the previous value in R9. The fullword is unchanged by this operation. We are assuming a 31-bit addressing mode.

Since **LA** is an RX instruction, an index register may be coded as part of operand 2 as in the example below. We assume that register 6 is used as an index register and initially contains x’0000002F’. When the assembler processes the expression AFIELD(R6), it uses the symbol AFIELD to determine a base register and a displacement, leaving R6 as the index register. The address which is loaded into register 9 is the “effective address” computed by adding the base register contents, plus the index register contents, plus the displacement:

Effective address = C(Base register) + C(Index register) + displacement

We assume that the contents of the base register plus the displacement is x’00001000’. Then the effective address is x’00001000’ + x’0000002F’ = x’0000102F’ .

```
LA    R9,AFIELD(R6)
```

The example above uses a mixture of symbolic and explicit addressing. The instruction could also be coded using only explicit addresses:

```
LA   R9,30(R7,R8)
```

In the example above assume that R7 contains x’00001000’ and that R8 contains x’00000020’. R7 is treated as an index register, R8 is the base register, and 30 is a displacement. The effective address is C(R7) + C(R8) + 30 = x’00001000” + x’00000020’ + x’0000001E’ = x’0000103E’. (Remember that a decimal 30 is 1E in hexadecimal.) After the instruction has executed, R9 contains x’0000103E’.

Examples

Some Unrelated Load Addresses

```
          R4 =  X’12121212’
          R5 =  X’00000008’
          R6 =  X’00000004’
Assume that AFIELD has address x’00003000’.

AFIELD   DC  F’4’       AFIELD = X’00000004’

         LA  R4,AFIELD      R4 = X’00003000’
         LA  R4,AFIELD(R6)  R4 = X’00003004’
         LA  R4,AFIELD(R5)  R4 = X’00003008’
         LA  R4,20(R5,R6)   R4 = X’00000020’ 4 + 8 + 20 = 32 = X’20’

         Using R0 as an index indicates that no index register is
         desired:

         LA  R4,3(R0,R6)    R4 = X’00000007’  4 + 3 = 7

         Consider the next two consecutively executed instructions.

         LA  R4,AFIELD             R4 = X’00003000’
         LA  R4,L’AFIELD(R0,R4)    R4 = x’00003004’

         In the example above, the length attribute (L’) is used as
         a displacement
```

Tips

1. An old assembler joke:

   Novice: What’s the difference between a Load instruction and a Load Address instruction?”

   Old Hand: About a week of debugging.

Seriously, you should pay attention when coding **L** or **LA**. Both instructions compute the address of operand 2. In the case of **L**, the machine retrieves the contents of the fullword in memory at the specified address and places the four bytes in a register. In the case of **LA**, the address is simply stored in a register.

2. The **LA** instruction is often used to change the location referenced by a DSECT:

```
TEST     DSECT
TESTREC  DS   0CL80
X        DS    ...

         USING  TEST,R5
         LA     R5,TABLE       POINT AT TABLE AREA
         ...
         LA     R5,L'TESTREC(R0,R5)  MOVE THE DSECT
```