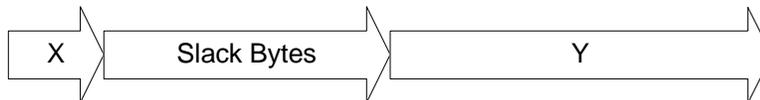


Fixed point data fields, more commonly called “Binary” data fields, are defined using an “F” or an “H” in a DS or DC declarative. The “F” creates a fullword (4-byte) field containing a binary integer in 2’s complement format. In this format, the integer can be positive or negative. The “H” designator is used to create halfword (2-byte) fields containing 2’s complement signed integers. In both formats, the length indicator “Ln” is usually omitted since the length is understood to be 2 or 4. When the length indicators are absent, the fields will be aligned on either halfword or fullword boundaries. (A halfword boundary is an address that is evenly divisible by 2, while fullword boundaries are evenly divisible by 4.) In order to align a field properly, the assembler may generate from 1 to 3 unused bytes called “slack” bytes. Consider the example below. We assume that field “X” is located at address x’1000’ and that the addresses of the bytes are shown inside each byte.

LOCATION

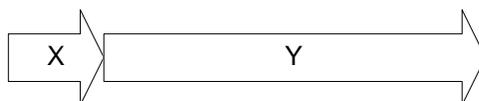
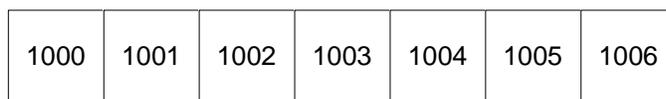
1000	X	DS	CL1
1004	Y	DS	F



It is possible to code a length for fullword and halfword binary fields. Specifically, we may code “FL4” and “HL2”. When a length is indicated, slack bytes will not be generated. Consider the following example which is similar to the example above, but generates no slack bytes.

LOCATION

1000	X	DS	CL1
1004	Y	DS	FL4



Fullword and halfword alignment can also be obtained with another technique: Coding a 0 duplication factor forces proper alignment for the succeeding field. For instance, the following example forces FIELDA to be fullword aligned.

```

                DS    0F
FIELDA        DS    ...

```



Some Typical DS's and DC's:

J	DS	F	A fullword field, properly aligned
K	DS	H	A halfword field, properly aligned
L	DS	FL4	A fullword field, no slack bytes generated
M	DS	HL2	A halfword field, no slack bytes generated
N	DC	F'2147483647'	Maximum size of a binary fullword = $2^{31} - 1$
O	DC	H'32767'	Maximum size of a binary halfword = $2^{15} - 1$
P	DC	F'-2147483648'	Minimum size of a binary fullword = $-2^{31} - 1$
Q	DC	H'-32768'	Minimum size of a binary halfword = $-2^{15} - 1$
R	DC	F'0'	A fullword containing a zero
S	DC	H'40000'	Error - constant too large
	DS	0F	Provide fullword alignment for the subsequent field
	DS	0H	Provide halfword alignment for the subsequent field
T	DC	H'20'	T = x'0014'
U	DC	F'-20'	U = x'FFFFFFEC' - 2's complement integer
V	DC	H'92'	V = x'005C'

Tips

1. Remember that halfword fields are fairly small - between 32767 and -32768. Don't select a halfword if you think your results may exceed these values.
2. When defining fields in an input or output buffer, fullword and halfword fields are not usually aligned in order to conserve space on a file. Remember to code the length indicator in these cases.