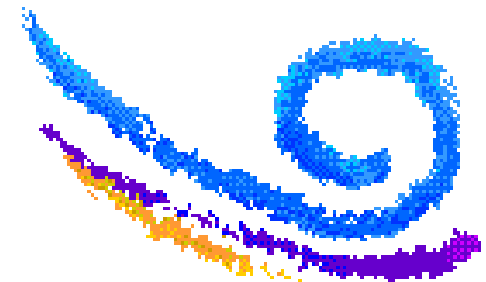


IBM Enterprise COBOL

The PICTURE Clause and Data Editing

PICTURE

- ▶ When describing data items, the following data types must have a PICTURE clause:
 - Numeric data
 - Binary, comp, comp-4, comp-5
 - Comp-3, packed-decimal
 - String data
 - Display
 - Display-1
 - National



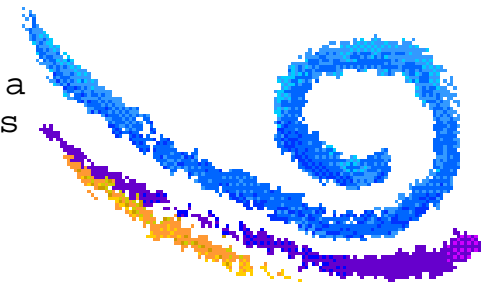
PICTURE - String items

► PICTURE characters for describing string data items:

```
... PIC X.  
... PIC XXX.  
... PIC X(20).  
  
... PIC A.  
... PIC AAA.  
... PIC A(20).  
... PIC XXA(3)BBX(5).
```

Notes:

- * The words PICTURE or PIC may be in upper-case, lower-case, or mixed-case
- * The picture characters may be in upper case or lower case (A, B, X, or a, b, x)
- * Each picture character represents one character of a particular type of content:
 - X - one byte of any type of data
 - A - one byte of alphabetic data or space
 - B - one space (blank)
- * A number in parenthesis (e.g.: (20), (3), (5) above) represents a multiplier of the previous picture character; the last picture is 2 bytes of any data followed by 3 alphabetic or space characters followed by 2 spaces followed by 5 bytes of any data



PICTURE - More string items

► PICTURE characters for describing double byte string data items:

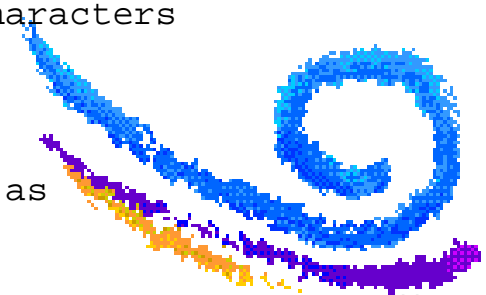
```
... PIC G.  
... PIC GGG.  
... PIC G(20).  
  
... PIC N.  
... PIC NNN.  
... PIC N(20).
```

Notes:

- * Each of these picture characters represents one character of a double-byte character type (each character is two bytes):
 - G - graphic: Double Byte Character Set (DBCS)
 - N - national: Unicode (UTF-16)

Note also that 'N' may represent DBCS data, depending on the compiler option NSYMBOL; if NSYMBOL(DBCS) is set, 'N' picture characters represent graphic characters; if NSYMBOL(NATIONAL) is set, 'N' picture characters represent Unicode characters

- * A "B" picture character may also be used, and it is interpreted as a DBCS or Unicode space; in this case a USAGE of DISPLAY-1 or NATIONAL must be included with the data item



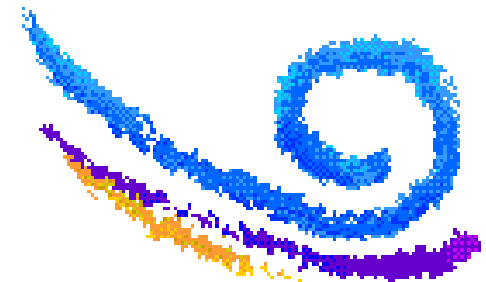
PICTURE - [non-edited] numeric items

► PICTURE characters for describing numeric data items:

```
... PIC 9.  
... PIC 999.  
... PIC 9(5).  
... PIC 99V999.  
... PIC 9(5)V99.  
  
... PIC S9.  
... PIC S9(5).  
... PIC S9(5)V99.
```

Notes:

- * Each '9' represents a digit position; whether or not it represents a byte depends on the USAGE (see papers on binary and packed-decimal numbers); for DISPLAY data, each 9 represents a byte; for DISPLAY-1 (DBCS data) and National (Unicode) data, each 9 represents two bytes
- * An 'S' picture character indicates the data item carries a sign with it (the S itself does not take any space)
- * A 'V' picture character indicates where the implied decimal point is: the V takes no space; it is used by compiler to keep track of decimal positions in moves and calculations



PICTURE - Edited numeric items

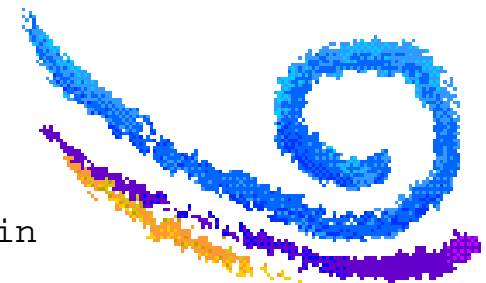
- ▶ The PICTURE for a numeric edited data item describes how the item should appear on displayed or printed output media:

Picture

<u>character</u>	<u>use</u>
9	represents a numeric digit; 0-9
Z	zero-suppression: leading zeros should be replaced with blanks
.	decimal point: align V to decimal point and display a decimal point
,	comma: insert a comma at this location
\$	currency symbol: insert a visible currency symbol
/	slash: insert a visible slash
0	zero: represents a physical, visible zero
+ -	plus or minus: a visible sign
CR DB	Credit / Debit abbreviation: display as shown

Notes:

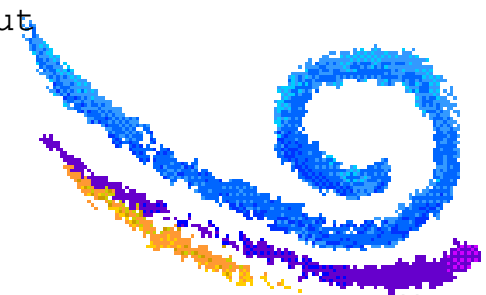
- * Each of these characters takes up space in the field
- * If zero suppression is in effect, decimal points and commas are also replaced with spaces
- * If a sign is present, it must be the first or last character in the picture
- * If a currency symbol is present, it must be the first character in the picture, except a '+' or '-' may precede it



PICTURE - Edited numeric items, continued

- ▶ A numeric edited field normally has a value moved or calculated into it, formatting the result based on the picture; for example:

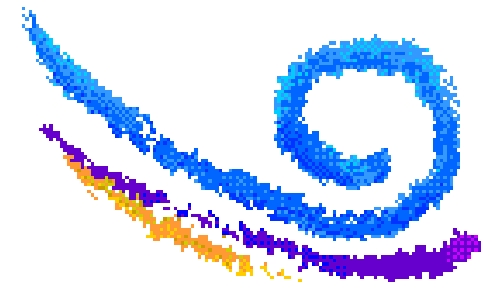
<u>Value</u>	<u>-> Edit Picture</u>	<u>-> Resulting value</u>	<u>Notes</u>
45V23	999.99	045.23	'V' lined up with decimal point
123678V001	999999.999	123678.001	
53V75	9999.9999	0053.7500	leading and trailing 9's replaced with 0's
75362V0158	9999.99	5362.01	truncate leading and trailing digits!
13459V82	99,999.99	13,459.82	inserted comma
273456V88	\$999,999.99	\$273,456.88	inserted currency symbol
10	\$99,999	\$00,010	leading zeros not conventional appearance
155V19	ZZ,ZZZ.ZZ	155.19	comma has been zero suppressed
0	ZZ,ZZZ.ZZ		everything zero suppressed: not desired
23419V22	ZZ,ZZZ.99	23,419.22	significant leading digits, no suppression
0	ZZ,ZZZ.99	00	not a desirable output
0	ZZ,ZZ9.99	0.00	more common
0	ZZ,999.99	000.00	not common



PICTURE - Edited numeric items, continued

- ▶ Sign indicators are used to display if a value is negative, positive, or zero; examples:

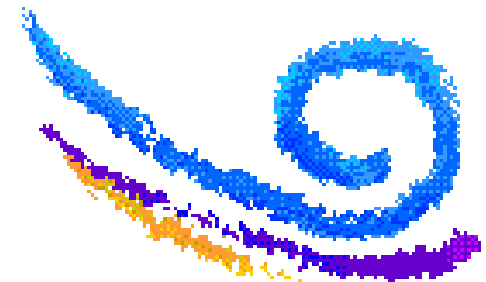
<u>Value</u>	<u>-> Edit Picture</u>	<u>-> Resulting value</u>	<u>Notes</u>
+137V43	999.99+	137.43+	'+' always displays a sign
-137V43	999.99+	137.43-	
+214V27	+999.99	+214.27	
-214V27	+999.99	-214.27	
+137V43	999.99-	137.43	'-' displays a blank for zero or positive and a '-' for negative values
-137V43	999.99-	137.43-	
+214V27	-999.99	214.27	
-214V27	-999.99	-214.27	



PICTURE - Edited numeric items, continued

- ▶ Sign indicators are used to display if a value is negative, positive, or zero; examples:

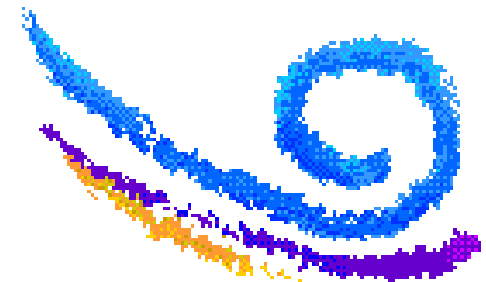
<u>Value</u>	<u>-> Edit Picture</u>	<u>-> Resulting value</u>	<u>Notes</u>
+137V43	999.99CR	137.43	'CR' displays spaces if value positive or zero, CR for negative
-137V43	999.99CR	137.43CR	
+214V27	CR999.99	214.27	
-214V27	CR999.99	CR214.27	
+137V43	999.99DB	137.43	'DB' displays spaces if value positive or zero, DB for negative
-137V43	999.99DB	137.43DB	
+214V27	DB999.99	214.27	
-214V27	DB999.99	DB214.27	



PICTURE - Edited numeric items, continued

- ▶ A currency symbol (\$) may appear by itself or with a sign indicator:

<u>Value</u>	<u>-> Edit Picture</u>	<u>-> Resulting value</u>	<u>Notes</u>
+316V44	+\$999.99	+\$316.44	sign must be first or last in the picture; currency symbol must be first, except it must follow any leading sign indicator
+316V44	\$999.99+	\$316.44+	
-316V44	-\$999.99	-\$316.44	
-316V44	\$999.99-	\$316.44-	
-345V26	+\$999.99	-\$345.26	b represents a blank
-345V26	\$999.99+	\$345.26-	
+345V26	-\$999.99	b\$345.26	
+345V26	\$999.99-	\$345.26b	



PICTURE - More tricks of the editing trade

- ▶ Floating insertion: place \$, +, or - to the left of the most significant digit:

To get \$92.43 instead of \$ 92.43 (use PIC \$\$,\$\$\$,\$\$9.99)

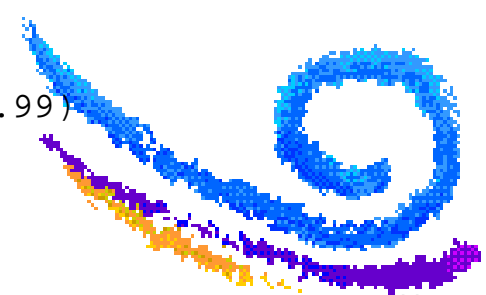
To get -87 instead of - 87 (use PIC -,---,--9)

To get +312.55 instead of + 312.95 (use PIC ++,++9.99)

- ▶ Asterisk replace: place leading asterisks up to the left of the first significant digit ("check protect"):

To get ****19.42 instead of 19.42 (use PIC **, *99.99)

To get \$*****427.99 instead of \$ 427.99 (use PIC \$*.***, **9.99)





6790 East Cedar Avenue, Suite 201
Denver, Colorado 80224
USA

<http://www.trainersfriend.com>
303.393.8716

Sales: kitty@trainersfriend.com
Technical: steve@trainersfriend.com