

To The Point

Why you have to pay attention to every detail of punctuation when you write a computer program

You may well have noticed, in the program listing in the first part of Basic Programming (page 20) that there is a semi-colon at the end of line 50. The function of this punctuation mark in BASIC was not explained at the time, but is nevertheless very important. It is used in almost all versions of BASIC to concatenate printed sections ('concatenate' means 'join together'). Lines 50 and 60 on page 20 were:

```
50 PRINT "I THINK THE NUMBER YOU TYPED
    WAS ";
60 PRINT A
```

Line 50 printed the words inside the double quote marks. Line 60 printed the value of the variable A. Putting in the semi-colon caused the value of variable A to be printed directly after the words within quotes in line 50. If no semi-colon had been used, it would have been printed on the line following the words.

The program below has been designed to illustrate some of the useful properties of the semi-colon as it is used in BASIC. Try typing it in and running it. From now on, we will omit the <CR> reminder at the end of each line to indicate that you should press the RETURN key. This next program allows you to enter a range of temperatures in Centigrade (also known as Celsius) and have them converted automatically to their equivalents in Fahrenheit.

```
10 REM PROGRAM TO CONVERT DEGREES C TO F
20 PRINT "ENTER THE LOWEST TEMPERATURE"
30 INPUT L
40 PRINT "ENTER THE HIGHEST TEMPERATURE"
50 INPUT H
60 FOR X = L TO H
70 LET P = X * 9 / 5 + 32
80 PRINT "IN CENTIGRADE IS "
    IN FAHRENHEIT"
90 NEXT X
100 END
```

Enter this program, LIST it to check that it has been entered correctly, and then RUN it. First you will be asked to enter the lowest temperature. Try typing in -5. Then you will be asked to enter the highest temperature. Try typing in 10. The program will convert all temperatures at one degree intervals from -5 to 10 degrees Centigrade to their Fahrenheit equivalents. You should get a

'printout' on the screen looking something like:

```
 6 IN CENTIGRADE IS  31.2 IN FAHRENHEIT
 5 IN CENTIGRADE IS  23  IN FAHRENHEIT
 4 IN CENTIGRADE IS  24.8 IN FAHRENHEIT
```

Notice that the columns are not very even because of the decimal points, but that each value in Centigrade is printed with its equivalent in Fahrenheit on a single line. After you have run the program a few times, re-type line 80 just as it is, but substitute commas wherever we have printed semi-colons. RUN the program again. As you can see, the printout becomes a complete mess.

To see why this happened, let's try a very simple program to compare the effect of commas compared with the effect of semi-colons. Type NEW<CR>. Then enter:

```
10 REM COMPARE ; WITH ,
20 PRINT "THIS LINE USES SEMI-COLONS"
30 PRINT "H","E","L","P"
40 PRINT "THIS LINE USES COMMAS"
50 PRINT "H", "E", "L", "P"
60 END
```

When BASIC prints line 30 it will appear on the screen as HELP, whereas line 50 will appear as H E L P. See the 'Basic Flavours' box for variations between different machines. The comma has many uses in BASIC, but in PRINT statements it has the effect of making the individual items appear on the screen (or on a paper printout) spaced out, usually by between 8 and 16 spaces depending on the version of BASIC. If the PRINT statement is used without either commas or semi-colons, the items will be printed out on separate lines.

Apart from illustrating BASIC's use of the semi-colon, our temperature conversion program also revises several statements covered in the first two parts of the Basic Programming course. Lines 30 and 50 set variables L and H to the values for the lowest and highest temperatures we want to convert. Line 60 is the first part of a FOR-NEXT loop. It seems to differ from the FOR-NEXT loop we have encountered so far by using letters instead of numbers. In fact, there is no difference. The letters we are using here, L and H, are variables with numeric values corresponding to the values typed in at the INPUT L and INPUT H stage of the program. If, as suggested earlier, you entered -5 and 10, the statement FOR X = L TO H is therefore equivalent to FOR X = -5 TO 10.

Line 80 in effect says: PRINT the value of X (which starts at the lowest temperature and