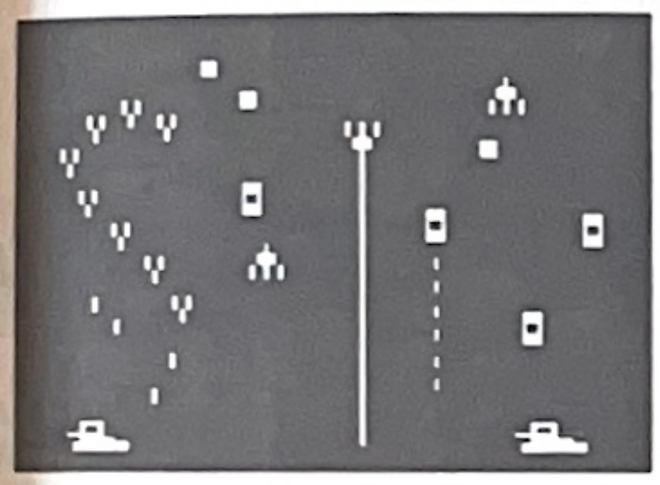
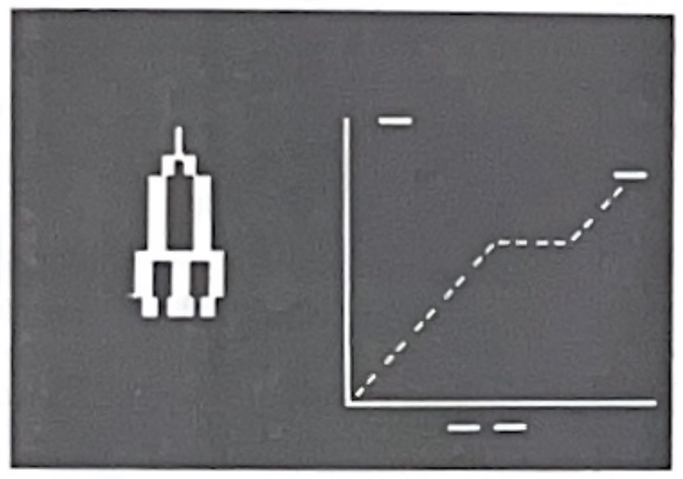
More graphics

These two pages show how you can use PLOT and UNPLOT to make moving pictures on the screen. Moving pictures are called animated graphics and they are useful for games programs, or to illustrate programs which explain, say, the principles of gravity or ballistics and flightpaths.



The pictures for video and arcade games are controlled by a small computer. The computer is programmed to play only the games and the programs are in the computer's own code, not in BASIC.

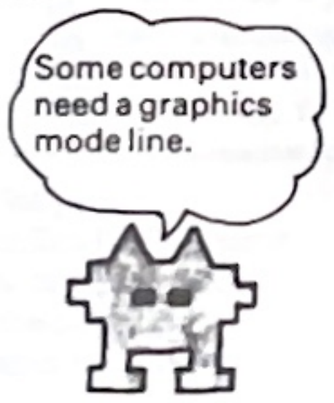


A general purpose microcomputer programmed in BASIC makes slower, simpler pictures. It cannot handle all the instructions for the screen quickly enough to make really fast moving graphics.

Plot/unplot program

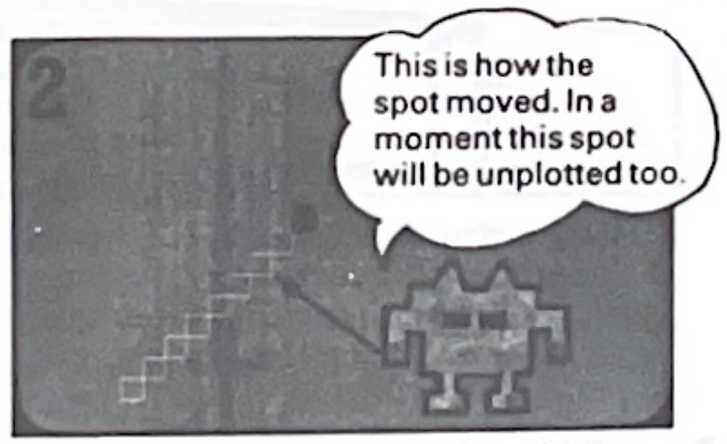
1

```
10 LET X=1
20 LET Y=1
30 PLOT (X,Y)
40 UNPLOT (X,Y)
50 LET X=X+1
60 LET Y=Y+1
70 GOTO 30
```



This short program makes a spot of light move across the screen. Remember, the commands for PLOT and UNPLOT vary on different computers.

2



When the spot reaches the edge of the screen the program may stop with an error message as the values for X and Y are outside the screen range of the computer.

3

Bat and ball video games use programs like the one above to move the ball on the screen. There are simple program rules to keep the ball moving when it reaches the edge of the screen.

When the ball reaches the top of the screen the amount to be added to Y is subtracted instead. In the same way, when it reaches the right edge, the amount is subtracted from X.

Line pattern program

This program plots a line across the screen and when it reaches the sides, sends it back again in another direction. It does not use UNPLOT so the lines leave a pattern on the screen. The picture on the right shows what happens when you run the program. The program is set by line 100 to plot 10,000 pixels. You can change this figure to make it shorter, or BREAK the program at a pattern you like.

```
10 REM: SET UP GRAPHICS MODE HERE IF NECESSARY
20 PRINT "HOW MANY PIXELS ACROSS?";
30 INPUT H
40 PRINT "AND UP?";
50 INPUT V
55 CLS
60 LET X=H/2
70 LET Y=V/2
80 LET S=1
90 LET T=1
100 FOR I=1 TO 10000
110 LET S=S+(INT(RND(1)*10+1)-5)/50
120 LET X=X+S
130 LET Y=Y+T
140 IF X<5 THEN LET S=-S
150 IF X>H-5 THEN LET S=-S
160 IF Y<5 THEN LET T=-T
170 IF Y>V-5 THEN LET T=-T
180 GOSUB 300
190 NEXT I
200 STOP
300 REM: PLOT LINE
310 PLOT (X,Y)
320 RETURN
```

Lines 20 to 50 ask for the height and width of the screen. The semi-colon puts your reply on the same line as the question.

This makes X and Y start at the centre of the screen.

S and T are the amounts that will be added to X and Y to make the line move.

The loop from lines 100 to 190 is repeated 10,000 times Each time, X and Y are changed by a small amount.

This gives a very small number to add to X. The number varies each time the loop is repeated.

These lines test for the edges and reverse S and T when X and Y come within five pixels of an edge.

Sends the computer to the subroutine to plot the line

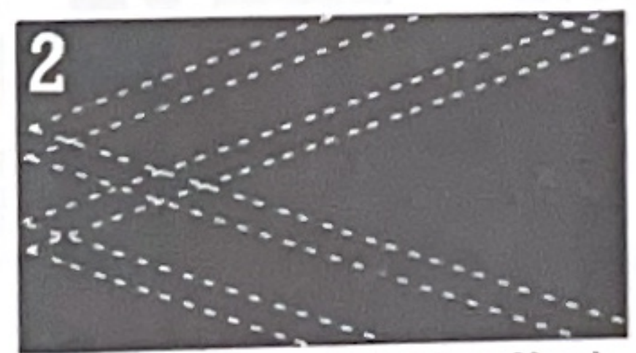
Plots the pixel with the current value for X and Y.

Experiments

1

Line 110 adds a very small random amount to X each time and this makes the line wiggle across the screen. If you have a computer, try deleting this line. The lines on the screen should become parallel.

2



Try changing the numbers in lines 80 and 90 to; say, 5 or 10 (or larger on a computer with high resolution graphics). This makes the computer plot the pixels at intervals.