



# Sound Ideas

## Continuing our look at the BBC Micro's sophisticated ENVELOPE command

In the previous instalment of the Sound And Light course we introduced the BBC Micro's ENVELOPE command. This is one of the most powerful commands available to the BASIC programmer when used with the SOUND command, discussed on page 358. We now continue our explanation of ENVELOPE by looking at 'volume envelope'.

In the following line of programming parameters, N to NS3 are concerned with the pitch envelope, and these were dealt with on page 408.

```
ENVELOPE N,T,PS1,PS2,PS3,NS1,NS2,NS3,AR,DR,
SR,RR,FAL,FDL
```

The remaining parameters are all concerned with the volume envelope, between them setting peak volumes and rate of change of volume over the duration of the note set by the associated SOUND command.

AR & DR (-127 to 127) + FAL & FDL (0 to 126)

AR sets the Attack Rate of the note. Although the software allows a negative value, in practical terms the range is 1 to 127. This relates to the number of volume changes per time step and continues to rise until the Final Attack Level (FAL) of volume is reached, which indicates the beginning of the decay phase. Decay Rate is controlled in a similar manner by DR, usually a negative value, causing volume to fall until it reaches the Final Decay Level (FDL). Although software allows a range of 0 to 126 for final volume levels, current hardware only allows 0 to 16, so a FAL value of 50 would be automatically scaled down and rounded off to a volume of 6.

SR & RR (-127 to 0)

The Sustain Rate (SR) and Release Rate (RR) also refer to volume changes per time step although both must take negative values. Sustain continues until the duration set by the SOUND command is complete. This means that if the Attack time and Decay time together are greater than or equal to the set Duration time, there will be no Sustain

# Light Waves

## Atari's graphics set a trend that other manufacturers have followed

The Atari 400 and 800 home computers are well known for their plug-in cartridge systems, but the machines themselves also have fairly sophisticated graphics facilities available in BASIC. These facilities, common to both machines, support nine levels of screen display — three text modes (offering different character sizes) and six graphics modes. The maximum resolution obtainable is 320 x 192 dots.

There are 16 colours to choose from on the Atari computers, but the maximum number that can be displayed at any one time is five. The standard ASCII upper and lower character sets are available, as well as 37 special Atari graphics characters. These characters may be used in PRINT statements to build up low resolution displays and tables. The Ataris also allow cursor movement to be controlled from a BASIC program. This is done

using cursor control characters within PRINT statements to position the text that follows on the screen. The cursor control characters allow up/down or backwards/forwards movement of the cursor.

One of the most attractive features of the Ataris is their ability to use sprite-style graphics, known as 'Player-Missile' (PM) graphics, which allow the user to write fast-moving arcade games in BASIC. There are, however, no special BASIC commands to use PM graphics, and all the necessary work has to be done by manipulating the memory locations in RAM, using PEEK and POKE. Player-Missile graphics will be discussed more fully in a later part of the course.

## Display Modes

Modes 0, 1 and 2 are for text display. When the machine is switched on, the display is set to mode 0 and the screen is formatted into 24 rows, each containing 40 character spaces. In this mode the display characters are based on the standard eight by eight ASCII format. Characters PRINTed in mode 1 are twice the width of mode 0 characters, but are still the same height; whilst mode 2 characters are twice the height and width of those in mode 0.

With the exception of mode 0, all graphics modes have a split screen, the bottom few lines being reserved for miscellaneous data such as error messages. To PRINT to the main body of the screen in modes 1 and 2, a device number must be specified. PRINT #6 allows text to be PRINTed to the