



# Sound Qualities

## Sound generation on the BBC Model B

Exceptional sound facilities and comprehensive BASIC commands to control them place the BBC Micro among the best computers available for the home user who is particularly interested in sound. Three independent square wave oscillators, eight types of noise and four independent ADSR (Attack, Decay, Sustain and Release) and pitch envelopes are supplied as standard. This means that music sequences can be constructed consisting of up to three voices in harmony and special commands ensure that notes selected to form a chord are played at exactly the same time.

### Sound Creation

In its simplest form, sound can be created by the use of the SOUND command:

SOUND C,V,P,D

In this case:

C=Channel or oscillator number (0-3)

V=Volume

P=Pitch of note

D=Duration or length of note

Any one of three oscillators (1, 2 and 3) may be selected to play a note and 0 selects noise. Volume takes a value between 0 (off) and -15 (loud). Pitch is defined in steps, of a quarter of a semitone between 0 (A# at 116.5Hz) and 253 (D at 4698.64Hz) giving a range of five and a half octaves. Middle C is set by the value of 53. If the noise channel has been specified, there are eight types available, which set up the following pitch numbers:

Number	Noise Type
0	High pitch 'tremolo'
1	Medium pitch 'tremolo'
2	Low pitch 'tremolo'
3	'Tremolo'. Pitch varies with the pitch of channel 1
4	High pitch
5	Medium pitch
6	Low pitch
7	Pitch varies with the pitch of channel 1

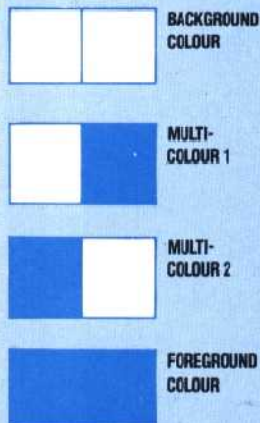
Finally, duration of note is controlled in steps of 20th of a second between 1 and 255, which give a maximum note length of 12.75 seconds. A command to play A above middle C on channel 1 at a medium volume of -7 for half a second is constructed as:

SOUND 1, -7, 89, 10

If the computer receives a second SOUND command before the first is completed the note is placed in the channel queue.

# Light Construction

## Commodore 64 graphics capabilities



The Commodore 64 computer has a great number of possibilities for the graphics programmer. The main drawback is that, in common with the Vic-20, there is only an extremely limited set of BASIC commands provided as standard. POKEing and PEEKing inside the computer's memory allow the programmer access to all the machine's features but some of the procedures required can be quite confusing. Again, as with the Vic-20, there are several ways out of this maze. These take the form of a number of independently produced software packages that make the creation of sprites or user-defined characters much simpler. In addition to these, Commodore produce their own plug-in

cartridge, called 'Simon's BASIC'.

The Commodore 64 has the standard upper and lower case character sets available in normal or inverse display modes. Also available are the special graphics characters that were first developed for the PET and which are also used on the Vic-20. The screen display consists of 40 columns and 25 rows and characters are positioned on it either by PRINTing them to the screen in any chosen colour or by POKEing the relevant codes into the screen and colour memories detailed in the user manual. The special Commodore graphics characters form an extremely flexible medium in which to put together attractive displays in low resolution. More than 60 special characters may be used in this way. Again, each of these special characters may be displayed in normal or inverse mode, giving the user well over 120 options from which to choose when designing a figure.

If the exact character cannot be found then it is possible to define new characters for use in the display. This is, unfortunately, not very easy to do. To define a character the programmer must first copy all the normal characters that will be required from ROM memory to RAM, before POKEing the necessary numbers into the series of locations that are to hold the new character.