

# Sounding Out Vic

## A close look at sound generation on the Vic-20...

The Vic-20 was one of the first home computers to appear in the UK. As a consequence, its facilities may appear to be a little lacking in comparison with more recent computers. Additionally, Commodore don't make it particularly easy to construct sound or music programs as Vic-20 BASIC, in common with Commodore 64 BASIC, has no commands that relate specifically to sound. All sound control is achieved by a series of POKEs into memory locations. This principle also applies to the Commodore 64 and the techniques outlined here for the Vic-20 would be useful to the Commodore 64 user. The degree of sound control available is limited to volume (equivalent to envelope with A=D=R=0), frequency on three oscillators and a noise generator. Output is available via the television speaker alone. In addition, due to inaccuracies in the way the Vic-20 selects frequencies it is impossible to obtain the correct pitch for all notes on the musical scale.

With only these capabilities the Vic-20 has little value for music making; although with thought, patience and a little knowledge of BASIC programming these limited features can be used to create 'tunes' of two and three note chords.

### Sound Control

The Vic-20 is supplied with three square wave oscillators and a noise generator. Each oscillator covers approximately three octaves of sound, offset in frequency as follows:

Osc.1	Osc.2	Osc.3	Freq. Range (Hz)	Octave
•			(65.41-123.47)	1
•	•		(130.81-246.94)	2
•	•	•	(261.63-493.88)	3
	•	•	(523.25-987.77)	4
		•	(1046.5-1975.53)	5

This arrangement allows the user to cover five octaves in total with at least one oscillator available in each octave. Octave 3, which starts at middle C and contains the standard reference A at 440Hz, is available to all three oscillators.

Control of the oscillators is exercised by changing the contents of five memory locations as follows:

Memory Location	Oscillator
POKE 36874,X	1
POKE 36875,X	2
POKE 36876,X	3
POKE 36877,X	noise

In each case X is a whole number between 135 and 241 (0 switches that oscillator off), which refers to a table of equivalent note values on page 73 of the booklet supplied with each Vic-20. Before the selected frequency can be heard the volume level must be set, as follows:

POKE 36878,V

where V can be set between 0(off) and 15(loud) affecting all oscillators and noise. For example:

POKE 36874,219:POKE 36875,219:POKE 36876,219:POKE 36878,7

This plays reference A at 440Hz on oscillator 1, A an octave higher on oscillator 2 and A an octave higher still on oscillator 3, all at a mid-range volume of 7. Don't forget to POKE each location to 0 to turn them off!

### Notes And Pauses

Without a duration for each note and the correct pauses between them, a sequence of notes blurs one into another. To facilitate these 'wait' periods, one of two methods can be used to make the computer 'mark time' between POKEs. The first method is FOR...NEXT loops where the pause is timed by a long empty loop such as:

10 POKE 36878,7  
20 POKE 36876,203  
30 FOR P=1 TO 200  
40 NEXT P  
50 POKE 36878,0  
60 POKE 36876,0

This sequence of commands plays the note D# for 200 FOR...NEXT steps. However, this method depends on careful external timing of the loop for accuracy. An easier and more elegant way to set durations and pauses is by using the Vic-20's built-in clock, which counts in 60ths of a second (jiffys) and can be referenced within a program using the variable TI. This is extremely useful, as a command can be constructed to 'wait' for an accurately measured period of time, as follows:

10 POKE 36878,7  
20 POKE 36876,203:D=TI  
30 IF TI-D<15 THEN 30  
40 POKE 36878,0  
50 POKE 36876,0

These commands play the same note as before but for a period of 15 jiffys (a quarter of a second). D is set at the value of TI when the sound is switched on. Line 30 counts off 15 jiffys before proceeding to line 40. Tunes can be constructed by using the same principle to pause before playing a different note, and so on. Next time we look at the Vic-20 in the Sound And Light series, we'll investigate how to play tunes.