prints out what you have played in conventional music format, as notes on a stave.

Synthesisers are becoming established in the cinema, also. Walt Disney's film *TRON* received rave reviews for its stunning computer-generated graphics. Less well known is the fact that microcomputers were used for the music and sound effects. In addition to some 'real' music from the London Philharmonic Orchestra, a wide variety of sounds, including the noises made by the Goodyear airship and a refrigerator, were recorded and then altered using a Fairlight.

So many sounds were involved that a complete catalogue had to be kept up to date using the File Manager 800+ database package on an Atari 800 home computer. Some of the artificial voices in the film were also constructed using a home computer and a voice-synthesis device that allowed voice and music to be mixed together. Atari also lent them a package that had previously not been used outside the company. It amounted to a kind of additive synthesis program, which they had been using to create sophisticated sound effects on their own games software and coin-operated arcade machines. The claim was that this Electronic Sound Assembly System did for the creation of sound what word processing did for the creation of text.

There are in fact quite a number of add-ons that can turn an ordinary home computer into a sophisticated music synthesiser. The Apple is a particularly popular model for this application, because of the slots in the back of the computer into which additional devices can be plugged. Some of these use the computer to do all the creation, and simply provide a high-quality analogue synthesiser as an output, while others include a full piano-style keyboard.

At the domestic end of the market for computerised synthesisers, the Casio CT7000 features something called a 'polyphonic sequencer', which by means of a cassette deck and a large amount of RAM memory, manages to perform in a similar way to a professional multi track recording system. A domestic cassette recorder has just one track per side, a stereo tape deck has two. But a professional unit may have more than 24 so that each instrument can be recorded separately and then mixed together to make up the complete sound. With the CT7000 you can build up your own symphonies in this manner.

Its predecessor, the CT701, used a bar code reader (see page 40) to read music from printed bar codes into the machine's memory. Sadly, there seems to be no easy way for the user to create printed bar codes of his own creations, so this method is strictly available for use with Casio pre-printed music.

You don't even need this level of equipment to be successful in the pop world, as demonstrated by the German group Trio, who had more success with their hit song 'Da Da Da' using a £30 Casiotone VL1, than did Peter Gabriel with his Fairlight costing thousands of pounds.

Though the VL1 is a monophonic device (you can only play one note at a time), it does have the ability to emulate different musical instruments, and store a sequence of notes. There is also the ability to change certain qualities of the notes to create your own sound. This is known as altering the Attack, Decay, Sustain, Release (ADSR) envelope. Now the interesting thing is that home computers such as the Commodore 64 and Oric-1 have exactly the same features. And of course the very ability to be programmed in BASIC means that you have a built-in sequencer, too.

Music composition packages are available for many of these home computers — even the ones with comparatively simple music capabilities. Some of them display a musical stave on the screen, and music is composed by selecting the different kinds of musical notes with the aid of a joystick or a light pen and placing them on the stave. Pressing the 'fire' button on the joystick, or some equally simple command, results in your composition being played. Alternatively, the display may represent a piano keyboard — the notes being selected again with the light pen or joysticks, or with the computer's own keyboard.

Without the aid of such a package, musical effects can be programmed in BASIC. As with graphics facilities, the exact method varies greatly from machine to machine, as do the sophistication of the BASIC commands dedicated to this facility. The Dragon, for example, has just one voice, but features a PLAY command that initiates a sequence of notes typed in as the letters of the musical scale (A to G). The Commodore 64, by contrast, has very sophisticated musical facilities built into its hardware, but no such easy-to-use commands in its BASIC. In a future article we shall be instructing you how to get music from your machine.
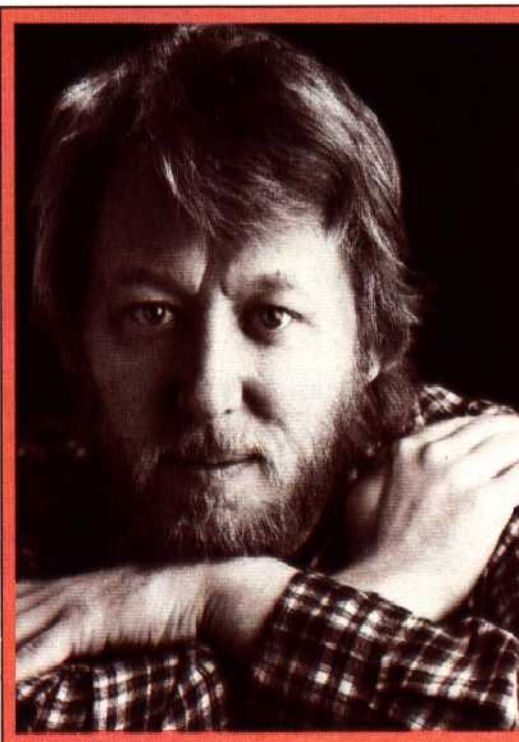
Martin Rushent

The producer of bands such as Altered Images and Dexy's Midnight Runners, Martin Rushent is one of the leading proponents of computer-controlled music synthesisers. His studio in the Berkshire countryside contains no less than nine different systems, which represent the current state of the art. Each of them uses a different method of programming, and different codes for the notes of a musical scale. Because they have defied all attempts to be linked together into one gigantic system, Rushent uses a program he wrote himself on a small home computer to convert a piece of music from one system to another

LEN LEWIS