the synthesizer
the mockingbird of instruments

by glenn morley

To the layman, the 'synth' sound is straight out of science fiction. But Glenn Morley demystifies the synthesizer's unique electronic nature in this practical guide for the filmmaker.

Mastering the 'synth' has meant success for one of Toronto's hottest, electronic rock groups, F.M Here, they take a break from composing the score for **Circle of Two**, to double as a blue-grass band in the film

Synthesizer. It is a word that conjures up images of rock bands with vast arrays of paraphernalia winking little red and green lights at you in the dark, all held together by what seems to be enough electrical wire to lay the trans-Atlantic cable three times over.

Or... it is a word reminiscent of Walter Carlos' enormously successful "Switched-On Bach," which you either enjoyed for its humour and clarity, or hated for its violation of Bach's intentions.

Or... if you're a filmmaker, it's a word that inspires hope for your latest project: with that $1.73 you have left in your post-production budget, you just might be able to get a score that sounds like **Apocalypse Now!**

Few words have had such a meteoric rise in public usage and acceptance, while simultaneously generating such confusion. The sources of this confusion are many and varied. Frequently, the terms associated with synthesizers (synths), such as Moog or Arp, are tossed off indiscriminately by D.J.'s, or in the notes on album covers, or by music reviewers who are themselves unfamiliar with what, exactly, the terms refer to, and consequently compound the dissemination of misinformation.

The reasons for the confusion are understandable, but the manufacturers of synthesizers don't make things any easier by individually adopting their own terms for what are essentially the same functions. With the increasing use of synths in every conceivable kind of music, it's not surprising that film composers are following suit; not only for the almost unlimited scope of tone-colours which can be produced, but also for practical, economic reasons.

Unlike conventional instruments (violins, trumpets...), which have a recognizable size, shape, sound and construction that are constant — in fact, the definition of what those instruments are — synthesizers are less a standardized physical object than a collection of certain electronic modules which each manufacturer assembles as he sees fit. Hence, when you hear a musician talking about an Arp or a Moog, he is not so much referring to a type of instrument, as to the form that the synthesizer takes in the hands of manufacturers by the names of Arp and Moog. True, many synthesizers don't *look* at all alike (some don't even have keyboards), but they are still, essentially, the same instrument because they all contain the same basic elements; sources of sound, treatments of those sounds, modulators and controllers, and amplifiers. All of these elements are electronic in nature. The sounds that we hear from the synth are the result of manipulations of electronic signals that are finally converted to an audible sound in the last stage of the process, the same process as in an electronic organ. And no matter how hotly the purists dispute it, the two instruments are closely related: though there are, of course, substantial differences in both the way these instruments are constructed and the manner in which they are played.

In order to understand how a synthesizer creates sounds, it is necessary to know what sound *is*. Recalling high school physics, sound is created by vibrations which are transmitted through the air to your ear, which translates these vibrations into a form your brain can recognize. In all naturally occurring sounds of a simple nature, these vibrations have a frequency (pitch), an amplitude (loudness), a timbre (tone colour), and an envelope (shape). These are the elements which the different modules of the synthesizer control.

Synthesizers generally have two sources of sound: oscillators, and white noise generators — although any electronic signal of an audio nature, such as that from an electric guitar, can be and are used. The oscillators produce different types of wave forms: sine, ramp, sawtooth, and square — each one possessing different tonal characteristics, because each wave form emphasizes different overtones for a given pitch. The frequency, or pitch of the oscillator, can be controlled by another electronic signal, for example another oscillator, or keyboard which generates different voltages for each key. In most cases, the changes in pitch which the keyboard effects on the oscillator correspond to the changes in pitch between keys on a conventional keyboard instrument, such as the piano. Hence, there is a familiar point of reference for keyboard players.

Next, the signal from the oscillator is passed through a filter, which either diminishes or deletes certain portions of the signal, or emphasizes others, thereby changing the tonal characteristics of the sound. Like the oscillators, the filter can also be changed by external signals such as another oscillator or a device known as an envelope generator. This module gives a "shape" to the sound, in that it controls the attack, decay, sustain, and release of the

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sound in both the filter and the amplifier. In this final stage of the signal processing, the sound is converted into a form which is either recorded on tape, or sent to a speaker in a form which the ear can understand.

This is the path that the signal would take in the construction of a sound on a monophonic synthesizer: that is, a synthesizer which can produce only one signal from the keyboard at a given time. There are several other types of synthesizers available on the market, as well as a number of hybrids and auxiliary pieces of equipment. Two of the most significant developments in recent years have been the poly-phonic synthesizer and the hybrid guitar synths. The poly-phonic units are able to produce several notes simultaneously, creating the possibility of chords. The guitar synths, although more complicated electronically, can be regarded functionally as a conventional synth where the keyboard has been replaced by a guitar.

The most important piece of auxiliary equipment for the synthesizer composer, aside from a tape recorder, is the sequencer. This device allows the composer to construct a pattern of notes which will automatically repeat in a cycle of the composer's choosing. The most recent developments in the field of sequencers incorporate digital, electronic microprocessors, such as are used in calculators and small computers, to produce patterns which can be hundreds of notes long.

Although it is possible, given enough time and a sophisticated enough synth, to duplicate the sounds of almost any instrument, it is usually extremely difficult to duplicate on a keyboard the manner in which a given instrument might be played. The instrument is much better suited to creating sounds unique unto itself, and these are limitless. This brings us to the aesthetic question of how the synthesizer is used in a score. For composer Ben McPeek (**Catch the Sun, The Rowdyman**), "The most successful use of synthesizer seems to be in conjunction with live players." John Mills-Cockell, a prolific composer of scores for film and television, is known particularly for his use of synthesizer in his work. However, he points out, "if a film really calls for strings, I won't use a string synthesizer... it can't achieve the same effect." In fact, the message from most composers who use synthesizers in film scores is: use them for the unique properties which they can bring to your film, not for cutting costs on the number of musicians employed.

One final point to remember: much of the synthesizer music heard today comes from the rock world. Rock may indeed be the appropriate music for a particular film, however, there is a growing tendency for filmmakers to hire rock bands to write their film scores, a situation for which most rock bands are ill-prepared. In a situation where the filmmaker is quite sure that the rock synthesizer sound is what is needed for his project, he would be well-advised to hire not only the rock band that he has in mind, but also an experienced film composer, preferably with a background in electronic music. The composer can then lead the band through the intricacies of dramatic underscoring without sacrificing the band's sound, or wasting expensive studio and musician hours in experiment, trying to fit the music to the picture. In this way, the best interests of the picture are served — and doing it right the first time is always cheaper. □