

Tune Up Your Commodore

In addition to all the games, complex calculations and practical applications your Commodore computer can do for you, it is also capable of producing music. And it gives you not just "rinky-dink" notes like those of a cheap toy piano, but everything from rich, mellow tones reminiscent of a cathedral organ to "funky" sounds or enough distortion for even the most avid new wave or heavy metal aficionado.

And what sound effects machines they are! Through the marvels of the silicon chip and interactive electronic circuitry, your VIC-20 or C-64 can synthesize virtually any sound you've ever heard.

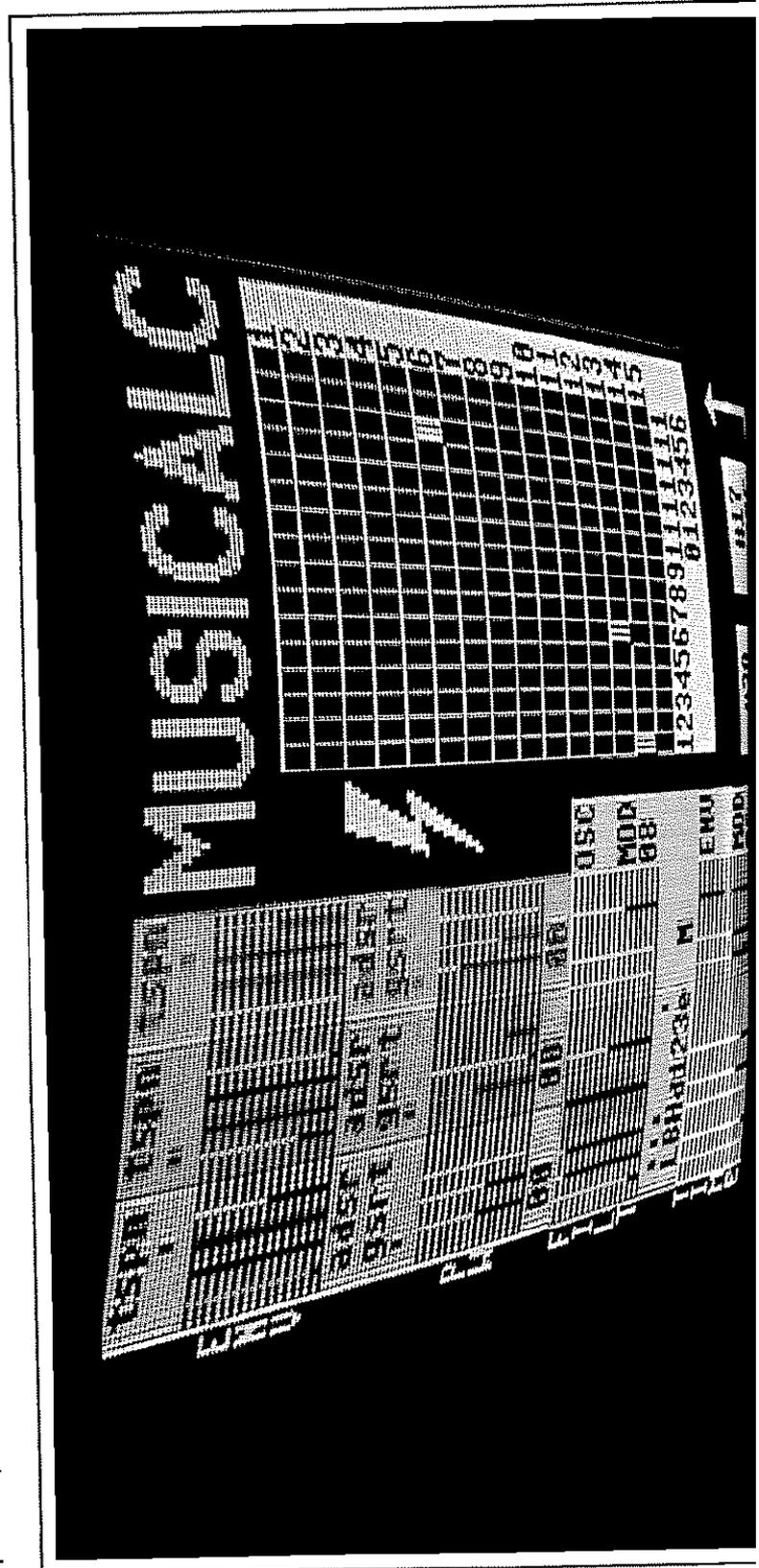
But what actually produces the sounds inside the computer? An electronic circuit known as a tone generator does all the work. The VIC-20 has four tone generators, capable of a five-octave range. Three of them are used for music synthesis, and the other one produces "white noise."

White noise is useful in producing sound effects, but can also be combined with musical tones to alter the way they sound. If you're wondering what white noise sounds like, just listen to the sound coming from your TV set after the station has gone off the air for the night and the screen is full of "snow." That's white noise.

Tone generators are also referred to as voices, since their output can be combined in harmony, much like the voices in a choir. So, in effect, your VIC can create four distinct sounds at once by utilizing all four tone generators. For example, the first three voices might combine into a chord, while the fourth voice (the white noise generator) produces a clicking sound, like a finger-snap or metronome.

The Amazing SID

The Commodore 64 utilizes a special chip, the SID, which stands for sound interface device. The SID is re-



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For the Sounds of Your Life



markable, for this one chip is an entire three-voice electronic music synthesizer and sound effects generator, all on a single piece of silicon.

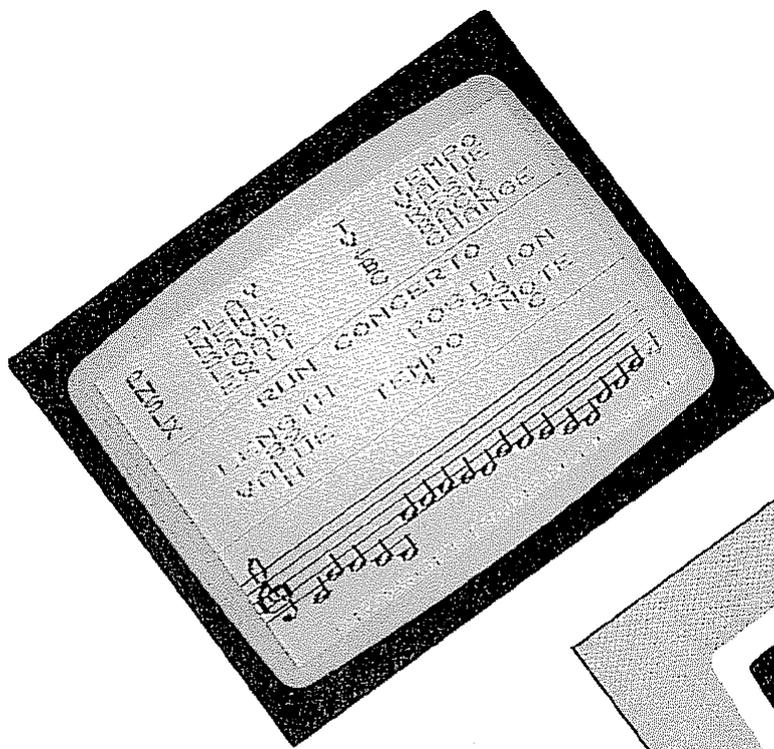
When you consider that the SID chip contains three independent digital tone oscillators (with four waveforms per oscillator), three amplitude modulators, three envelope generators with exponential response, oscillator synchronization, ring modulation, programmable filter, master volume control, a random number modulation generator, two analog/digital interfaces and an external audio input, and packs all of this onto a sliver of reconstituted sand, it seems just short of incredible. But that's what the SID chip does—and well.

If some of the terms used in describing the features of the 64's SID chip sound like an alien language to you, relax. I've included a glossary that explains what's what in the world of electronic music synthesis for those of you who want to learn all the "techie" terms, but I'll try to keep this article in everyday English as much as possible.

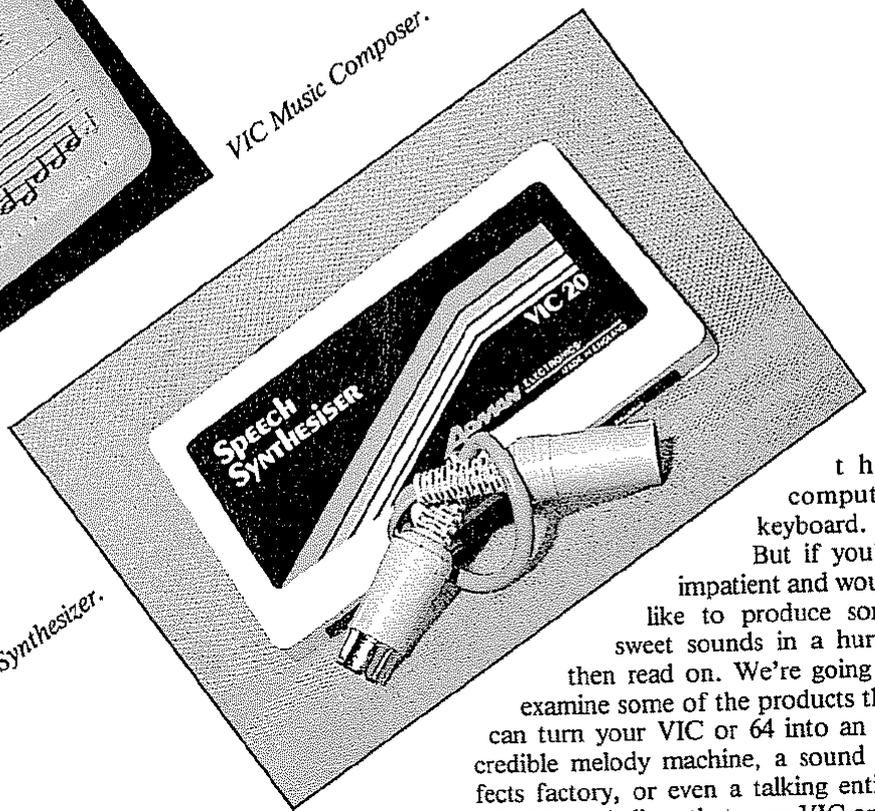
You gain access to the tone generators and control them by Poking various memory locations that turn on the voice, control its volume and in general determine what it will sound like. Both the VIC and C-64 user's manuals contain helpful sections on producing sound and music, and their respective programmer's reference guides further explore the subject. Also included in the manuals are the memory maps for each machine, including the locations of the sound registers.

So now you have a little background on how your VIC or C-64 produces sound. If you use a Commodore Super Expander cartridge with your machine, sound synthesis is considerably easier, since many of the sound commands are preprogrammed. By using a Super Expander and devoting a lot of time, you can become a Rachmaninoff of

*Photo-montage by Martin Paul.
Product photos by Liz Benford.*



VIC Music Composer.



VIC-20 Speech Synthesizer.

the computer keyboard.

But if you're impatient and would like to produce some sweet sounds in a hurry, then read on. We're going to examine some of the products that can turn your VIC or 64 into an incredible melody machine, a sound effects factory, or even a talking entity. Would you believe that your VIC or 64 can even sing to you?

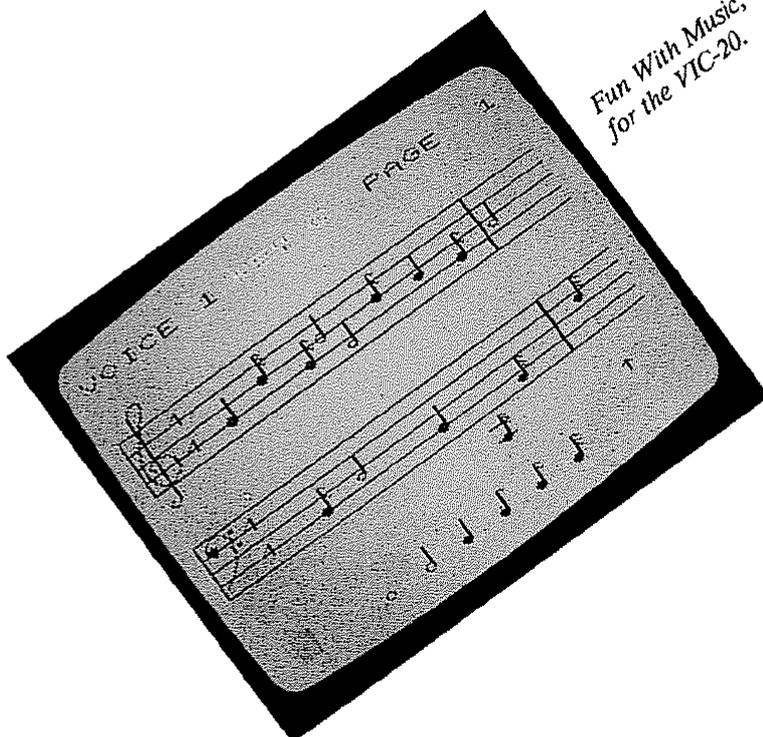
VIC-20 MUSIC SYNTHESIS

VIC Music Composer

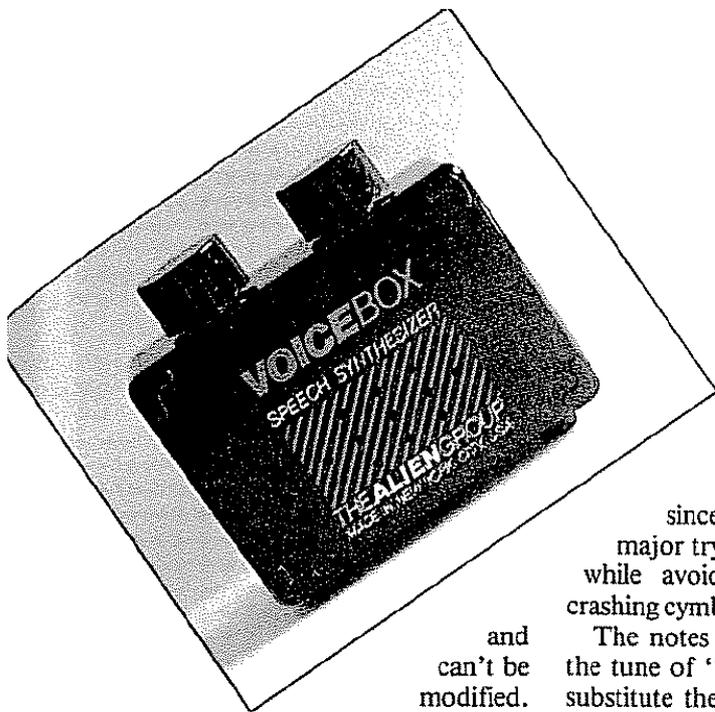
First let's take a look at the VIC Music Composer from Thorn EMI. This ROM cartridge program is ready to use when you turn on your VIC, and it allows you to play as many as three voices at one time, although you must enter each one individually.

The main menu asks if you wish to compose, play, save or load a musical composition. Then you must choose the voice as well as the key and time signature. You enter notes one at a time on the musical staff video display by using the cursor control keys. You also enter rests in this manner. Sharps and flats may be added to the placed notes, and you create bar lines to separate measures by hitting the B key.

In the compose and play modes, only one voice will be represented on the scrolling staff, although you may be hearing two or three. Also, the tones of the voices are set to a reed organ sound,



Fun With Music, for the VIC-20.



The Voice Box, for the VIC-20 and C-64.

and can't be modified. These are the only two areas where I found the VIC Music Composer wanting.

An important function of the program is saving your compositions to tape or disk. You can store a partially completed piece and call it back later to finish or modify it. The program also allows you to store completed compositions so you may replay them anytime you wish.

The VIC Music Composer is very easy to use and lets you produce nice three-part-harmony compositions without any prior knowledge of music. The documentation booklet is thorough, yet concise and easy to understand. It's a good music program for computer musicians of all ages.

Fun With Music

Epyx Computer Software brings you Fun With Music for the VIC-20. Like the VIC Music Composer, this is a cartridge-based program. A novel twist of Fun With Music is that the cartridge includes a musical game you can play when you're not creating musical masterpieces. Provision for saving your compositions to disk or tape is also included.

Another nice feature is a scale card that sits in back of the row of number keys on the VIC. It identifies each key that will produce a sound and gives its equivalent name on the musical staff. You control note values, tempo, rests and placement on the staff through various keys on the VIC, and the video display shows a representation of the staff, as well as other information.

Of the two music programs mentioned so far, Fun With Music is the easier to use and the more fun, par-

ticularly for younger musicians. The game feature adds to the enjoyment of learning about music, since the scenario is a drum major trying to strike musical notes while avoiding a hungry dog and crashing cymbals.

The notes move along the screen to the tune of "Dixie," but you can even substitute the notes of your own compositions for the theme of the game! Paddles are recommended.

The documentation booklet supplied with the cartridge is straightforward and easy to understand. The sheet music for four traditional melodies is included, as well as the "Dixie" demo. Entering, editing, storing and playing back your musical compositions is extremely easy, even for youngsters, and the program teaches music in a painless manner. Epyx hit the nail on the head when they named this program, because it really is Fun With Music. Highly recommended, especially for very young computerists.

SPEECH SYNTHESIS

VIC-20 Speech Synthesizer

The VIC-20 Speech Synthesizer is produced by Adman Electronics, Ltd., in Great Britain, and distributed by Maxtron of El Monte, California. This unit is a cartridge with two cable "pig-tails." The cartridge is inserted into the VIC's expansion port. The male pigtail is inserted into the monitor or RF port on the computer, while the RF or monitor cable is plugged into the female pigtail.

The ROM-based program is active upon power-up. As you press each key, its letter is audibly voiced by the Speech Synthesizer as well as displayed on the video screen—and the pronunciation is quite good. You can initiate Basic programming while the cartridge is in place, and speech synthesis is instituted by invoking the SYS41000 command.

Allophones are individual speech

sounds. A phoneme is a grouping of allophones. For example, take the phoneme "P." The P sound differs depending on its place within the word. Peter has a different P sound than apple, and apple's P sound is different from the P in wasp. These three different P sounds are all allophones of the phoneme P.

The VIC-20 Speech Synthesizer utilizes allophones to create realistic-sounding speech. Allophones sound differently than the phonemes under which they are grouped, however, and that must be taken into consideration when keying in words for the VIC to pronounce.

An example of this would be the word "hello." To enable the VIC to speak, it would have to be entered as "H/E/LL/OO/". The slash marks act as separating links for the allophones, so that by separating and linking the individual speech elements of "H/E/L/LL/OO/", the word hello is produced. All that's really required is that you think in terms of sounds rather than letters.

Although the speech is entirely understandable, it lacks intonation and character because there is no pitch control. It's a "computer voice" that should satisfy the needs of most VIC users who want to make their computers converse with them. The documentation supplied with the unit is in the form of a booklet, and it's thorough and easily understood.

It also provides a wealth of information on the technology of speech synthesis as well as several different programming means of incorporating speech into Basic programs. Perhaps the most desirable feature is that through the use of allophones, the vocabulary is unlimited, since you can create any word by using the correct allophone components.

To sum it up, the VIC-20 Speech Synthesizer is an excellent cartridge-based voice synthesizer that's easy and fun to use. It provides good quality synthetic speech capability for the VIC.

The Voice Box for VIC and C-64

The Alien Group has produced the most awesome hardware/software combination for voice synthesis that I've seen yet. The hardware end is actually the Voice Box, a small black box that plugs into the user port of either the VIC-20 or Commodore 64.

This is a great feature in itself, since the same hardware works for both com-

puters. If you have both a VIC and a C-64 (like myself), then you need different driver software for the two machines, but only one Voice Box. It's also a point to consider if you now have a VIC and you eventually intend to upgrade to a 64. The driver software can be either cassette or disk-based, and the Alien Group supplies it in both media.

Using the Voice Box with a VIC is easy, and the results will amaze you. Standard programs included with the Voice Box are TypeTalk, which produces an "Alien" face "speaking" text that is entered via the keyboard; the PSpeak, FSpeak, and Speak programs that allow your Basic programs to contain speech commands through different access means; Daisy, which sings the first verse of "A Bicycle Built For Two;" and Spell, which is a spelling quiz program.

Variable inflection control of the Alien "voice" is achieved through certain keys that will either raise or lower the inflection level, thus producing very lifelike speech. The Voice Box also has two knobs on it, one controlling the overall pitch, or timbre, of the voice, while the other controls the volume level.

An external output jack is also provided that allows the voice to be output through your stereo system or a musical instrument amplifier. You don't use the speaker of the TV or monitor for speech reproduction at all, as the Voice Box contains its own speaker. The documentation booklet supplied with the Voice Box is absolutely first-rate in its thoroughness and user-friendliness.

As I mentioned, you can also use the Voice Box with the Commodore-64, and when you do, it's a whole new ball game. In addition to containing all the same programs as the VIC software, but in a more refined form, it also provides musical accompaniment to the singing Voice Box programs.

Moreover, it gives you various additional programming utilities that greatly enhance speech programming and an optional phoneme dictionary disk that automatically translates keyboard input from literal to phonetic spelling. In most cases, the Voice Box will produce accurate-sounding pronunciations of keyboard entry words, but there are some exceptions that you should enter phonetically, so they'll sound correct when played back.

The optional Music program turns the C-64 into a first-class music synthesizer, and the Alien Group has done a bang-up job of programming features into their software. By using the built-in

speaker of the Voice Box for the "vocalization," and the speaker of your TV or monitor for musical reproduction, you can have independent volume control of the voice and music, as well as total cut-off of either one.

The absolute show-stopper of this package is the animated singing face program and the sample melodies included. The hi-resolution face resembles Abe Lincoln, and while watching it and listening to "The Star-Spangled Banner," you're almost moved to stand up at attention! You are also able to alter the face if you decide that Honest Abe isn't your cup of tea.

Extensive control over the sound generation and filtering allows countless

variations for the musical accompaniment and sound effects. The icing on the cake is that all your settings and musical/visual creations may be saved onto disk or tape. Once again, since phoneme creation of the words is the basis of the synthesis, vocabulary is virtually unlimited.

Bravo, Alien Group. The Voice Box is the *tour de force* voice and music synthesis package, and I highly recommend it for both the VIC and C-64 user.

Magic Voice

The Magic Voice module by Commodore is intended for use on the C-64. It plugs into the computer's expansion port and provides an auxiliary cartridge

Glossary of Synthesizer Terms

Here's a list of terms often used in describing sound synthesis. It's by no means complete, but it covers the most commonly used terms and gives a brief but accurate definition of what they mean.

ADSR—Attack, Decay, Sustain, Release. ADSR as a group determines what the sound will be like (see the individual definitions for each of these components below).

Amplitude—the strength or volume of the signal (how loud or soft it is).

Attack—the amount of time it takes for the sound to start, as in hitting a key on a piano or plucking a string on a guitar. The attack determines how much time it takes for an event to go from silence to sound.

Band Pass Filter—filters out all frequencies above and below the pre-selected range or band. In other words, the frequencies within the band are allowed to pass through, while those above and below it are filtered out.

Decay—Once the attack portion is completed, the decay determines how quickly the sound begins to deteriorate.

Envelope—refers to the shape of the sound (the combination of ADSR values) and determines the way you will perceive the sound; e.g., a trumpet's envelope is different from that of a violin.

Filter—In much the same way that a coffee filter prevents the grounds from getting into your cup, filters

screen out certain portions of the sound wave. There are several different kinds of filters, and each one screens out a different portion of the overall sound.

Frequency—In general terms, this determines how high- or low-pitched a sound might be (not how loud or soft). A soprano has a higher frequency range than a baritone.

Cut-Off Frequency—determines where a filter will start doing its work (where to start cutting off the sound wave).

High-Pass Filter—As the name implies, this type of filter will allow high frequencies to pass through while cutting off low frequencies. The cut-off frequency determines what portion of the sound doesn't pass through.

Low-Pass Filter—the opposite of a high-pass filter; the lower frequencies are passed through, while the higher frequencies are stopped. Once again, the cut-off frequency determines what goes through and what doesn't.

Modulator—a control that allows you to tailor portions of a sound, such as its high or low frequencies.

Noise—a random-pattern sound wave. White noise is the most common (the sound of a channel on your

slot, eliminating the need to remove it when you want to access a game or utility cartridge. Several new products from Commodore, such as the Gorf and Wizard of Wor game cartridges, as well as the Magic Desk II home utility cartridge and preschool educational cartridges, have speech capability when used with the Magic Voice module.

The Magic Voice unit has a 235-word vocabulary built in, but this is somewhat deceiving, since the numerals from one to ten are considered words, as are the individual letters of the alphabet and parts of words such as "th" and "ing." Among other words of limited use included in the alphabet are "Commodore" and "Capital."

TV set after the station has gone off the air for the night is an example of white noise). Pink noise is another variety, produced by changing the octave and/or rate of the wave.

Pulse Width—In simple terms, every sound is made up of waves that rise and fall. The period of time between the crests of the sound wave (often thousands of crests per second!) determines the width of these crests, or pulses. It also refers to the voltage levels associated with these waves, but that gets a bit technical.

Release—another component of the ADSR/envelope package. The release determines how much time will elapse to go from sound back into silence.

Resonance—describes how mellow or "tinny" a sound is. The combination of the envelope components and the filters determines the resonance. Timbre is another term that's frequently interchanged with resonance in describing a sound.

Sequence—a pattern of notes, usually to be repeated later on in the composition. Sequencers replay these patterns a predetermined number of times.

Sustain—denotes a level that will be held or "sustained" as part of the overall sound envelope. Note that sustain describes a level, but attack, decay and release describe time values.

Waveform—If you could see a sound, you'd see its shape. There are four distinct soundwave shapes, or forms—square, sawtooth, triangular and noise. Each different waveform has a direct effect on what kind of sound you will hear.

TB

A very useful feature of the module, however, is the addition of the Basic command Say. You can use Say to make the computer utter a phrase enclosed in quotes (providing, of course, that the words are included in the vocabulary). By the time you read this, Commodore will have released its Magic Voice Vocabulary disk, containing a 10,000-word vocabulary, and allowing you to store words of your own creation on the disk. In case you're wondering, vulgarities will not be included!

The "natural" speaking voice of the module has a friendly-sounding female timbre, complete with inflections. Emphasis on words like "terrific" adds to the user-friendliness with enthusiastic ambiance.

According to some of Magic Voice's designers I spoke with at Commodore, they opted for the "female" voice because it sounds friendlier to preschoolers using it to learn their ABCs. It certainly is a unique sound!

This soothing and enthusiastic female voice can be drastically altered into a menacing male timbre by inserting the Wizard of Wor cartridge into the auxiliary slot. Say "bye-bye" to the nice lady and "hello" to the awful Wizard, who promises that "your bones will lie in the Dungeons of Wor—ha-ha-ha-ha" and informs you that "my pets are getting hungry."

A jumper cable is provided to allow the speech data encoded on the cartridge to operate interactively with the background music. Commodore has plans for releasing a multitude of applications, educational and entertainment programs to use with the Magic Voice module.

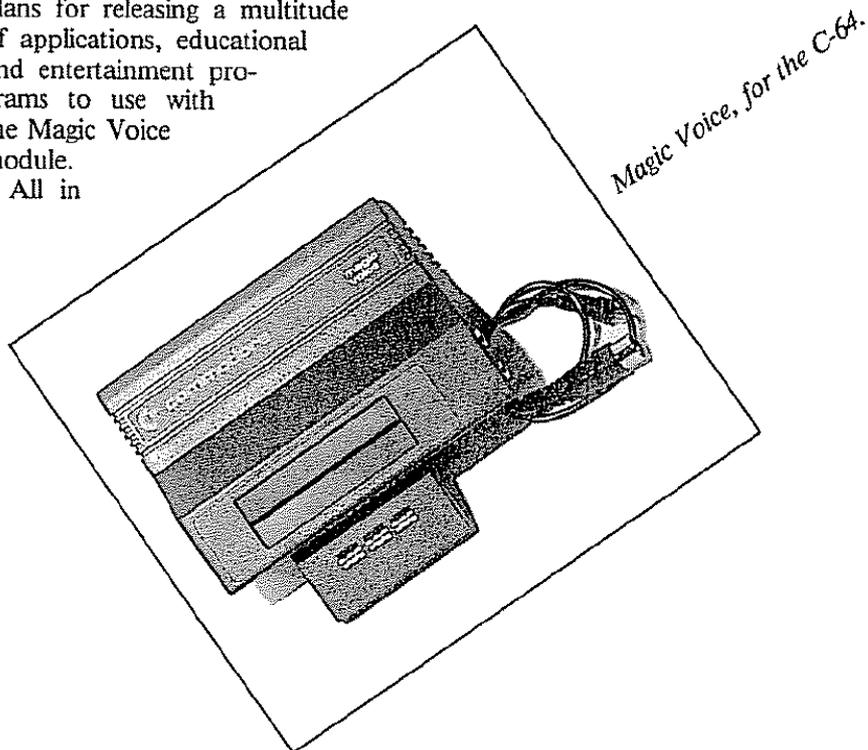
All in

all, Magic Voice is very easy to use, although its on-board vocabulary is extremely limited. However, if you use it with the appropriate speech cartridges, it should give you a valuable educational tool as well as providing entertainment and practical voice prompts for applications programs. The female voice is definitely a nice touch.

COMMODORE 64 MUSIC SYNTHESIS

The Commodore 64, owing to its SID chip, is capable of producing sounds rivaling those of a professional-quality dedicated music synthesizer costing several thousands of dollars. Just this feature alone more than justifies its purchase price, and that's why more amateur musicians have C-64s than any other personal computer.

Another reason for the overwhelming acceptance of the 64 as a serious musical applications tool is the abundance of high-quality music synthesis and sound generation software now on the market. Every music program for the 64 that I'm reviewing here is excellent, though there



are, in my judgment, varying degrees of excellence, depending mainly on ease of use and documentation quality.

Most of these programs also contain provisions for printing out your musical compositions, and this is a boon to composers and arrangers. Potentially, this can relieve a lot of the drudgery of music writing, and it's a point to consider when seeking a music program that's right for your needs. I say potentially because, once again, some are easier to use than others.

Another point to consider is whether your needs will be satisfied by using preset sounds, or whether you'll actually need to create or simulate sounds to get the effect you want. While all of these programs provide some degree of "sonic tailoring," you are limited to preset sounds on some programs, while others allow you to customize the sound in unlimited variation.

Previous musical experience also has to be considered. Some of these programs don't require any knowledge of music at all, and they'll allow you to produce music as soon as they're loaded. Other programs will be more effective for those who can read music and understand musical notation; but the beginner, with a little patience, can have a good time with these also. All of these programs offer some music tutorial, from modest to thorough, in the documentation.

Lastly, this review of music programs for the 64 is as complete as possible at the time of writing, but with the proliferation of software for the C-64, new programs are being developed and released almost on a daily basis. If you don't find a review of a program you've heard about, it's because it wasn't available at the time I wrote this; it'll probably be reviewed in a future issue.

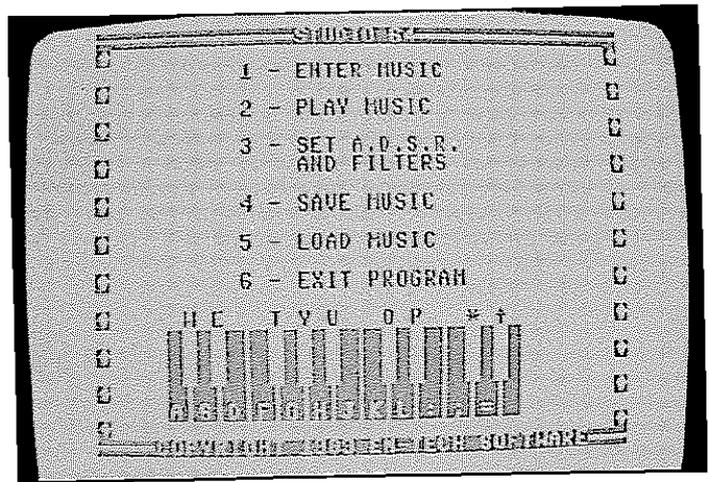
Music Construction Set

Electronic Arts has a sure winner with the Music Construction Set (MCS). The author of this ingenious approach to producing music on the Commodore 64 is a fellow named Will Harvey, who was only fifteen years old when he wrote the program!

MCS is a disk-load program, and its most outstanding feature is that you use a joystick with it, or a KoalaPad, if you have one. I used a joystick to test it, and found this an easy way to use the program. Essentially, you just pick and point to do what you want.

The video display shows three musical staves, and the lower half of the screen is filled with symbols, or icons, of notes, rests, sound values and

*Studio-64,
for the C-64.*



various other artifacts. A pointing hand icon does all the work, guided by either your joystick or KoalaPad.

Creating music with MCS is as simple as moving the hand down to select what kind of note you want (whole, half, quarter, etc.) and placing it where you want it on the staff. As you choose your note, you hit the fire button and then release the note where you want it by pressing the button again. As the note is placed, you hear it.

At any time during the composition, you may hear what you've created by moving the pointing hand to the piano icon and hitting the fire button. Presto, your musical composition is played back to you—it's as easy as that!

You don't have to know a thing about music to use MCS effectively. You can copy sheet music for any song you wish onto the MCS staves and play it back. Or you can experiment, plinking around by ear, since you can remove wrong or sour notes as easily as you place them. If you want to sing along, you can instantly transpose your compositions to find a comfortable range for your voice.

MCS also allows you to print out your composition using a VIC-1525 Graphic Printer or an interface that totally emulates the 1525. A printout is as easy and painless as composing, and the print resolution is excellent.

Storage of your compositions to disk is quick and easy as well. You simply move the hand to the disk icon, hit the fire button and type SAVE and the title of the piece at the arrow prompt. That's it. To retrieve a piece, you move to the disk icon, hit the button, type LOAD and the title, and you're all set. Then you move to the piano icon and hit the button again to play your piece. What could be more simple?

There are thirteen preset sounds included on the program. These include harpsichord, oboe, organ, brass, flute

and others, including percussion sounds. They should be sufficient for your applications. It would be nice if you could further tailor these sounds or synthesize new ones, but alas, nothing's perfect. This is the only limiting factor of MCS, and even this isn't a major drawback.

There is a feature called Cut and Paste that allows you to cut out a section of the musical score and paste it in anywhere you want within that score—or any other, for that matter. What a time-saver this is, especially if you want to repeat certain sections of a tune, such as a chorus or refrain.

You can even create entirely new compositions by cutting and pasting together pieces of other songs. Once again, the icons make the task simple: you use the "scissors" for cutting and the "glue bottle" for pasting.

If you're looking for a music program that's painless, offers every major feature you could ask for and doesn't require you to be a Leonard Bernstein, then Music Construction Set is definitely for you. Congratulations to both Will Harvey and Electronic Arts for a truly outstanding music program for the C-64!

Studio-64

Studio-64, from En-Tech Software, is the next item on our musical menu. This program is available on either disk or cassette and has the same features on both media (I used the disk version). In the concise but thorough user's manual supplied with the program, En-Tech describes Studio-64 as "a powerful word processor for music, not just a simple sound-maker." I must say that this definition is a fairly accurate description of the product.

The utility features of Studio-64 include the entering, editing and playback modes; sound customizing through setting the ADSR and filter controls; and

saving compositions to disk or cassette for future playback or editing. No provision is made for printing out musical scores on a line printer, although En-Tech plans to release a program in the near future that will do this with Studio-64 (it may be available by the time you read this).

All note entry, duration values, rests, tonal qualities, etc., are done via the keyboard. Three-part harmony is possible, with individual volume and tonal characteristics for each voice. Although it's not as direct or simple as the MCS, it's still a very easy program to use, and it produces excellent results.

The real strength of Studio-64 is the provision to customize the sound of your music through the alteration of synthesizer settings. The program also has the capacity to store approximately eight minutes of music for all three voices (combined), which is more than enough time for all but the longest compositions!

Studio-64 offers an excellent compromise between ease of use and the facilities to create virtually any sound or tonal characteristics desired. Pitch representation on the video screen is limited to a range from middle C to G sharp one octave above; higher and lower notes are possible through hitting other keys on the keyboard, but the staff doesn't show the actual pitch, even though it sounds correct. This part is a bit tricky to get used to, and you may

not care for this at all.

Another eccentricity of the program is that flats must be represented as sharps of the natural note one tone lower. This is really a pain in the neck, especially if you don't have a reasonably thorough working knowledge of music. The conversion process is adequately explained in the manual, but it's still confusion city until you get used to the conversion.

Apart from the limited visual representation of the musical score and the sharp-flat oddity mentioned above, Studio-64 offers you diverse tonal modifications and a great amount of music data storage while you're working on a composition.

En-Tech's promised score-printing module will round out one of the rough edges, but I can't help wondering if the printing will be limited to the same middle C to G sharp range as the video display; if it is, it will be next to useless. If, however, it does reproduce actual tonal representations, it will be a valuable music package.

In the meantime, if you feel you can live with the idiosyncracies of this program, you'll be pleased with the flexibility of the sound-coloring controls as well as the massive amount of working room for scores within the program.

The preset instrumental sounds are excellent, and the synthesizer controls allow virtually unlimited mixing of sounds, including effective percussion

effects. Apart from the above-mentioned quirks, Studio-64 is an impressive program worthy of serious consideration when you're purchasing music synthesis software.

MusiCalc

Waveform Corporation has produced the MusiCalc series of modular sound-synthesis programs, and it's really heavyweight stuff! Heavyweight is an appropriate term, since it accurately describes the extensive capabilities of the system as well as the myriad applications it can support.

Module 1 of MusiCalc is the Synthesizer and Sequencer disk, Module 2 is the ScoreWriter disk and Module 3 is

Playing

You don't have to purchase dedicated software to explore the sound/music synthesis capabilities of your C-64. If you're basically an adventurer and experimenter, then all you really need is your 64, the owner's manual and a copy of the *C-64 Programmer's Reference Guide*. Armed with these, you can journey into sonic adventureland and produce all kinds of interesting sounds.

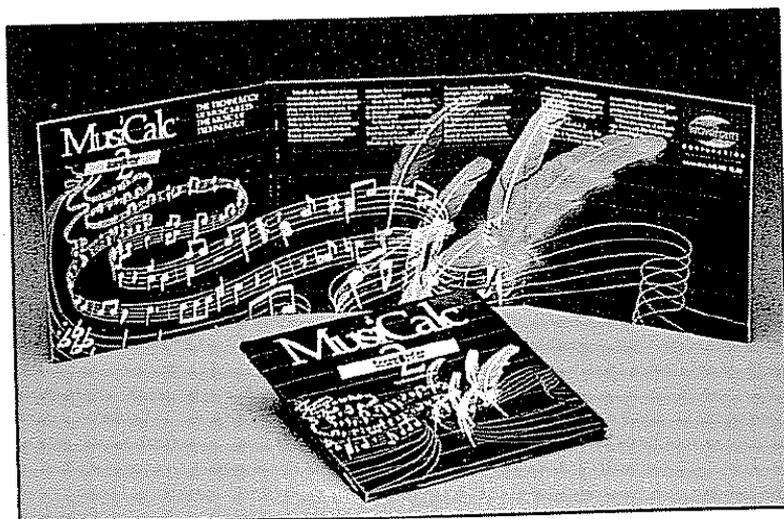
However, both of the Commodore books mentioned above are ambiguous, at best, when it comes to utilizing the SID chip to best advantage. For example, they mention that the chip will accept external signal input, but nowhere do they clearly tell you how to access this capability.

Not one to be thwarted when I'm really on to something, I decided to make a few phone calls to people who are infinitely more knowledgeable about these matters than I. This is what I discovered:

The following program tells you how to access the SID chip to read external input. These are only opening values, though, so you'll still have to do some book work to find out how to set the filters up and how different values will affect the sounds you produce. But it's a start, and a good one at that.

```
10 SID = 54272
20 POKE SID + 23, 128 + 8
30 POKE SID + 24, 32 + 15
40 POKE SID + 22, 128 + 2
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After you type this in, save it to either disk or tape. What you have here is the information that both the user's manual and *Programmer's*



MusiCalc, for the C-64.

the Keyboard-Maker disk. Two Template disks—African and Latin rhythms on one and new wave and rock on the other—are also available. Additionally, Waveform offers a demo disk that demonstrates the capabilities of MushiCalc, as well as their "Technopop" disks, which are recordings of current hits, old standards and even Christmas music that you can play on your computer.

They also intend to release a keyboard and software package called MushiCalc 4 that will work interactively with the MushiCalc 1 and 2 modules. This module will enable you to play music on the keyboard and record it on disk to play back or print out later. It will also let you play any scale in any key, which will

greatly enhance the musical capabilities of their already-impressive modular software.

Before I describe the features of the individual modules, I must mention the singular innovation of MushiCalc that makes it a stand-out among other music packages.

The SID chip in your C-64 will accept external input via the audio/visual port on pin #5. In short, this means you can introduce sound into the computer—for instance, by a microphone or electric guitar—and use the C-64's SID filters, oscillators and other controls to tailor and change the sound.

The C-64 user's manual and the *Programmer's Reference Guide* men-

tion that this is possible, but that's about all; neither book provides information about utilizing this feature. Waveform has taken the bull by the horns and has included in the MushiCalc 1 module a provision to accept external input and process it through the software synthesis controls. This is a great boon in creating music, especially if you're guitar-oriented, rather than a keyboard specialist.

I'm eagerly awaiting the release of Waveform's Colortone Keyboard and MushiCalc 4 package. What a blessing it will be to think in pure musical terms while playing on a piano-like keyboard, rather than in typewriter/music notation, where G sharp is the R key. I can hardly wait!

To get on to the MushiCalc system itself, Module 1 is the master module, the heart of the system. This program turns your C-64 into a three-voice synthesizer and fully-interactive stepping sequencer. The sequencer feature allows you to repeat sequences or patterns of a musical score over and over. All note entry is done via the keyboard, and you enter the synthesizer panel in the same way.

There are over 70 tonal controls in the synthesizer section, including modulators, transposers and waveform controls, with "sliders" to control their values. The sliders are simply lines that can be moved up or down to increase or decrease the values of the control settings. The disk includes a massive assortment of sample sounds and musical scores.

Module 2 is the ScoreWriter disk. This disk works in conjunction with Module 1 to change your compositions and improvisations into musical notation represented on the traditional staff. It also allows you to print out your music on a graphics line printer with a minimum of fuss and bother. It does not work alone, however, since it is interactive with the Module 1 disk. Print-out quality is excellent.

Module 3 is the Keyboard-Maker disk, and it enables you to create your own custom musical keyboard configurations on the C-64 according to your needs. This module comes with over 30 preset keyboard scales that accommodate just about every musical form, from classical to rock, and you can custom-tailor the keyboard if you find none of the presets adequate. Once again, this is an interactive disk, so you need Module 1 to use these features.

The Template modules are interactive overlay programs supplied on individual disks. Template 1 contains

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with SID

Reference Guide neglect to tell you.

You'll also need some way to access pin #5 of the audio/visual port on the back of your 64. I strongly suggest you use the Sound Box from HES, which allows external input via an RCA-type jack.

As an alternative, you can rig up your own connector, using parts from Radio Shack or a comparable supplier. But if you're not adept at soldering, I don't advise this, because you can really mess up your computer if you make the wrong connections. Also refer to the user's guide and programmer's guide for input voltage values—you might fry your SID chip if you try to force-feed it too much juice.

Once you have a suitable connection to pin #5, you're all set to plug in your guitar, microphone or other device (but watch that voltage!) and use the SID's capabilities to process and filter the signals you're sending into it. It'll take a lot of experimenting, but that's part of the fun.

You serious programmers out there should find it quite easy to add some lines to the Basic program I've provided to sequentially increment or decrement these starting values by means of a loop. If anyone comes up with something that he feels is really great, I'd love to hear about it. Drop me a line describing what you've done, as well as either a program listing or a copy of it, and we'll publish the best efforts in a subsequent issue. (If you do submit a program on disk or tape and you want it back, please provide a stamped envelope large

enough to handle it; otherwise, it becomes a "keeper"!)

All submissions of this nature should be addressed to:

Tom Benford/*RUN*
PO Box 125
Osborneville, NJ 08723

I'd like to publicly thank Mick Fitzgerald of Waveform, Inc., as well as Nancy Nieradka for their kind contributions.

Thanks are also in order to Steve Finkel and John Mathias at Commodore for their help (and patience with me and my numerous phone calls) while I was researching this article.

While I'm at it, I might as well thank all of the manufacturers and distributors who submitted their software and/or hardware for evaluation, as well as their technical assistance where needed.

And a very special thank you goes to the "kooks" at the Alien Group, who provided a wealth of knowledge and data on speech synthesis.

On a parting note, let me mention that neither I nor *RUN* will be responsible for any damage to your computer or other equipment resulting from trying to rig up external input devices. This information is presented solely for your edification, and if you don't understand what's going on with the A/V port, then you shouldn't mess with it! In any event, do have fun with your computer music and sound synthesis experiments, 'cause that's what it's all about.

TB

Continued from p. 51.

African and Latin rhythms, while Template 2 has new wave and rock scores and sounds. Since they're both overlay programs, they won't work on their own, but combined with the Module 1 disk, they provide additional music scores and synthesizer presets that you can use to develop your own creations.

Waveform makes the MuziCalc system available in two ways: you can purchase each module independently, as your needs expand; or you can purchase what they call their Professional System, a more economical package deal that includes Modules 1, 2 and 3, as well as the two overlay Templates.

The documentation supplied with Module 1 is first-rate, leaving nothing to be desired as far as thoroughness and explanations go. The 65-page manual provides a wealth of information on music theory and electronic music synthesis. It covers every aspect of operation and control of MuziCalc, and it's written in an understandable and user-friendly manner.

The MuziCalc system is complex. Although it *can* be used by a child or musical novice, I feel it is best suited for the serious amateur, music student or professional musician who is willing to spend a lot of time with the program. There's a section in the manual that will get you up and running in a couple of minutes. But to fully enjoy the features of the system and get the most out of it, a thorough reading and rereading of the manual is required, as well as the investment of many hours of experimentation.

As I mentioned earlier, it's a heavy-weight package that will transform your C-64 into an incredible sound synthesizer and music machine. This is without a doubt the most flexible and comprehensive music/sound package

for the C-64 on the market so far. It will accommodate your musical needs, no matter what they are.

One final point that's worth mentioning is the packaging. Waveform uses the "record album" package similar to the one used by Electronic Arts. The disk, however, is a work of art in itself. Rather than the mundane black disk envelope we're so used to seeing, MuziCalc disks are in technicolor envelopes.

The illustrations on these disks are colorful and innovative; I've never seen anything like them before. The protective jacket is made of clear plastic, instead of paper, thus allowing the artwork on the disk to be seen, even when not in use. This novel idea also makes the modules a snap to pick out when you flip through your disk file. Very nice touch, Waveform!

Music Writer 64

M'Soft Corporation has produced Music Writer 64, a disk-based music program for the C-64. Music Writer 64 allows the entry, editing and playing of three voices, control of the SID chip during play for tonal colorations, saving the compositions to disk and printing sheet music of the score to your printer.

All musical signatures, notes, rests, etc., are entered through the keyboard in the Write mode. The Play mode allows editing and modification of the tonal qualities of the composition. Eight preset sounds are activated upon boot-up of the program, and you control them by using the function keys. There are also provisions for disk utilities, such as formatting and scratching.

An excellent feature of Music Writer 64 is the inclusion of help screens. The user's manual is thorough and concise, and provides full descriptions and explanations of the operation of the pro-

gram. Essentially, these help screens are quick electronic command reference cards. They provide an on-line directory of commands for the various modes of the program, and I found them to be enormously helpful during composition and playback.

The synthesizer screen allows total control of the sound of the composition. Wave form, pulse, synch, ring modulation, ADSR, speed and other settings can be set or changed, and a myriad variety of setting combinations allows for unlimited sounds and tonal colorings.

Some examples of the sounds that can be created are presented in the sample selections, included on the disk. Another unique feature is the Verify function of the program, which automatically verifies all loads and saves to ensure everything's working as it should.

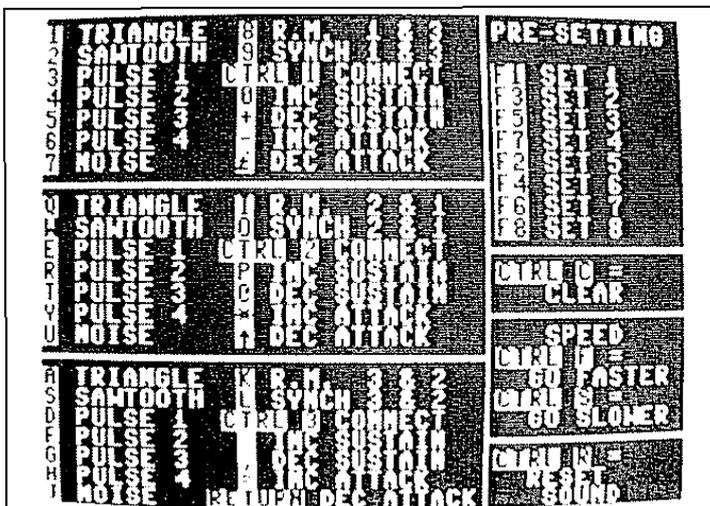
This program is one of the easier music/synthesizer packages to use. To enter music, you must make logical decisions: choose a clef for each voice, enter the note name, the octave (1, 2 or 3) it is to be in and the duration of the note. Sharps are represented by a + sign, flats by a - sign and naturals by a £ sign.

Rests are entered by hitting the R key, followed by the duration value. Clefs may also be changed at any time during a composition, which also adds to the flexibility of the program as a creative tool.

Everything's laid out in very logical fashion, and this straightforward approach, combined with the help screens, makes both learning and using the program easy and fast.

Music Writer 64 will also print out your compositions on your line printer. For this function to work properly, you must use a Commodore 1525, 1526 or 810 printer, or a printer that will totally emulate one of these (there are several emulator interfaces available to make your printer act like one of the Commodore models).

Once the program "thinks" it has a Commodore printer on-line, the quality of the printed sheet music is excellent. The printout process is somewhat slow-



Music Writer 64.

er than some of the other programs reviewed here, but this shouldn't be a primary consideration in making your decision for purchase. It's still infinitely faster than penning in the notes by hand on staff paper!

All in all, Music Writer 64 is a versatile program that combines extensive features, synthesizer controls and printing functions in a user-friendly package. It's one of the better all-around programs for the computer musician, whether a beginner or an accomplished virtuoso.

Note Pro II

Note Pro II is a complex sound and music synthesizer program from Electronic Lab Industries. When it is combined with the Note Pro Bridge, another program on a separate disk, musical creations and sound effects may be combined with your own Basic programs by performing a SYS call to activate them. Neither of these programs allows printing out your creation in mu-

sical notation on a line printer.

The main program, Note Pro II, supersedes Note Pro I, which is a simple music editor. NP-II adds many features, including the ability to transpose by octaves, a full eight-octave range for each voice, control of the ADSR, wave shape and filter settings, high-speed play of up to 450 notes per second (useful for arcade sound effects) and file-joining capabilities, using disk or cassette files. In addition, you can arrange musical compositions in any sequence, all note durations are available and you can select legato or staccato for each note.

The user's manual is complete and thorough, and it fully explains all notation, entry and control settings. I can't really call this system user-friendly, though; it takes a lot of reading and practice to get proficient at using the features. In fact, I found Note Pro II to be one of the more cumbersome music programs I reviewed.

All entry is accomplished through the

keyboard, but it's not done in the standard music-notation format. If you're interested in tonal variety and the creation of sound effects to be used with your other programs or games, then perhaps the extra effort needed to utilize this package may be worthwhile for you.

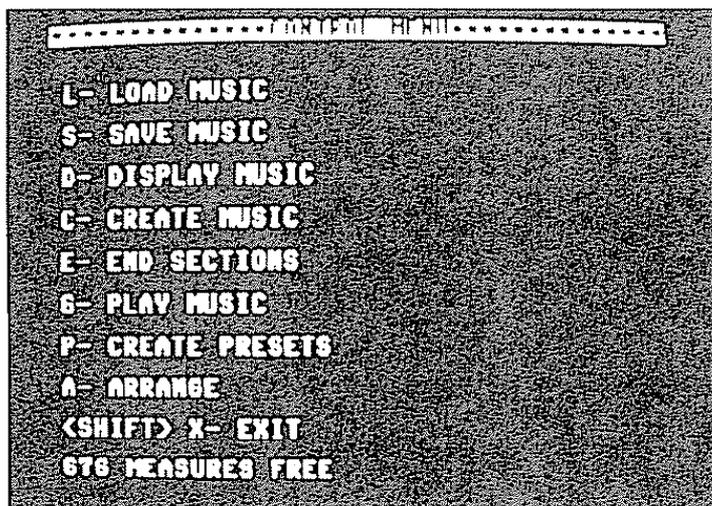
The Note Pro Bridge is a separate disk containing copyable routines in machine language that can be incorporated into your own Basic programs for the addition of music or sound effects. This is a strong point for Note Pro, since virtually any program is improved by adding sound effects or audio prompts.

The Bridge program is intended to be used in conjunction with Note Pro I or II—you first have to create the sound effects or music, and save them either to disk or tape to create a sound file. The Bridge utilizes these sound data files to integrate the sound into your program through the SYS command.

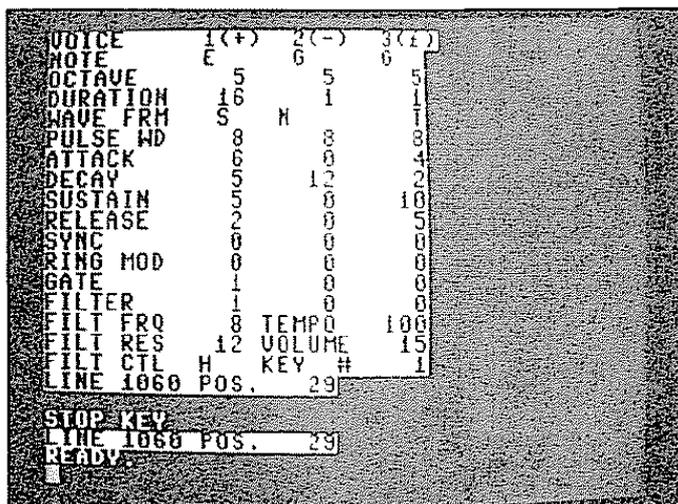
Control register values are Poked into memory and then called as needed from within the program. The bridge is interrupt-driven, so you can add it to programs already written or incorporate it into a program you're in the process of creating.

Note Pro II and the Note Pro Bridge have extensive applications and capabilities. They are complex to use, however, since the controls are sophisticated. In light of this fact, your intended use will determine whether this is the right package for you.

If you wish to create and compose musical scores easily and print them out in the form of sheet music, then Note Pro is not for you. If, however, you intend to incorporate your musical creations into your applications or game programs, then Note Pro II and the Bridge are perfect for these purposes.



Note Pro II and Note Pro Bridge.



Synth-64, for the C-64.

Synth-64

Synth-64, from Abacus Software, is yet another music and sound-synthesis program for the C-64. Although it doesn't make any provision for printing out sheet music on your line printer, it does contain other useful features, such as an interactive display of a song's lyrics, with musical accompaniment, should you desire to sing along. The program is available on either disk or tape, and you can also store your creations on either of these media.

Synth-64 is fairly easy to use, as inputting follows a logical pattern. For example, if you wish to play a C note, you type in C; to denote duration values of the note, a slash followed by the

value is input; e.g., C/4 would give you a C quarter note. Most other entry utilities follow a similar pattern, and getting the hang of using it takes but a short time.

I don't mean to oversimplify Synth-64; it still takes a bit of time to learn the command structure and read the manual, but compared to some of the other systems already mentioned, it's fairly simple to learn. Mastering all the controls and functions, on the other hand, may take some doing.

The program lets you tailor the SID chip's controls to extract the sounds you want. You can control waveform, pitch, envelopes, filter and modulator settings, and in so doing can obtain an infinite variety of sound. These controls aren't as easy to use as you might like, but they're workable and can produce some nice results.

There is no quick-reference chart, which would be useful for the cumbersome control settings, so you'll probably find yourself referring frequently to the manual, at least in the early stages. A provision for line-printing sheet music would have been nice, but this just isn't the case.

To sum it up, Synth-64 is one of the better compromise music-and-sound programs. It will allow a great variety of sound generation for all three voices, it permits saving your compositions to either disk or cassette, and it provides an interactive graphics display of text (lyrics) along with music and control settings.

If you absolutely need to print out your scores, you should look elsewhere. If you don't need the printout capability and would like to experiment and investigate the limitless variety of sounds that can be synthesized, you'll probably like Synth-64.

Kawasaki Synthesizer

This is a very comprehensive music package that lets you compose, record, play and print out your musical creations. This package contains the name of the designer and author of the program, Ryo Kawasaki, who is a noted Japanese jazz guitarist with over a dozen album releases to his credit.

As with all the other programs (except the joystick-controlled Music Construction Set), Kawasaki Synthesizer is keyboard-controlled, both for inputting music and sound-control settings. The program is marketed on two disks, and the documentation supplied with it is exhaustive. Four stars must go to Mr. Kawasaki for thoroughness—you can't help but learn quite a bit about both

music and sound synthesis on the C-64 after reading through the manual.

A very thorough study, not just a casual reading, of the manual is required if you want to make the most of the intricacy and flexibility that the Kawasaki Synthesizer offers. A large portion of the manual is in the form of a tutorial on music theory and practice as well as synthesizer nomenclature. It offers a wealth of information.

The set contains Easy Beginner and Easy Pro. The latter is the more complex and does just about everything conceivable with the SID chip.

A three-voice sequencer has been incorporated into the software, so that passages of the composition can be repeated. A two-voice sequencer is also provided so that you can play along to create or improvise the third voice while listening to two others. This is a handy feature when you're developing harmony parts or chord structures.

Another strong point is the six-octave range that's available for your scoring needs. The excellent graphics display simplifies (to some extent) inputting music and control settings.

The print-out function is superb, and apart from the vast flexibility of tone and pitch ranges possible, this is a real strong point for Kawasaki's Synthesizer set. Although intended to be used with a Commodore printer, an emulator interface will produce equal results on most printers, and the print quality is excellent.

Another plus for Easy Pro is the "real-time sequencer track," as it is called in the manual. I found this to be particularly useful in laying down rhythm tracks, such as drum beats and other percussion sounds. It's a real boon in

adding color and depth to your compositions, and it will do double duty to keep time for you if you're practicing on another instrument as well. Very realistic percussion sounds are possible using this feature of the program.

I recommend Easy Pro for the serious user who isn't easily intimidated by fat user manuals and who doesn't mind some extra work during the input and editing stages to extract precisely the type of sound he or she wants to produce. The many illustrations included with the text in the manual aid in gaining proficiency at using the program. This is a serious program with excellent capabilities for the serious musician.

For the amateur composer, there's Easy Beginner. As the name implies, Easy Beginner is a simple program that will get you ready to compose and play music in a hurry. This program uses eight different screens that demonstrate the piano keyboard screen and the available sounds, give you access to 21 pre-set sounds and 13 pre-set songs, and let you change the wave forms and octaves.

Other options let you play along with pre-programmed music patterns on the "piano keyboard." By combining the pre-set voices and changing wave forms and octaves, you can create over 500 pre-set sounds with this program. Ninety percent of the documentation to operate Easy Beginner is on the screen for easy use.

The Kawasaki Synthesizer program will also contain a songbook of today's most popular songs from artists such as Billy Joel, Lionel Ritchie, Michael Jackson, Duran Duran, The Police and others. With this songbook, you'll be able to program complete compositions

Kawasaki Synthesizer.



into the Easy Pro program and dump them onto disk to save and show to your friends.

The distributor of this program, Sight & Sound International, Inc., will also be manufacturing a keyboard overlay for the 64 ASCII keyboard. The keyboard overlay will consist of a two-octave, organ-type keyboard that easily snaps over and allows you to play the C-64 as if it were a portable keyboard (like a Casiotone).

Music Machine

Even Commodore has gotten on the music-synthesis bandwagon. The Music Machine is a music-synthesizer package on a ROM cartridge, instead of the usual cassette or disk formats. Cartridge-load programs have certain advantages and drawbacks as against tape or disk programs, and we'll examine them right now.

The most obvious advantage is that the cartridge offers "instant-on" readiness. In other words, once you insert the cartridge into your C-64 and turn the power switch on, that's it—you're ready to roll without having to wait for the program to load.

A drawback of the cartridge is that there is only so much data that can be crammed into it, so there has to be some

limitation on the complexity of the program. Such is the case with Music Machine—it is a compromise of features.

Basically, it's an easy program to use, with a minimum of effort needed to produce music. Input from the keyboard controls three voices. The function keys control rhythm and tempo.

A pitch control is also provided so you can "tune" your C-64 to play along with the radio or a record, and you even have limited control over the sound of the music by adjusting the waveform, effect and octave controls.

In typical Commodore style, the instruction manual is user-friendly, and you can learn everything you need to know in just a few minutes, since it's only eight pages long. No lengthy technical explanations are given, just the nitty-gritty information on what the controls are and do and how to handle them.

For this reason, it's a good choice for those of you who can't be bothered reading a lengthy dissertation on how to use the software. Just plug Music Machine in, turn it on, breeze through the manual and start making music (or noise).

The major drawback of the Music Machine is that there's no provision to save your compositions to disk or tape.

Why this feature wasn't included is puzzling, since it wouldn't have taken up much more memory in the cartridge or have increased the price significantly.

This lack of capability to preserve your music becomes painful when you've spent a long time getting the harmony of the three voices just right in a song and setting the tempo and sound to your liking. You'd like to save it—but you can't do it! When you shut off your C-64, your music goes bye-bye and won't be heard again unless you key in the notes and settings all over again.

For this reason, I don't imagine the Music Machine is going to appeal to the more serious musicians. It's a really good starter program for younger musicians, though, and should provide lots of fun with a minimum of effort.

Music Composer

Commodore must have realized the inherent shortcomings of their Music Machine cartridge, so they came out with the Music Composer. Once again, this is a ROM cartridge, but this time they did add the provision for at least saving the composition to cassette. While the Music Composer isn't heavy-duty as far as music and sound packages go, it's definitely a few cuts above the Music Machine.

The user's manual is twelve pages long, and is devoid of frills—just matter of fact stuff here that will get you using the program in short order. Again, since it's ROM-based, there's no wait while you load the program; you simply insert the cartridge, turn on the C-64, and off you go. All note entry is done by keyboard.

To keep up with their tradition of user-friendly software, virtually everything on the Music Composer is menu-driven, which greatly simplifies choosing sounds, voices and other variables. It includes a sample piece of music by Handel that gives a nice demo of what the program can do, and you're even given the option of changing the preset instruments, the filters and other tone controls to hear what effect these changes will produce in the sample piece. This is more useful than just reading about the controls' functions and trying to imagine the effects.

While the Music Composer still isn't in quite the same league as most of the other programs I've covered here, it's very easy to use, allows storage of your compositions for replay and editing, and is an excellent choice for those looking for a fun way to get their feet wet in the area of computer sound and music synthesis. [R]

Manufacturers' Addresses

Music Construction Set
Electronics Arts
2755 Campus Drive
San Mateo, CA 94403
Disk, \$40

Studio-64
En-Tech Software
PO Box 881
Sun Valley, CA 91352
Disk or cassette, \$39.95

MusicCalc
Waveform Corp.
1912 Bonita Way
Berkeley, CA 94704
Disk, \$74.95

Music Writer 64
M'Soft Corp.
12027 Pacific St.
Omaha, NE 68144
Disk, \$69.95

Note Pro II; Note Pro Bridge
Electronic Lab Industries
100 West 22nd St., PO Box 7167
Baltimore, MD 21218
Note Pro II, cassette, \$46.95
Note Pro Bridge, cassette, \$24.95
(Add \$3 each for disk)

Kawasaki Synthesizer
By Ryo Kawasaki
Distributor: Sight and Sound Int'l
3200 S. 166 St., PO Box 27
New Berlin, WI 53151
Two-disk package, \$49.95

Synthy-64
Abacus Software
PO Box 7211
Grand Rapids, MI 49510
Cassette, \$29.95; disk, \$32.95

Music Machine; Music Composer
Commodore Business Machines
1200 Wilson Drive
West Chester, PA 19380
Cartridge, \$17.95 each

Magic Voice Module
Commodore Business Machines
1200 Wilson Drive
West Chester, PA 19380
Under \$100

VIC Music Composer
Thorn EMI
1370 Ave. of the Americas
New York, NY 10019
Cartridge, \$19.95

Fun With Music
Epyx Computer Software
1043 Kiel Court
Sunnyvale, CA 94086
Cartridge, \$30

VIC-20 Speech Synthesizer
Maxtron
1825A Dursee Ave.
El Monte, CA 91733
Cartridge and cables, \$99

The Voice Box
Alien Group
27 West 23rd St.
New York, NY 10010
\$129, software included