The Magazine For ALL Commodore Computer Users

TPUG Magazine

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INCLUDED IN THIS ISSUE

- World of Commodore III: Exclusive information
- Jim Butterfield: C-128 ml
- Steve Punter: More on his new C1 Protocol
- VIC 20 Game reviews

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Inside Information

Magazine Ethics Mudslide

Magazines depend heavily on advertising for their survival. Every magazine aims at a certain ratio of advertising to editorial copy; when the ratio falls much below the ideal, the magazine shrinks. Perhaps you remember the 400 page *COMPUTE!* of a couple of Christmases ago. Look at the size of *COMPUTE!* now, and you'll see clearly what results from a decline in advertising revenue. *TPUG Magazine*'s current size of 48 pages also reflects the fact that computer advertising in today's market is not as easy to get as it used to be.

Why has advertising revenue slipped so alarmingly over the last two years? Partly because the microcomputer industry in general is not growing now the way it was then. Perhaps also because the massive trade in pirated software has driven a lot of manufacturers — advertisers, that is — out of business. If that's the case, there's a striking irony in the fact that the advertising of piracy tools is bucking the trend, and booming rather than declining.

The September issue of *COMPUTE!'s Gazette* included no fewer than 16 ads, totalling nearly 7 pages, for products whose principal function is to copy protected software. These include bit nibblers and cartridge copiers, products like Starpoint's ISEPIC for making a 'snapshot' of a computer's memory and saving it to disk, books 'exposing' protection techniques, and even a newsletter promising instructions for cracking "3-5 (or more) programs each month".

In a tight market, one has to sympathize with the plight of advertising sales people and the publishers for whom they work. To some extent, the sales of a magazine depend on being able to print enough pages so that readers feel they are getting their money's worth. All the same, the ads for piracy tools must, in the long run, be counterproductive for the magazines that run them, as well as for magazines like this one that regularly refuse such ads. It would be startling to see burglars' accessories advertised in *Home Beautiful*, or hot-wiring tips being peddled in *Road and Track*. Why do we accept it as routine that computer magazines should sell space to vendors whose specialty is software theft? And why do other manufacturers, whose own welfare is directly threatened by this practice, continue to promote their goods in those same magazines?

A further irony: we wrote to one manufacturer a few months ago asking for a review copy of a product we felt would be of interest to *TPUG Magazine* readers. The manufacturer wrote back to say that it was against their policy to supply review software to users' groups. No reason was given, but presumably that policy results from the generally undeserved reputation that users' groups have for being hotbeds of piracy. Reviews of that manufacturer's products appear frequently in *COMPUTE!'s Gazette*, as do their advertisements.

True confessions

After writing the above editorial, which we did in a duly incensed frame of mind, we were slightly mortified to realize that an ad for a deprotection product had appeared in the October issue of our own magazine (yes, that's just last month). For that we humbly apologize. Too little vigilance and a hectic production schedule led to what — in view of the above homily — was a most untimely slip. Nonetheless, we stand by the argument as written, and we'll try even harder in future to keep our own act clean.

This month

Our cover photograph this month is the work of John J. Wood, and was designed by Steve MacDowall of Watson-MacDowall Inc. The large object in the foreground is a 'violin', a primitive sound generation device with no digital circuitry. Though it has now been almost entirely supplanted by the SID chip, in the hands of a skilled user the violin is capable of imitating certain synthesizer timbres with an astonishing degree of realism. Music files generated with this instrument are widely available in both disk and tape format, though you will need special peripherals to run them successfully.

Our feature article on music deals not with the violin, however, but with the Commodore 64 and 128 computers. Author Tim Grantham compares the capabilities of the SID chip with those of dedicated synthesizers, and gives a quick overview of the multitude of music software and hardware that the C-64 has inspired.

Also in this issue, Jim Butterfield gets you started at writing machine language programs on the C-128; Steve Punter wraps up his two-part series on his new file transfer protocol; and Vic Forde concludes *his* two-parter on computers and ham radio. In the centre of the magazine you will also find a four-page pullout section on the World of Commodore III show, which is coming up early in December at the International Centre near the Toronto airport.

Micro-memo update

Ron Byers called a little while ago with a few corrections for users of his **Micro-memo** program, which appeared in our Micro Processes section in the August-September issue. To fix up your copy of the program, load it into memory, type in the following lines, then save it again:

```
30 ifpeek(59271)=232thenmac
   h=20:md=37136:cl=0:n=0
35 dimt%(255),ms$(50)
155 print"press space to si
    mulate a call"
165 geta$:ifa$<>""goto290
345 geta$:ifa$<>""thenfori=
    1to9000:nexti
```

Ron tells us that his BBS is now up 24 hours a day. The number to call is 1-902-893-8742. □

Communications bloopers

We are honest as the day is long, but now and again we tell you something that isn't true. Look on the Library Additions pages for corrections to last month's telecommunications feature. And while we're at it, the capacity of the Amiga's built-in 3 1/2 inch disk drive is 880K, not the mere 800K we reported in October.

The Editors

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LCD True or False

To begin with, I'm definitely pro-Commodore — I bought my youngest son a VIC 20, my oldest was just given my old C-64, and I have a three-day-old C-128 for myself. I use my SX-64 mostly, as I'm a travelling field service tech.

My problem is that a year ago I bought a 24K TRS-80 M-100 for those less-than-one-week trips out of town. I don't like the high cost of Radio Shack equipment but, at the time, there was no other low-cost lap computer. I now have a chance to sell the M-100, but I'm only willing to do so if Commodore is really going to come out with the LCD!

Worry #1. Commodore is known for testing public reaction by press releases of equipment that's not in production.

Worry #2. I read in another magazine that, at the CES show, Commodore didn't even show the LCD and, as the article said, how can you drum up orders, if you don't exhibit the equipment?

It is believed that TPUG has the most clout and the largest user base... do you have any inside knowledge as to whether or not they will manufacture (and sell in the USA) the LCD?

Dutch Kuykendall
Scurry, Texas

According to one Commodore insider who addressed the subject on CompuServe recently, the LCD computer has, alas, been cancelled. This news comes in the wake of a report (in Info *magazine, I believe) that Commodore had developed a display for the computer that was very much clearer and faster than the Model 100's. The ways of Commodore are infinitely mysterious.*

Plus/4 Minus

I fully agree with Terry Traub's article 'Plus/4 and C-16: Disappointingly Mediocre'. I believe the underlining comment is 'major marketing error'. With a market in the millions, I believe Commodore could have made much more money, and had an easier time, marketing add-on products for the existing VICs and C-64s. At the computer show, a Commodore representative advised me that if I was considering a home computer for a mixture of games and some light business applications, then the 'old' C-64 would be best. On the other hand, if I wanted it mainly for business, then the 'new' Plus/4 was best, due to the built-in software.

I hope Commodore is not going to make the same error that Tandy Radio Shack made, that of not defining which market they were in, and trying to be all things to all people. Business buys the best in both hardware and software. They also buy 'name'. Price is not a big factor, but performance is. As Terry pointed out, the performance in the Plus/4 is very disappointing. As a bundled package, Commodore used very poor software performers. I guess they have not heard of Osborne, Kaypro et cetera, who built their market with an excellent software package.

The new CBM products, including the B-128, do not have a market niche, from what I've heard. My marketing strategy would have been an improved C-64, and/or add-ons, preferring the latter. Then I would hold on until the new home computer generation appears, featuring the 'MAC' type approach (680xx series), or enter the MS DOS market with a home/educational emphasis, although that is a *tough* market.

I'm proud of Commodore being strongly associated with Canada. I'm proud it was Commodore who introduced so many people to the wonderful world of computing. They have done a fine job... let's hope they know something Terry and I don't.

TPUG, I look forward to receiving each of your magazine editions. Great stuff!

Frank Rioux
Barrie, Ontario

Colour Hi-res

Enclosed is a short listing to be added to Michael Keryan's great program for dumping *colour* high resolution graphics to dot matrix printers. The original three-part article appeared in the late, great *Micro Magazine* (#73, 74 and 75). Each colour has to be put on one at a time with a separate coloured ribbon. Keryan's programs were difficult to use in one way: aligning the multiple passes of the printer so that the colours line up. He advises that it is important to set the printer in 'unidirectional print' mode; this helps with dots that intersect horizontally, but are no help for vertical alignment.

My printer is a C. Itoh Prowriter, and it can automatically reverse the direction of the paper feed (escape CHR$(114) reverses; escape CHR$(102) forwards). I have added lines 1340 through 1360 to automatically align the print head. Also, a **GOSUB 1340** is added to Keryan's line 1330. These lines return the printer precisely to the beginning of the printed page between each print pass.

```
1330 sys20480:gosub1340:
 goto1110
1340 close4:open4,4:prin
 t#4,chr$(27)chr$(114)ch
 r$(27)"t16";
1350 print#4,chr$(12)chr
 $(12)chr$(27)chr$(102);
1360 close4:return
```

Brian Schott
Decatur, Georgia

IEEE meets B-128

In a past issue, a reader wanted to know why the B-series would not work without all the devices turned on. The reason is the IEEE bus is handled differently. The REN line of the bus is not permanently grounded anymore, therefore allowing other devices to act as controller on the bus. While this has some advantages, certain devices ground this line when turned off. Thus, the B-128 will 'hang up' when this condition occurs. A possible software cure for this condition was discovered by using an 8300P IEEE printer with the B-128 system. The ready light will flash each time the B-128 accesses the bus without the above poke being done. This flashing is the B-128 grounding and releasing the REN line.

David L. Evans II
Caldwell, ID

***Line Noise** presented by Lana Coviello*

The Answer Desk

with Malcolm O'Brien

Reviving aged PETS

Regarding the article by John Kurczak, 'Ye Olde Pette 80 — It Already Exists', in the May 1985 issue of TPUG Magazine*: the modification mentioned is truly needed, if we old PET users are going to continue using the PET. John's description of the Microcomputer Services modification is intriguing, and I am ordering my kit today.*

John also mentioned a 64K conversion kit that I am very interested in learning about. There must still be many PET users around, and any information regarding upgrades and/or software is greatly appreciated — especially if it allows me to triple my memory.

One area that I have seen lacking is information on transferring the wealth of C-64 programs to the PET. There are some routines that allow simple C-64 programs to be transformed, but I have not seen any that would handle all the differences, including peeks and pokes. Do you know of any reference books or programs that might be helpful in this area?

Mel Johnson
San Jose, California

For information on the 64K memory expansion for PETs, check out our Microprocesses section last issue. There is no general procedure for converting C-64 programs to run on the PET. The main difficulty, of course, is that many of the most characteristic C-64 features — sprites, SID sound, colour graphics — cannot be translated to the PET by any means whatsoever. The first step in converting programs is therefore to remove any portions that make use of the above features. If what remains is still worth converting, the remaining steps may not be too difficult. Briefly, you will have to look at:

- changing the program load address to 1025 ($0401), since the PET does not do relocating loads;
- altering any direct references to screen memory, which is usually at 1024 ($0400) on the C-64, but 32768 ($8000) on the PET. Extra work will be required if you are adapting to an 80 column rather than a 40 column PET;
- if the program accesses disk, you may want to make adjustments suitable for a dual disk (4040 or 8050) rather than a single disk (1541), possibly making use of BASIC 4.0 disk commands, if your PET has them;
- a few BASIC commands operate somewhat differently on the PET than on the C-64. An important instance is the **INPUT** command, which was improved on the C-64 to handle a null response without returning to direct mode.

A good place to look for further information would be the books by Raeto Collins West, *Programming the PET/CBM* and *Programming the Commodore 64*, which are widely distributed, comprehensive and authoritative.

A VIC Compiler?

I've been using the VIC 20 for many years now and find it a super computer. I haven't 'upgraded' to a C-64 because of radio interference problems that many of my fellow Ham Radio Operators have experienced with their C-64s. The VIC radiates much less RF so I can listen to the stations on the radio with the VIC 20, whereas I'd be listening to the computer if I had a C-64.

I have a fully expanded VIC (27K) and two 1541 disk drives. That should be large enough to hold about anything designed for the C-64. At this point, the only difference between my VIC and a C-64 is the sound chip and the sprite graphics, neither of which I need for non-game, 'real' computing (database applications and statistical analysis).

I am looking for a compiler for the VIC 20. I don't want one that generates 'pseudo code' — something that requires a run-time support package for it to work. I would like to have one that actually generates either assembly language statements that can be subsequently assembled, or one that generates the machine code directly, ready for execution.

Terry G. McCarty
Manassas, Virginia

Sorry, Terry. To the best of my knowledge there never was a compiler of any description commercially available for the VIC 20. I suspect that fully-expanded VICs are few and far between. It may be that many VIC owners were unwilling to spend the extra money to expand beyond 8K or 16K, and a lot of them (including me!) never expanded their VICs at all.

Of course the prospect of selling to a limited market keeps software developers away in droves, and this is probably the reason why 'serious' applications such as compilers were never really part of the mainstream of VIC offerings; instead, the VIC was mostly thought of (fairly or unfairly) as a games machine.

It may be that there is a BASIC compiler for the VIC lurking somewhere in the public domain; however, it might only use integers or work with a subset of BASIC. You are very unlikely to find one that will generate 6502 machine language.

As far as your particular applications go, the real culprit in the database application is the speed of the 1541 drive (*zzzz...*), which would be unaffected by compiling (though the transfer of data between the drive and the computer might be enhanced, particularly if BASIC's **GET#** statement is being used). BASIC is certainly fast enough to keep up with your typing while entering or editing records. Statistical analysis is a different kettle of fish. The speed of memory operations is significantly enhanced by compiling, but there is a better solution. Take the plunge and learn machine language. You can probably get a **HESMON** cartridge for 5 to 10 dollars these days (I paid fifty!). You can still write a lot of your program in BASIC — just rewrite the slow parts as machine language subroutines and **SYS** to them from BASIC.

Learning machine language is not as horrible as it is often made out to be, especially with the good reference materials now available. Recommended reading includes: Jim Butterfield's machine language book; *The VIC Programmers Reference Guide* from Commodore (also heavily discounted these days); and *The Complete Commodore Inner Space Anthology* by Karl Hildon (available through *The Transactor* magazine).

Naturally, this will take considerably longer than compiling an existing BASIC program, but the results will be dazzling! One other suggestion is to keep watching TPUG library listings. Statistical programs are always being written anew, and you may find one that suits you to a tee. □

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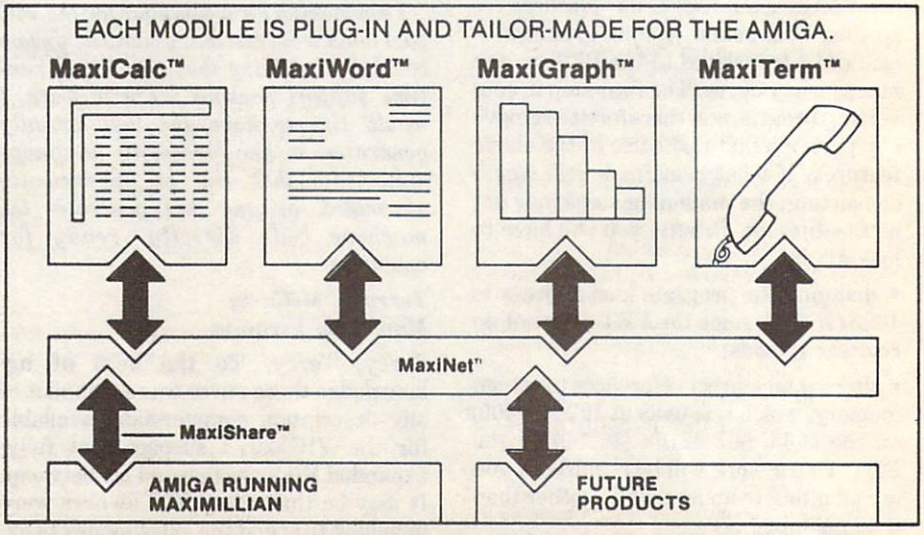

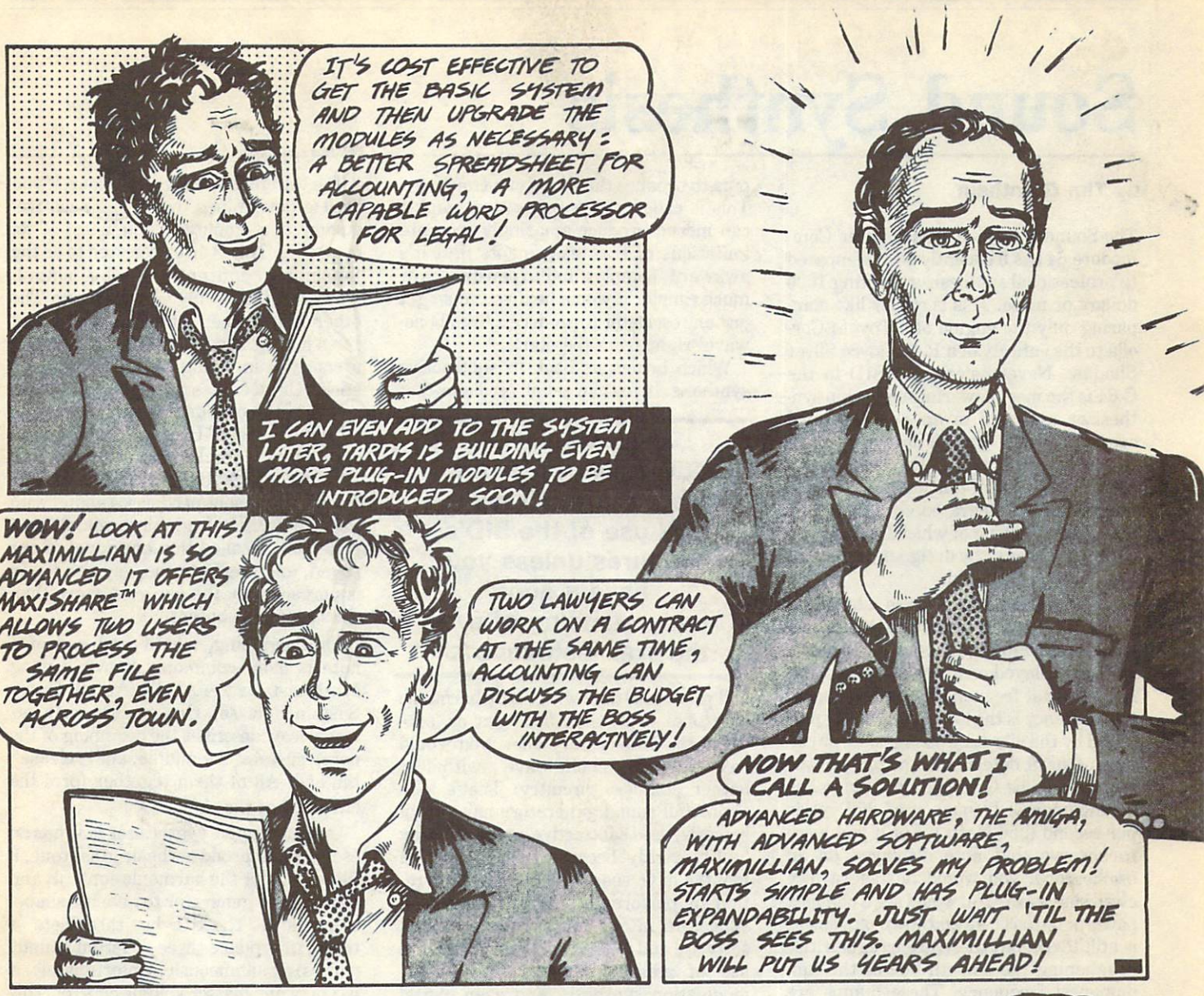

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Sound Synthesis

by Tim Grantham

The Sound Interface Device in the Commodore 64 has frequently been compared to professional synthesizers costing 1000 dollars or more. This is rather like comparing only the engine of a Toyota Corolla to the entirety of a Rolls-Royce Silver Shadow. Nevertheless, the SID in the C-64 *is* the most powerful single-chip synthesizer available in an 8-bit personal computer today — and it does have many features in common with performance synthesizers. All of this was packed onto one 20-dollar integrated circuit. It is a feat of engineering of which Commodore and Bob Yannes, the designer of the SID chip, should be proud.

Most synthesizers today use subtractive synthesis. To understand what this is, you have to understand what 'harmonics' are. Any note played on an instrument has a fundamental frequency. The fundamental frequency is the lowest frequency produced by the vibrating string, skin, or column of air; it determines the pitch of the note. A middle C played on a piano has a fundamental frequency of 256 cycles per second (256 Hertz). But if you were to observe that note displayed on an oscilloscope, you would not see a nice clean sine wave. You would see a complex pattern: the basic up and down movement is still there, but there are irregularities roughening the smooth line of the fundamental frequency. These bumps are overtones, and they are what make a middle C played on a piano sound different from a middle C played on a flute.

Overtones are frequencies present that are higher than the fundamental frequency. Harmonic overtones ('harmonics', for short) are overtones that are multiples of the fundamental frequency. The greater the number of overtones present in a note, the richer the sound. A wooden recorder, for example, which produces few overtones, has a much 'thinner' sound than a trombone, which produces many.

If you want to synthesize the sound of a trombone, you must generate the fundamental frequency, plus all the necessary overtones in their correct proportions. You could do this by assembling at least eight sine-wave oscillators, each producing one of the necessary frequencies; then carefully mixing their outputs to produce the sound of a trombone. This is called *additive synthesis*, and it can indeed produce amazingly accurate imitations of real instruments. But it's awkward, complex and expensive. How much simpler it would be if you could get just one oscillator to produce a 'trombone-wave' right from the start.

Which brings us back to subtractive synthesis. If you can get an oscillator that

. . . Whatever the advertising hype may say, you can't make full use of the SID's features unless you have a good understanding of synthesizer technique . . .

will produce a tone with many harmonic overtones in it, then filter out or 'subtract' the unnecessary ones, you would have your 'trombone-wave', with less bother and less circuitry. That's why almost all sound generators have, until recently, used subtractive synthesis. I say 'until recently' because the last eighteen months have seen a whole new generation of performance synthesizers. Advances in integrated circuitry, control software and memory are permitting the use of additive synthesis, frequency modulation synthesis, and even digital sampling synthesis. Of course, these products cost anywhere from 2000 dollars to 30 thousand dollars. Subtractive synthesis is going to be around for a while yet.

The timbre of a sound (its colour, if you like) is determined by the number, frequency and amplitude (loudness) of its overtones. This is often referred to as the 'harmonic content' of the sound. However, that's only half the story. The other half is the 'shape' of the sound. Does it start suddenly, like the sound of a snare drum being smacked with the stick? Or does it start slowly, like the sound of the bow drawn gently over the strings of a violin? Does the note die away slowly like a struck gong, or does it stop abruptly like a damped piano string? Every instrument produces a sound with a characteristic beginning, middle and end. This is called the 'envelope' of the sound, and it affects the way the sound is perceived by the ear even more than the harmonic content.

The beginning, middle and end of a note is more commonly known among synthesists as the ADSR (Attack Decay Sustain Release). One can say that 'attack/decay' describes the beginning of the note, 'sustain' the middle, and 'release', the end. All of them together form the envelope of the note.

Our subtractive synthesizer now has an oscillator to produce the original tone, a filter to tailor the harmonic content, and an envelope generator to give it a shape, to mould it. The SID has three sets of these, to produce three different sounds (voices) simultaneously. Unfortunately, it has only one master volume control. This was done to reduce the complexity of the chip, but it limits the degree of contrast between the voices. You can't use volume to distinguish what voice is 'lead' and what voices are 'back-up'. In fact, the

The MAX keyboard from Sequential Circuits is a MIDI-keyboard especially designed to operate with computer equipment.

volume control on the SID is its most serious limitation. More on this later.

Let's look more closely at one of the oscillators in the SID chip. As in other synthesizers, we have a choice of waveforms that the oscillator can produce: triangular, sawtooth, rectangular (or 'pulse'), and noise. The triangular waveform approximates a sine wave at the fundamental frequency. The pulse waveform contains the odd harmonics of the fundamental frequency, and the sawtooth waveform contains both odd and even harmonics. The noise waveform produces overtones that are non-harmonic (their frequencies bear no mathematical relationship to the fundamental frequency): furthermore, the amplitude of each overtone bears no relationship to its frequency.

If you seek to synthesize a real instrument, you must first decide which of these four waveforms is closest in timbre, and then refine it with the filters and envelope generator. The sound of a flute most closely resembles the triangular waveform; a trumpet, the sawtooth. The noise waveform is best for almost all of the percussion instruments.

The SID chip provides three types of filters: a high-pass, a low-pass and a band-pass filter. The behaviour of these filters depends on a value called the cutoff frequency, which is set in an 11-bit register in the SID chip. A low-pass filter will pass the frequencies below the cut-off frequency and attenuate the frequencies above it. The high-pass filter is just the reverse: passing the upper frequencies and attenuating the lower. The band-pass filter will pass the frequencies in the immediate vicinity of the cut-off frequency, attenuating the frequencies above and below it. You can create a fourth filter with the SID chip by enabling both the low and high-pass filters, and assigning them the same cut-off frequency. This will produce a notch filter, the reverse of a band-pass filter. It will prevent frequencies close to the cut-off frequency from coming through. Other combinations of filters are also possible.

The envelope generators on the SID are very similar in function to those found on performance synthesizers. However, you do not have fine control over the ADSR settings, because these can only have sixteen possible settings each. Dedicated synthesizers can break up the envelope into as many as sixteen different sections, with each section having an infinite range of settings. Still, you have your choice of 65,536 possible combinations on the SID chip.

Continued overleaf...

SID's Curious Quirks...

by Tim Grantham

There are several interesting things about the SID chip that are not generally utilized. You can synchronize the fundamental frequencies of any two of the oscillators. Varying the frequency of the first with respect to the frequency of the second will generate complex harmonic structures from the first, at the frequency of the second. The fundamental frequency of the second oscillator should be lower than the first. Ring modulation can also be created between pairs of voices to produce bell-like or gong-like tones rich in non-harmonic overtones.

You can even route an external audio signal through any or all of the filters, controlling its loudness with the volume nybble (half-register). In order to do this, you need a DIN-to-RCA cable. You can get this at stereo stores. It must be a 5-pin DIN connector at one end, with four RCA phono plugs at the other. On mine, the yellow plug goes to the audio input pin of the SID. This pin has an input impedance of 100K Ohms. The signal should not exceed 3 V, peak-to-peak. It's best to use the output from a pre-amp of some kind: for example, the tape output jack on most amplifiers.

Resonance is another control the SID chip has in common with other synthesizers. Resonance increases the amplitude of the frequencies closest to the cut-off frequency of the filters. This can give a much sharper, punchier sound.

The SID has a couple of features that conventional synthesizers do not have, and the advantages they provide result from the fact that the SID is a chip designed for a computer, not for a musical instrument. Under software control, the gate and test bits for each voice can be turned on and off. Suppose you gated the envelope generator and then, *before the attack/decay cycle had completed*, you cleared the gate bit. The release portion of the envelope would start early. If you subsequently set the gate bit to 1 before the release had finished, the attack would start again. You could keep attacking and releasing indefinitely, never letting the envelope generator complete a full cycle. This feature allows for the creation of complex envelopes, but the programming involved would be formidable.

The same principle applies to the test bit, only in this case setting the test bit will cause the oscillator output to drop to zero. Complex waveforms can be generated by rapidly toggling this bit.

There are also two analog-to-digital converters on board the SID, otherwise known as the paddle ports. The outputs of these registers can be fed to the other registers, just as we can with the outputs of the third oscillator and the envelope generator. In fact, any varying voltage — such as one from a microphone — can be converted to binary form (digitized), providing that the voltage is in the 0 to +5 volts range. This feature is used by the Covox voice recognition system to record and store real speech into the C-64's memory.

By using these features unique to the SID, even human speech can be synthesized. SAM (Software Automatic Mouth) uses a complex algorithm to generate artificial yet recognizable speech. And the Covox system actually programs the SID to act as a digital-to-analog converter, to reproduce digital recordings of actual sounds. Not many keyboard synthesizers can do all this!

To summarize, the SID comes close to matching the sound quality of keyboard synthesizers. However, its power is limited by the complex programming required to operate it. This has been mitigated somewhat with the introduction of BASIC 7.0 on the C-128, which has an extensive set of SID commands. And there are a few of the many commercial music programs that will take you to the limits of the SID's sonic universe.

Further information about the SID can be found in the *Commodore 64 Programmers Reference Guide*, Chapter 4 and Appendix O. This is available at most bookstores. An excellent introduction to the fundamentals of synthesis and recording can be found in the four-volume set called *The Synthesizer*, published by Roland, which can be obtained in most musical instrument stores. □

Thus far, the SID offers much the same sound generation and control features as a keyboard subtractive synthesizer. You can define pitch, timbre and loudness. The SID has 16-bit frequency resolution, which means that you can sweep the frequency on the oscillator and not detect an abrupt change from one note to the next. And, as we shall see later, the SID can, with the right programming, generate a tremendous variety of timbres.

When it comes to volume control, however, the SID is sharply limited. The only way one can control the individual volumes of the voices is to adjust their sustain levels. Too much of this and the actual timbre of the voice will begin to change, as well. Furthermore, one cannot obtain smooth changes in loudness. These are essential to the proper phrasing of music, which in turn is essential to music's power to move us. The SID's volume can only be changed in 16 increments or steps. There are no in-between volumes. One of the reasons Baroque music sounds good on the SID is because it has simple changes in volume: sixteen bars loud, sixteen bars soft. The SID cannot produce the subtle variations in loudness found in a piano sonata, or a ballad: nor does it have the dynamic range, being able to produce only a 45 db (decibel) difference between the loudest and softest sounds.

In early versions of the C-64, some of the SID chips had defective filters. When the filters were enabled, they produced significant distortion in the sound. I understand that current versions of the SID have corrected this fault. Even so, the behaviour of the filters does vary widely from one C-64 to another, which creates problems in transporting music software between computers. This defect is discussed in an article by Dr. Karel Vander Lugt in the most recent issue of *The Transactor* magazine (volume 6, issue 4).

The envelope generators do have a slight bounce-back problem. When the note dies away on the release portion of the envelope, it drops to 0 volume, then bounces to 1 and stays there until the master volume is dropped to 0 (or until the envelope generator is gated — triggered — again).

The major difference between keyboard synthesizers and the SID is, of course, the means of programming. Keyboard synthesizers are controlled by sliding knobs, flipping switches and pressing keys. The SID is controlled by storing numbers in the appropriate memory locations, or registers. If you want to control the chip directly, you pretty well *have* to know something about programming. And poking a decimal 15 into SID register 54296 somehow doesn't have the same feel as jamming the volume pedal of a Yamaha DX-7 to the floor.

Fortunately, there is a wealth of software available to do the boring work for us. Programming can create an interface to the SID suitable for either someone who knows nothing about music, or a professional composer who knows nothing about computers. There are also piano-style keyboards that will connect to the C-64, providing a more traditional method of inputting pitch information than the typewriter keyboard. None of these keyboards contain synthesizer circuitry; they are merely alternative input devices.

But packages that provide 'complete' control of the SID are rare. Whatever the advertising hype may say, you can't make full use of the SID's features unless you have a good understanding of synthesizer technique. And the people who have that kind of knowledge are much more likely to invest in a dedicated synthesizer. Even those with C-64's are probably more interested in using it to control other synthesizers via MIDI. Therefore, most packages are intended for use by those new to the art of synthesis. Most assume a knowledge of music, and provide only cursory explanations of musical notation.

. . . Poking a decimal 15 into SID register 54296 somehow doesn't have the same feel as jamming the volume pedal of a Yamaha DX-7 to the floor. . .

One very powerful feature seldom implemented is modulation, which is available on all keyboard synthesizers. The SID provides two read-only registers that reflect in binary the output of the third oscillator, and the output of the third envelope generator. For example, if the third oscillator is set to the triangular waveform, the corresponding output register will produce numbers starting from 0, incrementing smoothly up to 255, and then decrementing back down to 0. The whole cycle repeats at the frequency of the oscillator. With programming, you can feed these numbers into the other registers.

If you set the third oscillator to a frequency of 7 Hertz, say, and then direct this output to the frequency control registers of one of the other voices, you will produce a vibrato effect in this other voice. In other words, the pitch would rise and fall seven times a second. The same triangular output could be used to modulate the volume control register to produce a steadily varying loudness, or tremolo. Selecting a different waveform in the modulating oscillator would produce a different effect.

For the simulation of real instruments, the output register of the third envelope generator is crucial. We know we can subtract some of the harmonics in the chosen waveforms with the filters, in order to more closely approximate the harmonic content of the chosen instrument. However, the harmonic content of a real instrument changes even as a note is played. Unless we have some way of changing the cut-off frequency of the filters *as the note is played*, we will have synthesized only the harmonic content of the real instrument's sound as it exists for one brief moment during the playing of the note.

It just so happens that the harmonic content of a note often changes in step with the envelope of the note. When a note is first played on a trumpet, for example, the sound is dominated by the upper harmonics, producing a 'pinched' timbre. As the note is held, the sound 'fattens' as the other harmonics appear. As the note dies away, so do the upper harmonics, and the tone seems to flatten. This can be duplicated on the SID by feeding the output of the third envelope generator into the cut-off frequency control of the low-pass filter. Of course, both the third envelope generator and the envelope generator of the other voice should be gated at the same time. Their respective ADSR settings should be the same, as well. This technique will greatly increase the realism of the sounds.

Don't forget that this ADSR output can be fed into the other control registers, as well. If you feed it into the frequency control registers of another oscillator, you can obtain 'phaser' sounds. You can also use it to modulate the pulse width of the rectangular waveform.

You must remember, though, that the output of these two modulation registers must usually be 'scaled' before it can be used to change the other registers. The 0 to 255 range of these registers is usually too wide to be used, so it must be shrunk to fit the task.

The fun comes in experimenting with different effects and sounds. The use of modulation opens up a wealth of creative possibilities. □

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Cruising The Sea Of 64 Music

by Tim Grantham

In the great deluge of software for the Commodore 64, music programs have formed an ever-swelling river. No other computer has even come close to generating the variety, power and imagination put into the products available. This is in part due to the C-64's deserved reputation as an 'Everyman' computer. It is also a tribute to the power and versatility of the Sound Interface Device (SID) chip within the C-64.

Trying to navigate these swift currents can be a problem. You can get swept away by a product that promises you will become an instant musician. You can sink under the weight of a program so loaded with features you have to have a degree to do anything with it. In this article I will attempt to chart these sometimes treacherous waters, and place markers so that you will have some means of comparing features.

Current music software falls into three broad categories: the first is intended to reach people new to music, music theory and synthesizer technique; the second is intended for those with a basic knowledge of music who wish to use the unique features of a computer to compose or transcribe; and the third is directed to those who have an intimate knowledge of the SID chip and music in general. This last group is the smallest, but the most dedicated. They are largely responsible for the wealth of public domain music available. You can hear some of their work for yourself on disks in the TPUG (C)S series (1 through F).

Naturally, these categories overlap in places. Simply because a program is aimed at the novice does not mean it lacks sophistication or power. Assess your own needs, then choose a package that will let you get started fairly quickly, yet still leave room for growth. Questions you might ask yourself include: Do I know what a time signature is? Do I know what ADSR stands for? Do I want to learn, or do I just want to hear what I'm playing, and share it with friends?

Let's deal first with software; then hardware. Often both come in one package. We will *not* deal with programming aids such as Simons' BASIC or Video BASIC, which both add sound commands to programming languages; nor with the growing number of products that enable the C-64 to act as a MIDI controller for dedicated synthesizers. (See 'What is MIDI?' in this issue).

Particular features to watch out for include the ability to print out your composition in musical notation; to accept input from sources such as an add-on piano keyboard, a joystick or a graphics tablet; to create your own sounds (and save them); and to tap into some of the special features of the SID, such as vibrato and ring modulation. Of course, you should always look for clear, complete documentation.

For paddlers

You can test the musical waters with Commodore's **Music Machine** and **Music Composer** ($14.95). These two inexpensive programs require absolutely no knowledge of music or musical notation. **Music Machine** can produce vibrato, two-voice harmony, and portamento effects. Both programs convert the computer's keys into a piano keyboard.

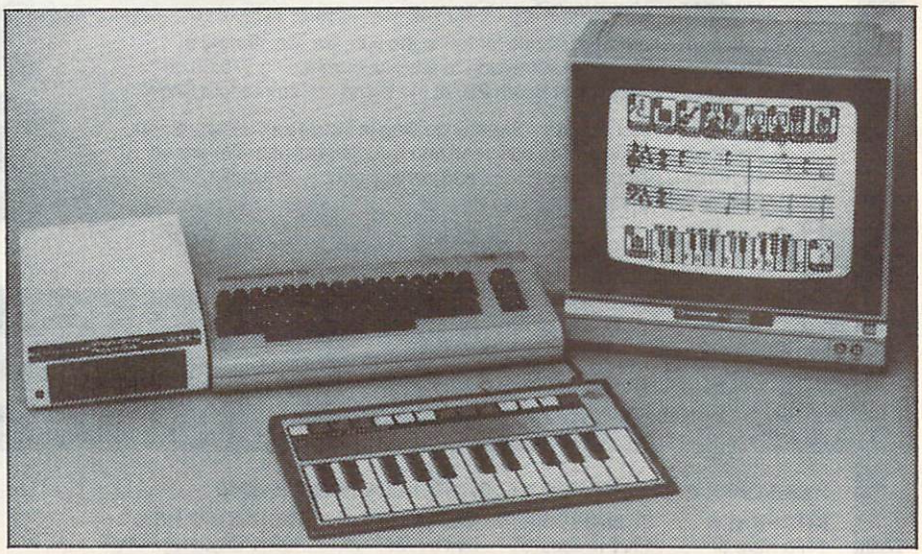
Rhythm Master ($39.95) from Melodian uses a video game to train your sense of timing and rhythm. The documentation includes a comprehensive tutorial on music. You can play along on the Melodian **Concertmaster** piano keyboard (see below), or use the keyboard on the C-64.

Two programs intended specifically for children are **Notable Phantom** ($49.95 US) from Designware, and **Songwriter** ($39.95 US) from Scarborough Systems. The first program teaches children to recognize notes on a staff and play them on the computer's keys. The second uses a graphics display similar to a piano-roll on a player piano, rather than a musical staff. Notes are placed onto the display with a joystick or the keyboard.

You can use a joystick and literally draw your melodies right on the screen, with Passport Design's **MacMusic** ($49.95 US). This program uses Macintosh-style icons and menus, and includes a library of popular tunes you can modify.

If you are starting to feel more confident, it may be time to move on to the music programs developed by Sequential Circuits. This highly-respected synthesizer manufacturer has produced a series of programs, all of which require the MusicMate piano keyboard (see below). **Sound Maker** presents you with a representation of a real synthesizer control panel. By pressing the keys you can 'turn' the knobs and create your own sounds. You can save these to disk.

Song Builder constructs songs from segments created by you when you play the keyboard. As each key is pressed, the corresponding note appears on a staff on the screen. By combining segments, you can build songs of up to 2176 notes. **Song Editor** lets you combine files created with **Song Builder**, and change any note. **Song Printer** will print your songs in full



The ColorTone Keyboard, from Waveform Corporation, features a unique 'Touch Harp' in addition to the regular keyboard.

music notation on a 1525 printer, or equivalent. Each program in the series sells for $39.95.

3001 Sound Odyssey ($42.95) from Sight & Sound uses hi-res graphics to provide a very complete tutorial on the principles of subtractive synthesis. If you are a musically knowledgeable person who would like to know more about synthesizer theory, this is the program for you. This program is one of the few that offer a complete implementation of the SID chip's capabilities.

For sailors

The most popular music software falls into this intermediate category. Most provide some introduction to the basics of music, but their real power is realized once the basics have been learned.

Electronic Arts' **Music Construction Set** ($59.95) lets you use the keyboard, a joystick or a graphics tablet to place notes on a staff. It makes extensive use of icons, and provides complete editing and playback control. You cannot create your own timbres from scratch, although you can make some adjustments to the sounds included.

Activision's **Music Studio** ($39.95) also accepts input from a joystick, tablet or the keyboard, and adds the ability to change the settings on the synthesizer. A unique feature is a 'paintbox' mode that lets a non-musician paint notes onto the staff, and then hear the results. Activision claims their product is compatible with a MIDI interface.

Soon to be released is a MIDI-compatible version of Broderbund's **Music Shop** ($59.95). Current versions feature Macintosh-style pull-down menus and icons. Using a joystick or the keyboard, you pull notes out of the 'Note Box' and place them on the staff. You navigate around the entire composition very quickly, cutting and pasting at will.

Bank Street Music Writer from Mindscape ($69.95) is a 'notation editor' that works like a musical typewriter. As you enter each note on the staff from the keyboard, the note is played. You can edit the score much as you would edit text with a word processor. As in **Music Construction Set**, only limited changes can be made to the built-in timbres.

Studio 64 by Entech ($39.95 US) has a scrolling score. When you play in real-time, the notes appear on the staff. With the addition of **Add Mus'In** ($39.95 US), you can add your compositions to your own BASIC program.

When I'm 64 ($29.95 US) by The Alien Group offers some unique features, including filter sweeping and glissando. It interfaces with their **Voicebox** speech

Continued overleaf...

What is MIDI?

by Tim Grantham

Several years ago, the major manufacturers of synthesizers accomplished something that up to now has eluded the manufacturers of personal computers on this continent — they developed a complete communications standard. Any synthesizer equipped with this Musical Instrument Digital Interface (MIDI) could exchange musical data with any other MIDI synthesizer, and act upon it. You can now buy a Yamaha synthesizer, connect it to your Roland keyboard with two cables, and whatever you play on the Yamaha will be duplicated exactly on the Roland. If you also had a personal computer with MIDI compatibility, you could store the musical data produced by the synthesizers in the computer's memory, edit it, and send it back out again to be played. Each synthesizer could be commanded to play something entirely different from the others.

Dedicated MIDI computers are often called digital recorders, but these should not be confused with the 100 thousand dollar digital tape decks used by recording studios. The latter digitize the actual sound as it is picked up by the microphones, recording it onto magnetic tape. MIDI takes each 'event' produced by playing a synthesizer (such as: a key's pitch; when it is pressed; when it is released; how hard it is pressed), then describes it with a particular 8-bit number. These numbers are sent to the sound generation CPU in the synthesizer, which decodes them to produce the required sound.

This procedure is very similar to the way one sends control characters to a printer to command it to change fonts or pitch, or to underline. In the same way as two different printers can have different device numbers, each MIDI device on the chain can be specified with an address. Although all of the devices receive the data, only the device addressed will act on the information.

One example of a MIDI interface is Passport Designs' unit for the Commodore 64. This looks like a game cartridge with three leads coming out of it, marked 'MIDI in', 'MIDI out' and 'DRUM sync'. It plugs into the expansion port like a game. Cables run from the interface to the 'MIDI in' and 'MIDI out' on the first synthesizer. Additional synthesizers are connected via a cable running from the 'MIDI thru' socket on the first synthesizer to the 'MIDI in' socket on the next synthesizer; and so on, down the line. It's very reminiscent of the way disk drives and printers are connected to the C-64 and, in fact, MIDI is a serial interface, like the serial bus on the C-64. The 'DRUM sync' lead enables the computer to trigger a non-MIDI drum machine at a controllable rate.

The matching software, **MIDI/4**, emulates a 4-track sequencer with editing functions. To enter music into the C-64's memory, all you do is set the track to which you wish to record, and start playing on the master keyboard, which is always the first MIDI device connected to the computer. All the musical information (pitch, key velocity, start of note, end of note, aftertouch, portamento, et cetera) is sent to the computer as you play. Even if you switch to a different pre-set (sound or timbre), this will be duly sent and stored. Once the track is recorded, you can use the editor to overdub, loop tracks, punch in different bars, transpose, alter tempos and, finally, store your work to disk.

When you play back, you can assign each track to a different MIDI device, all synchronized to the drum machine you have connected to the 'DRUM sync' output. You can still play the synthesizers yourself during playback; the computer does not lock out the keyboards. With additional software, you can print out your compositions in complete musical notation on a compatible dot-matrix printer. It's a professional composer's dream! □

synthesizer to provide a musical accompaniment to lyrics sung by the outboard unit.

Most of the public domain music you see on CompuServe and other BBSs has been produced with **Master Composer** ($59.95), a music editor produced by Access. This is because music written with this program is easily transportable. The playing program is saved with the music file and, once it has been loaded into the computer, only a **SYS 30120** is required to start it playing.

The **MusiCalc** series ($119.00, complete with **ColorTone** keyboard) from Waveform is a synthesizer/sequencer combination that adds the unique ability to link two or more C-64s together, and synchronize them to form a computer orchestra. The package provides extensive sequencer files, pre-sets, editing and printing facilities, as well as excellent documentation.

The **Kawasaki Synthesizer** ($42.95) from Sight & Sound is also a synthesizer/sequencer combination. This program and the **Kawasaki Rhythm Rocker** were developed by Ryo Kawasaki, a jazz musician with over a dozen albums to his credit. Sight & Sound have developed a line of eleven software products, all compatible with each other. They all use the keyboard to input the notes, but this is facilitated with the addition of the **Incredible Musical Keyboard**.

The **Kawasaki Rhythm Rocker** ($42.95) lets you lay down electro-pop sounds over a pre-programmed bass line, and combine it with dynamic hi-res abstract graphics. (You can also compose your own bass lines.) **Tune Trivia** ($39.95) is a 'Name That Tune' type of game to which you can add your own songs. **Music Video Kit** ($49.95 US) lets you create your own animated graphics and synchronize them to songs available on the Computer Song Albums. These are variously titled *On Stage*, *Solid Gold*, *Rock Concert*, and *Music Video Hits* ($27.95 each).

For steam-boat captains

The programs in this category might best be described as music programming languages. A trade-off is made, sacrificing the more intuitive approach of the other two categories for greater flexibility and power.

A fine example is Nick Sullivan's **Music Assembler 64** — TPUG's first 'freeware' offering. Here, all the musical requirements are entered in just like a BASIC program. **.FOR** and **.GOSUB** are very similar to their BASIC counterparts, and enable you to loop sections of the music. One unique feature is the ability to subdivide notes into unusual fractions: 13 notes per beat, for example. After the music program has been written, it is assembled into playable object code that can be transported into other programs on an interrupt-driven basis.

The **Music Processor** ($42.95) is a Sight & Sound product that also uses a BASIC-like language to provide very complete control over the SID. It includes a real-time playing mode. It can be used to compose and arrange your own songs for the **Music Video Kit** mentioned previously.

Likewise, **Allegro** ($39.95 US) from Artworx Software uses a language called 'Forte' to harness the power of the SID. The music files compiled from the Forte source can also be used as background music for other programs.

The MusicMate keyboard from Sequential Circuits sells at $99.00. It is compatible with that company's MusicMate software.

Synthy C-64 ($14.95) by King Microware, **Note Pro I**, **Note Pro II** ($57.95 and $34.95 respectively) and **Note Pro Bridge** ($34.95) from Electronic Lab Industries are also music programming languages.

Outboard equipment

All of the keyboards described below come bundled with software of varying degrees of sophistication. Because you can't get this software separately from the keyboard, I'm describing them here, rather than in the previous sections.

The **Incredible Musical Keyboard** ($49.95) from Sight & Sound is an overlay that fits over the keys on the Commodore C-64. Consequently, it's more awkward to use than a full-size keyboard, but certainly easier than trying to play the C-64's typewriter keyboard without it. The software included can take a novice on a tour of the SID, or introduce a musician to computer-controlled music. It also comes with comprehensive demos of the complete line of Sight & Sound software.

The **MusicMate** keyboard ($99.00) from Sequential Circuits plugs into the joystick #1 port on the C-64. The keys cover a 2 1/2 octave range, and can be used for input by all of the Sequential Circuits MusicMate software. A simple song recorder with eight pre-set instruments is included.

The **ColorTone Keyboard** ($69.95) by Waveform is a membrane-style keyboard that also plugs into joystick #1. It has a 25-note chromatic range. A unique feature of this keyboard is the 'Touch Harp', a multi-coloured strip above the keys. You can slide your finger anywhere along this strip to alter the pitch of the note. The accompanying software has an automatic correction feature that locks out wrong notes as you play along with the pre-recorded melodies. The keyboard can also be used with **MusiCalc 1**.

The **Music Port** ($149.95 US) keyboard by Tech Sketch is a 32-key unit that plugs into the user port of the C-64. The accompanying software is very powerful, with complete editing and scoring capabilities, as well as the ability to use modulation when creating your own timbres and sound effects. All the options can be selected directly from the **Music Port** keyboard.

The Melodian keyboard ($199.95) is a 40-key unit that comes complete with the **ConcertMaster** composing and synthesizer software. The program features a scrolling score and pre-set voices that you can alter. The keyboard has two plugs, one connecting to the user port and the other going into joystick #2. The **ConcertMaster** software can be used without the Melodian keyboard.

Passport Designs' **Soundchaser C-64 Keyboard** ($199.00) is the largest keyboard currently available, with 49 keys. It comes with composing and synthesizer software included.

Finally, there is the Covox **Voice Master** ($139.95). I include this product because of its unique 'Voice Harp' feature. The unit consists of a microphone and headphone combination that connects to the joystick #1 port. The accompanying **Composer** program lets you hum a song into the microphone, and transcribes what you hum into musical notation. You can compose without having any knowledge of music.

Once you've dipped a toe into the sea of music products available, we hope you'll have a whale of a time. □

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*****Dealer Inquiries Invited*****

Commodore 128: New Things

by Jim Butterfield

The new Commodore 128 has a side that is virtually identical to the earlier Commodore 64, and a second side that is expanded with new features. BASIC is generally upward-compatible in the new side, dubbed 'C-128' mode. The machine's new interfaces increase its overall usefulness, of course. An area that was of particular interest to me was its compatibility on the machine language level, and that's what I'll talk about here.

I have a book in print — *Machine Language for the Commodore 64 and other Commodore Computers* — that tries to cover the whole Commodore product range. Most of the exercises will run on almost any Commodore computer — PET, CBM, VIC 20, Commodore 64, Plus/4 or Commodore 16. My objective here was to teach transportable programming skills, so that a reader could move, say, from VIC to 64 without needing to scrap much of what had been learned.

This generality led to some limitations. I couldn't deal with graphics or sound in any detail, since each machine has quite different mechanisms for achieving these effects. And I had to use care in choosing the area of memory that would be used to stage student exercises: addresses from 828 decimal and up were free on all machines.

The B-128 created special problems. The existence of a memory banking structure, the curious bank-selection mechanisms, the completely different memory maps, the non-extensible machine language monitor, and the need for special 'transfer sequences' — all of these took the B-128 out of the mainstream of Commodore machines. Spending too much time on special considerations for this 'orphan' machine would clutter the book, yet I didn't want to leave it completely out. The B-128 ended up largely as supplementary material in the appendices, with extra material on the disk-that-can-be-bought-with-the-book. And there was a mild suggestion that a beginner would find the B-128 a more difficult machine with which to learn.

Now comes the Commodore 128. Will it be a mainstream machine, so that the book immediately applies to it? Or will it be another offbeat machine like the B-128?

The answer is: a little of both. There will need to be a revision of the book — it should be ready in early 1986 — to accommodate changes that are largely trivial but might confuse a beginner.

It would be easy to 'cop out' and suggest that exercises should be done on the C-64 side: these will certainly run without problems. But, heck, the C-128 side is too good. It's got a dandy built-in machine language monitor, and lots more 'playing around' room in memory. It has some limitations, too; for example, it's hard to put programs in high memory.

Let's talk about the major difference areas.

The monitor

The built-in monitor is good stuff. Say **MONITOR** and you'll be there. Most of the new features are convenient for beginners. Want to know what the decimal value of hex C3B is? Just type **$C3B** and press **RETURN**. Or, to change 1000 decimal to hex (or binary, for that matter) just type **+1000**. Sure, old hands know how to do the conversion on a calculator, but it's nice to have it right there. For that matter, you can use odd number systems such as decimal or binary at any time, in any command. If you're doing an assembly and want to load the X register with a value of 40 decimal, all you need to type is **A 0B00 LDX +40**. No need to remember that 40 is hex 28; it will change in front of your eyes.

Ranges for memory displays and disassemblies can be given in three ways: with two addresses, to display between two locations; with one address, to display a number of bytes starting at any location; or with no address, to continue from a previously displayed address. No scrolling, but you'll find that typing a single character and **RETURN** is easy going. Oh, and memory displays also show the values as ASCII characters.

The new monitor is convenient, so much so that I've written a parallel one for the Commodore 64. It's in the TPUG library as **Supermon+64**, and there's also a version for VIC 20. My biggest objective, again, is compatibility. Users switching between C-64 and C-128 sides shouldn't need to remember which formats are needed by which monitor.

The work area

The common work area in earlier computers — from $033C to about $03F0 — is not available for C-128 mode. In fact, it's a sensitive area and you'll crash if you use it. (Sigh). It's easy to grump about this, but the area below $0400 (decimal 1024) is at a premium because it's the only part of memory that is never bank switched.

Put your practice programs in the new cassette buffer area ($0B00 to $0BFF).

When you're ready to attach your machine language programs behind your BASIC program (this comes up around Chapter Six), you'll find there are less pitfalls since variables are not stored behind BASIC any more (they're in a different

bank). There is a new pointer called End-of-Basic at addresses $1210/$1211, and you'll need to adjust that one. After that, BASIC and ML programs will save and load as a single unit.

Don't try to put a machine language program anywhere above $4000 (+16384) unless you're quite familiar with the architecture. And before giving a **SYS** to your machine language program, it's wise to command **BANK 15**.

Variables

Chapter Six suggests that it's often convenient to get the value of a BASIC variable by reading it directly from its location in memory. This turns out to be a new challenge on the C-128, since the variables are in a different memory bank from the program you are writing.

There's too much detail to give here, but here's the core of it. Read memory in another bank by the following sequence: Set up an indirect address somewhere in zero page, pointing at the address you want to read, with Y containing the appropriate offset; load the *address* of this indirect address into the A register; load the bank number into the X register; and call **JSR $FF74**. Upon return, A will contain the value. Store to another bank as follows: Set up an indirect address somewhere in zero page, pointing at the address to which you want to write, with Y containing the appropriate offset; put the *address* of this indirect address in location $02B9; load the bank number into the X register; and call **JSR $FF77**. Upon return, the contents of A will have been stored to the appropriate location.

Whew! That's quite a job, and I gave some thought to dropping the corresponding exercise from Chapter Six rather than calling for the reader to sweat through it. It finally went in — as part of an appendix — the material is too useful to leave out.

Other

Don't let me scare you. Most of the things that you know from machine language on other machines still apply. You **GET** with $FFE4, you **OUTPUT** with $FFD2, and you'll find yourself in a familiar environment. BASIC starts at quite a high location — $1C01 or decimal 7169 — but there's lots of memory available, so there shouldn't be any problem.

The 80-column screen is mapped quite differently to memory, but that shouldn't worry the average ML user — $FFD2 sends to it if it has been selected. There are special characters that you can print to do things like screen windowing or scrolling — these work just as well in machine language as in BASIC.

It's a nice machine, and a new challenge. You'll enjoy it. □

Wireless Computing: Part II

by A. Vic Forde

Last month's article explained how amateur radio operators communicate with one another, and how they can also use their radios and the computer to communicate in a special way. Not only are they able to transmit and receive information among themselves, but they are also able to copy teletype transmission from the major news services of the world. This latter aspect is also available to you and your computer if you can obtain a good general coverage (short wave) receiver and purchase a special modem.

The two modes of reception that would be of the most interest to you are Morse Code (CW) transmission and teletype (RTTY). Teletype is the method by which the newspapers receive news from the so-called 'wire services'. The news story is automatically printed by means of a typewriter onto continuous or fanfold paper. It can also be printed directly to a screen monitor.

As mentioned, to receive these, you will need a good general-coverage receiver and an interface modem attached to your present computer system (remember, this is *not* the same type of modem as your BBS modem). The radio receiver component must also include an antenna system, although (as will be seen a little later) this need not be too sophisticated if it is only being used for reception.

The radio must be capable of covering the radio spectrum from 1.800 to 30 Megahertz (MHz). This range of radio frequencies does not need to be continuous on the radio's dial, but can be broken up into a number of sections called 'bands'. Most of us are familiar with AM and FM: however, there are three other types of transmissions in communications, and these are called CW, USB (upper side band), and LSB (lower side band). It is necessary to use a radio that has all three of these communication modes available, if you want to copy CW and RTTY.

Another important quality that a good receiver must have is the ability to discriminate between two stations transmitting on adjacent frequencies. There are a number of good receivers available, for a minimum price of about 150 to 250 dollars. The price range for a good general-coverage receiver can be as high as several thousand dollars.

Although the higher cost radios are more sophisticated, the cheaper radios will work well receiving either CW or RTTY. Higher-priced radios will not necessarily provide you with a stronger signal. The secret of receiving a strong signal is having a good antenna system, along with an excellent grounding system.

The antenna itself can be a simple long wire about 100 feet long (or longer). It should be as high above ground as possible. A desirable height would be about 40 to 50 feet. However, many long wire antennae receive signals reasonably well at heights as low as 20 feet. The antenna wire does not have to be strung in a straight line, nor does it have to be perfectly horizontal with the ground. It can be insulated, or just a bare wire.

The antenna really consists of two parts: the elevated long wire, and a good grounding system. The ground for the antenna is more important when you are connecting the computer to the radio, so that the computer and the radio will be at the same ground potential. The best type of grounding is an 8 or 10 foot metal bar driven into soil that is always somewhat damp. In many cases, water pipes in the home provide a reasonably good grounding system.

Now we come to the little 'black box' that magically translates the CW or RTTY into meaningful letters and numbers on the screen — the interface modem. Audio sounds from the receiver are translated into a digital form that makes sense to computers.

Interface modems are available for most popular computers. These modems are often advertised in radio magazines such as *QST Magazine*, *73 Magazine* and *CQ Magazine*. They are made to be compatible with specific computers, although some of the more expensive ones used for both receiving and transmitting are adaptable to several different computers.

Interfaces that receive only are much cheaper than the transmit-receive type. For instance, the MFJ-1224 transmit-receive modem lists at $99.95 US, whereas the MFJ-1225, which allows you to receive RTTY and CW, but not transmit, costs $69.95 US. Both of these can be obtained from: MFJ Enterprises Inc., Box 494, Mississippi State, Mississippi 39762. The Kantronics Company have several interfaces. Two of them are actually called The Interface and Interface-2. These units cost about 275 dollars for the transmit-receive type. I don't know the price of the receive-only type — it is probably about 125 dollars US. Their address is: Kantronics, 1202 E. 23rd Street, Lawrence, Kansas 66044. Kantronics also has one of the better software programs — **Hamtext** — which comes on disk and cartridge. Another company that sells interfaces is: HAL Communications Corp., Box 365, Urbana, Illinois 61801.

As with any modem interface, you will also require accompanying software so that the computer can translate them into letters and numbers, and print on your monitor screen or printer. The programs can be purchased from the company supplying the modem. They are very sophisticated programs that provide you with a number of options. I will not go into the details of making the connection between the radio and the computer, because the interface comes with the necessary connections and cable. You should not have any trouble following the instructions.

Frequency (MHz)	Wire Service
6.87	TASS (Moscow)
6.984	Associated Press (London)
10.649	Associated Press (London)
10.959	Reuters (London)
12.085	TASS (Moscow)
13.62	USA National Weather Service
13.51	METOC (Canadian Maritime Weather)
13.89	ADN (East Germany)
14.900	TASS (Moscow)
14.974	Associated Press (London)

Once you have the equipment connected and turned on, turn the dial of the radio until you either hear the CW (morse code) or the RTTY (teletype). To copy the CW to the screen or printer, you simply adjust the radio signal until you see print appear on the screen. The same applies to the RTTY signal. It should be pointed out that the CW and RTTY are each quite distinctive. The CW is a series of short and long 1000 cycle notes, whereas the RTTY signal is two distinct tones of about the same length.

The list in the box on the page opposite is just a small sample of the frequencies and the services transmitting on a regular basis. Remember, there is a time difference between countries, so you will have to pick a time of day to listen when the stations are transmitting. Furthermore, radio propagation is dependent on the number of sunspots on the sun, so there will be a variation from day to day and season to season in the type of reception you will be able to obtain.

This is just a short list of wire service stations available. In the future, if enough interest is shown by TPUG members, a larger, more comprehensive list could be made available. □

The Wright Alignment

by George K. Culbertson

I read with interest Ian Wright's '1541 Problems and How to Solve Them' in the January 1985 edition of *TPUG Magazine*. My problem was that some program disk copies made on a 4040 disk drive produced some errors when loaded from my 4040. At first, I worried that my 5-year-old 2040 drive, which had long ago been upgraded to 4040 format, might be out of alignment.

Then I came across Mr. Wright's article. I rearranged it slightly to accommodate the two drives in my 4040 *(see listing)*.

At first, I would regularly get '29 DISK ID MISMATCH'. Then I discovered that if I catalogued a disk, there would then be no errors when the **Disk Track Test** program was run. It appears that it is necessary to initialize the drive each time a new disk is inserted (although for normal loading and saving the DOS 2 in the 4040 takes care of this). Fortunately, I made this discovery before spending $150 for the CBM 4040 Disk Service Manual and the two alignment disks!

Since the DEMO/TEST disk that came with my 2040 is in a different format than the 4040, when I try to test it I get '22 READ ERROR'. So, for my test disk I have to use a TPUG library disk. I hope that they are recorded with a carefully aligned 4040! *(The alignment of TPUG's disk drives is checked regularly, but should not be used as a standard if something specifically designed for the task is available. -Ed.)* □

```
10 rem***disk tracking test***
12 rem modified for 4040 disk drive by george c
   ulbertson, spanish fork, utah
14 rem from article '1541 problems and how to s
   olve them' by ian a. wright
16 rem in tpug magazine, jan 1985, pages 8-9
20 print"(clr)load this program, and then inser
   t into the drive selected, the";
30 print" commodore 4040 test demo disk.
40 print"(we assume that the tracking is correc
   t on this disk!)
50 print:input"enter drive # to be tested";d:
   open15,8,15:rem open error channel
60 ifd=1then80
70 print#15,"i0":goto100:rem init drive 0
80 print#15,"i1":rem or drive 1
100 open8,8,8,"#":rem open random file channel
120 lt$=str$(lt):rem set string value
130 print#15,"u1:";8;d;lt;0:rem block-read a 25
    6 byte block
140 t$=lt$:gosub500:rem check status
150 print#15,"u1:";8;d;ft;0:rem read track 1
160 t$=ft$:gosub500:rem check status
170 lt=lt-1:iflt>1then120:rem decr last track
180 close8:close15:end:rem close files and quit
500 print"reading track: ";t$:rem screen prompt
    (space)of track being read
510 input#15,nu,me$,tr,se:rem get error msgs
520 printtab(12)nu;me$;tr;se:rem print errors
530 ifnu<2thenreturn:rem status ok?-yes-go on
540 print:print"drive failure!!":close8:close15
    :rem oops ... that's a boo boo
```

The C1 Protocol: Part Two

by Steve Punter

Varying block size

The reason that block size was included in the header was originally to allow only the last block to vary in size (one can never guarantee that the amount of data to be sent will divide nicely into a preset block size). It quickly dawned on me that 'C1' was set up in such a way that *any* block size could be used for *any* block in the transmission.

Varying block size has its advantages. Under reasonably clean line conditions, large blocks transmit the most data with the least handshaking (which is mildly time consuming). Smaller blocks are superior under bad noise conditions, since smaller blocks run a higher chance of making it through the noise unscathed. Should the block still fail to make it, less time is required to repeat a smaller block.

My current implementation of 'C1' allows the user to pick a fixed block size between 40 and 255 bytes, but in other implementations, there is no reason why block size couldn't be varied *during* transmission to adapt to *changing* line conditions.

One final thing concerning block structure: how would one presume to know the size of the *first* block, if that is revealed only in the block that came before it (quite a paradox)? 'C1' requires that the first block contain *only* a header, which would make that block 7 bytes long. This header would do little more than supply the receiving computer with the size of the first *real* block. Accuracy of this first 'dummy' block is guaranteed, since it must still pass the checksum tests. You must make the block number for this dummy block '0'.

Now that you understand block structure, handshaking methods and code word vocabulary, it comes time to find out how this all comes together.

Communication syntax

Most procotols have very simple handshaking between blocks, which is easy to trip up, given sufficiently noisy conditions. Usually, the transmitting computer sends the block, then waits for a response from the receiving computer: either 'good' or 'bad'. The transmitting computer then proceeds to send the next block (if 'good') or resend the last block (if 'bad'). This system falls apart the moment the transmitting computer receives a false indication of 'good' or 'bad', and goes on to transmit the wrong block. Should things get out of sync, and the transmitting computer send the next block when it should have sent the last one again, XMODEM attempts to make corrections by use of the block number encoded within each block.

'C1' does nothing so crude; its very communication syntax guarantees that neither computer will get out of phase. Whereas XMODEM uses a single statement monologue between each block, 'C1' uses a multiple-part dialogue. This makes 'C1' about three per cent slower than XMODEM, but this small trade-off in speed for accuracy will be well worth it, the first time you run into trouble with XMODEM.

XMODEM communications would look something like this:

Transmitter: Transmits block
Receiver: 'Good'
Transmitter: Transmits next block
Receiver: 'Bad'
Transmitter: Transmits same block again

In 'C1', the transmission would look something like this:

Transmitter: Transmits block
Receiver: 'Good'
Transmitter: Good block acknowledged
Receiver: Send next block for me
Transmitter: Transmits next block
Receiver: 'Bad'
Transmitter: Bad block acknowledged
Receiver: Send that block again
Transmitter: Transmits same block again

In this type of transmission dialogue, neither computer can get out of sync. Should either computer receive the opposite response to that it expects, it will go back to give the correct code word for the response it *did* receive, thus regaining proper synchronization. Couple this with the 'Statement and Listen Loops', and you can readily see that communication is unlikely to break down.

The syntax

Here is a more formal version of the 'C1' dialogue given above. For a *good* block, it goes like this:

Transmitter: (Block)
Receiver: GOO
Transmitter: ACK
Receiver: S/B
Transmitter: (Next block)

The dialogue for a *bad* block is identical except for the receiving computer's first response:

Transmitter: (Block)
Receiver: BAD
Transmitter: ACK
Receiver: S/B
Transmitter: (Next block)

Immediately after receiving the block, the receiving computer recalculates the checksum to determine the validity of the data. In the meantime, the transmitting computer starts to wait for a 'GOO' or 'BAD' signal. Since it can 'say' nothing until it receives one of these codes, it merely waits. That may sound suspiciously like a good place to 'hang up' the protocol, but the receiving end is eventually going to finish receiving the block, either because it timed out waiting, or it finished collecting the correct number of bytes from the transmitting computer.

At that time, the receiving computer sends the appropriate code word ('GOO' or 'BAD') and begins to wait for an acknowledgement ('ACK'). If it doesn't receive the 'ACK' in about one half-second, it sends the 'GOO' or 'BAD' code word once again. Meanwhile, the transmitting computer has been patiently awaiting the reception of the 'GOO' or 'BAD' code. On receiving one of these codes, it transmits an 'ACK' and starts to wait for a 'send block' signal ('S/B'). If it doesn't get the 'S/B' within about one half-second, it sends 'ACK' again.

The receiving computer waits for this 'ACK' signal. When it receives the signal, it sends the 'S/B' signal and begins to wait for the block. Should it receive an 'ACK' while waiting for the block, or receive nothing at all for approximately five seconds, it assumes that the transmitting computer hasn't heard the 'S/B' and transmits it again. In the meantime, the transmitting computer is waiting for the 'S/B' and, upon reception, starts sending the block. The process has now started all over again.

A quick analysis of this system will reveal that it's darned near impossible to get any type of noise that could possibly

mimic the code sequences required. Also, no noise could stop the eventual completion of the above sequence, since each computer is always 'sending and waiting'. If two people keep repeating their sentences over and over, while continuing to listen to the other person, even a noisy room couldn't stop them from hearing one another eventually.

Of course, some line noise is just so horrendous that even this method of communication could fail. Then again, this type of noise would make it almost impossible for the user to be online in the first place, so it can be considered an unlikely event.

Should one of the computers go offline for any reason, however, we wouldn't want the other computer to keep looping and looping until it died of old age. Although I haven't built such protection into the terminal program I distribute in the public domain, my BBS program does have abortion code. Should the protocol on the BBS have to go through the 'Statement and Listen Loop' more than twelve times in row (which is highly unlikely, if the other computer is still online), it will abort the transfer. Similar code could be used in your implementation.

The 'End-Off' situation

When the final block is transmitted, the high order part of the block number should be made HEX FF (255 decimal). This will inform the receiving computer that this is the last block of data, and to expect no more. The question now arises: how can both computers be one hundred per cent sure that the other is fully aware of the file completion? A fair question, but not one with a simple answer.

When the transmitting computer receives the 'GOO' for the last block, it can be fairly certain that the receiving computer has received the final block, but it must inform the receiving computer that it knows this. It does so by sending an 'ACK', but cannot be sure the receiving computer has received the 'ACK' unless it gets the 'S/B' signal back. Now the transmitting computer must acknowledge the reception of the 'S/B', but under the normal communications syntax, it would now have to send a block.

This is where the 'End-Off' syntax comes into play. After receiving the 'S/B', the transmitting computer sends back a 'SYN' signal. In response to that, the receiving computer sends its own 'S/B' signal, then waits for the final 'S/B' from the transmitting computer. Since it will not be responding to this code, it simply goes into a wait cycle for approximately five seconds. If it does get the 'S/B' within that five seconds, it ends immediately, but otherwise doesn't really care if it receives the code or not since, at this stage, there is a one hundred per cent assurance of both computers knowing things are okay.

The transmitting computer need only send three copies of the 'S/B' code at this point since, as stated above, there is full assurance that both computers are finished. Note that the code words chosen for the End-Off situation are not necessarily related to their apparent function.

Transferring file type

When transferring files from one computer to another, it is often necessary also to transfer the file type, but this must be known *before* the file is opened and, therefore, before the protocol begins. 'C1' does not impose any strict rules on what sort of information you transfer about the files (if any), but when writing a terminal program to communicate with one of my bulletin boards, the following should be done:

Using a full implementation of the 'C1' procotol (first dummy block, data block and End-Off), transmit a single byte of data corresponding to the following file types:

1 Program file
2 SEQ file
3 WordPro file

Transmitting this single piece of data would require that *two* blocks be sent; the initial dummy block to set up the size of the first data block (of which there will be only one, size 8); and the data block itself, consisting of 7 header bytes and the single file type byte.

For other applications, one could conceivably transfer much more information, including file name, file type, computer type, et cetera. It could even be possible to transfer multiple files, specifying the number and name of each file in this first transmission. Alternatively, no one said you *have* to use this first separate transmission; if no information other the file needs to be transmitted, you just send the file, and nothing more.

Public domain source code

Also available in the public domain is a copy of the Source Code used to assemble **TERM.C1 V2**, the machine language portion of my public domain 'C1' terminal program for the C-64. You may use it simply to study my method of coding 'C1', or you may use it *directly* in any projects of your own. It is quite well-documented and, coupled with this article, should give you a fairly complete overview of the 'C1' protocol. □

C-64 TOP TWENTY

Last year TPUG Magazine ran a C-64 chess championship at the World of Commodore show. This year, we're planning on a battle of the bands. If you have a really good C-64 music file (public domain only) that you think deserves a place on the C-64 TOP 20, give our office a call (445-9865) before December 5, or come around to our booth on December 5, the first day of the show, and we'll try to include it in the contest.

Only stand-alone music files are eligible — something we can load and run without additional software. They should also be reasonably short — no more than four minutes, say. Graphics displays accompanying the music will *not* be considered in the judging — only the music counts. The judges of the contest will be the people who come by our booth at the WOC III show. We'll play off the music files against each other in pairs, and ask bystanders to choose between them. The results will be tabulated and released in the January magazine, and we'll also make available a disk containing the winning entries.

We have some entries already. If the volume of entries is too great, we may have to stop accepting new ones at some point, so get yours in now. This is an informal contest, with no prizes, except the glory if you programmed the music.

See you at the show.

WOC III Exhibitors

by Liz Murray

In addition to the Commodore booth with C-128s, PC10s, PC20s and the Amiga available to visitors for hands-on trial, this year the World of Commodore has attracted over 60 exhibitors from Canada, the US and Great Britain. Such Commodore-authorized dealers as Computer Odyssey, Desktop Computer, Electronics 2001, Norland Agencies, Micropace Computers, Phase 4 distributors and Share Data International will bring an incredibly wide array of the latest in software and peripherals.

The following is a brief outline of some of the manufacturers represented at the four-day show, and some of the products that will be featured at their booths. Because of our deadline for the November issue, we are unable to include those that registered after mid-October.

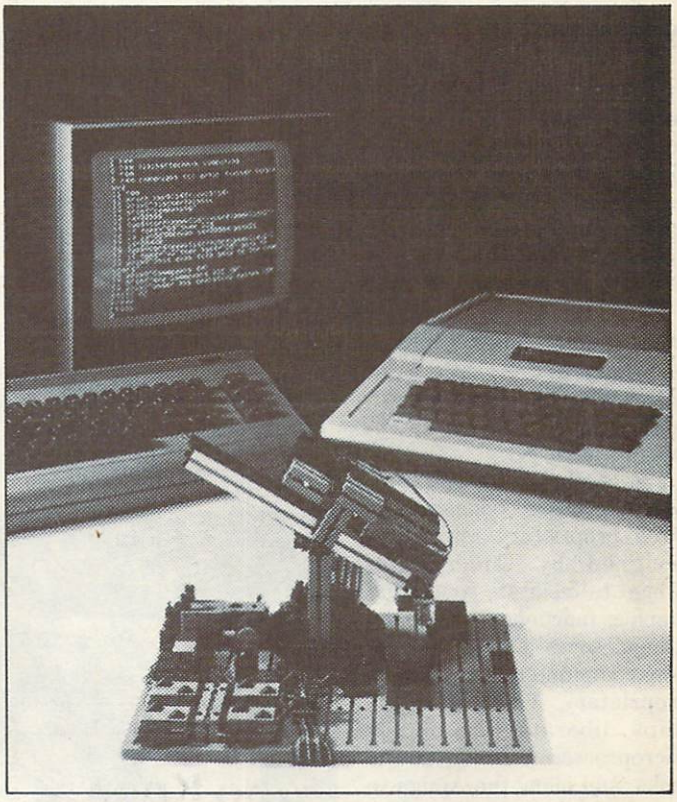
Timeworks, of Deerfield, Illinois, which distributes software in Canada through Multi Micro in Quebec and Aviva Software in Ontario, will have such new products as **Sylvia Porter's Personal Financial Planner**, **Swiftcalc with Sideways**, **Sideways**, **Word Writer 128**, **Data Manager 128** and **Swiftcalc 128**.

Digital Solutions of Willowdale makes "serious software that's simple to use", and to prove it they will have their **Paperback** line well displayed. Frank Winter, a name and face that might be well known to some of you as the former Education Manager for Commodore Canada, will be at the Digital Solutions booth.

Computer Specialties, a major manufacturer of microcomputer peripherals and specialty products, will be up from Florida with products designed especially for Commodore IEEE computers, the C-64 and the C-128.

Microphys Programs, whose products are employed in the educational environment in the US, has redesigned their programs for those who wish to improve their academic skills by working with their personal computers at home. They have developed over 40 sets of programs for home use, and they'll be selling them at WOC III.

The 'Space Pen', from Soniture Inc., is a two-dimensional or three-dimensional input device for the Commodore 64 and other computers. In its 2-D mode, it is compatible with existing joystick and touch tablet software.



The 'Robotics Automat Kit' from Fischertechnik includes an interface, an industry standard Robotic Control Language based on Superforth, and parts for ten intelligent robotic configurations. It is available for the Commodore 64 and other computers.

WATCOM Products from Waterloo will be on hand with many of their textbooks and programs. Such well-known micro software as the WATCOM Interpreters, **WATFILE** and **WATCOM GML** will be featured.

Soniture Inc. will feature their 'Space Pen', shown in the photograph below. In the 2-D position, it is designed to act like a touch tablet, and will operate with existing software. As a 3-D input device, the receiver frame can detect in all three dimensions the coordinates of the transmitter in a six foot field in front of the computer or frame.

Info Designs has completed its transition from a Commodore-only software developer to a multiproduct software publisher and marketer. They have products in both the low-end and high-end market place and will be at WOC III with their well-known home and business programs for personal computers.

EMJ Data Systems will be there with a wide array of TECMAR hardware and software, including their powerful new peripherals for the Amiga.

Grolier/Mindflight, developers and distributors of educational software products for the Canadian school market, will be there with their self-teaching productivity tools for preschoolers, for elementary and secondary school students, and for beginning adult users. Grolier has been publishing high-quality learning materials for 90 years, and remains a leader as it develops software that integrates books and encyclopedia with computers.□

The Amiga at WOC III

by Liz Murray

In 'Adventure Games: Text versus Graphics', in our June/July issue, Peter Archer pointed out that the problem with high-quality graphics is that they consume large amounts of memory. Peter explains that this situation will eventually change, and that the next generation of personal computers will have much more memory than today's machines.

Well, the next generation is already here, and is brought to you by Commodore... with the introduction of the Amiga.

The Amiga has already received plenty of attention, amongst users and in the press, and it is sure to be among the biggest attractions at this year's World of Commodore show. For those of you who are wondering what all the fuss is about, here's a quick look at the latest and most astounding product in Commodore history.

The Amiga is based on the versatile Motorola 68000 microprocessor, bolstered by three proprietary microchips designed by Commodore-Amiga to facilitate sound and graphics functions. In graphics, Amiga soars above conventional computers because its proprietary VLSI graphics chips liberate the 68000 microprocessor from routine tasks, and allow the Amiga to perform sophisticated graphics functions. It has the largest standard colour palette available on a microcomputer to date, with more than 4,000 colours. Commodore has engineered into the Amiga the following colour modes: 320 by 200, 32 colours; 320 by 400, 32 colours; 640 by 400, 16 colours; and a 'hold and modify' mode that allows 4,096 colours on screen simultaneously.

Genuine hi-res 'real live scenes' are now possible with the Amiga through the combination of videodisk and personal computer. The Amiga has three video ports. Port one allows for analog RGB output. This port also supports an optional genlock unit for synchronizing the Amiga with an external video device such as a laser disk, video camera or video tape player. A second video port outputs standard NTSC signals for TV via an RF modulator. Video port 3 is an NTSC composite video output.

Amiga is also the leader in professional quality audio capabilities, including a built-in music synthesizer. This capability includes four low-noise digital voices, each with independently programmable volume, level and sampling rates, which can be configured to provide stereo output. These sound features are also employed to provide text-to-speech voice synthesis, with unlimited vocabulary, and user-defined parameters for male and female voices.

Certainly this combination of graphics and sound capabilities gives the user a creative edge, and shows that Commodore is addressing needs in the advertising world, as well as in design, architecture and music. But the Amiga also addresses the needs of other professionals and the business user. Again the versatility and the power of the Motorola 68000 microprocessor gives the Amiga a muscular multitasking operating system. The Amiga offers 256K bytes of RAM, user expandable via a plug-in cartridge to 512K bytes, and is further externally expandable up to 8 megabytes. With the inexpensive software option **PC Transformer**, the machine can run popular MS-DOS business and professional programs such as **Lotus 1-2-3**.

Ease-of-use is a critical ingredient in the success of a personal computer, and here again the Amiga delivers. It makes it easy for the user to communicate with the computer using icons, windows, menus and a mouse. More significantly, because Amiga's three custom chips free the microprocessor of audio and sound functions, all the power of the 68000 is available to programmers so that they can build layer upon layer of commands and utility into the application programs themselves.

Most importantly, Amiga offers the additional feature of affordability. With its 16/32 bit 68000 main processor and three special-purpose chips, the A1000 personal computer — as it is officially known — delivers an unprecedentedly cost-effective combination of computer power and graphics capability via a multitasking operating system and a high-speed windowing user interface. Suggested list price is $2,000.

The Amiga A1080 features 80 column by 25 row text display, built-in speaker, audio amplifier and miniature jack socket for headphone use, an analog RGB input allowing the display of up to 4,096 colours, and compatibility with video cassette recorders and television tuners. Suggested list price is $800.

The A1050 is a 256K byte memory expansion cartridge that allows you to double the memory to 512K bytes in seconds, and is easily installed behind a panel on the front of the Amiga.

The A1010 3.5 is an additional external drive that increases data storage to 880K. It records data using the same format as the internal drive, creating a powerful interactive feature. Up to three additional drives can be added to the Amiga system for total storage capacity of 3.52 megabytes. Suggested list price is $450.□

Commodore in 1985

by Liz Murray

Commodore Business Machines Limited is a company in transition. New top management at Commodore International, guiding the corporation worldwide, is allowing all national subsidiaries, including Commodore Canada, to expand in new directions.

This means that Commodore Canada, while maintaining its traditional strengths, is aggressively pushing into new business markets for the first time.

Commodore has been investing significant revenue, effort and energy in developing new products. In so doing, it has looked to consumers for directions — at their routine challenges in everyday work, study and home life. The goal was to develop a product that addressed the problems that consumers are currently confronting.

Rather than talking about technology and power, Commodore is addressing the needs of users and the results they can achieve: ways they can facilitate and improve job performance, master a course of study, and explore their own crèativity as writers, businesspeople, artists, musicians and designers.

In its extensive research and development work, Commodore has been greatly aided by its unique philosophy of vertical integration, which allows a company to control its entire operating processes, enabling it quickly to adapt to changing market demands, and to provide more consistent quality control. Product design is based on cost-effective, high volume production that enables it to spread new technologies to an optimum user market.

Product design is also based on another philosophy: that people aren't looking for a computer — they are simply looking for a tool that helps them do a better job. By offering the latest in state-of-the-art technology at a competitive price, 20th century technology is brought within reach of virtually all consumers.

In fact, Commodore is the only major manufacturer to introduce any significant new hardware systems this year. In the past year, for example, Commodore has invested more than 40 million dollars in technology and human resources to make the Amiga possible. Because the company is determined to lead the market as the innovator of such new machines, it has doubled its engineering staff and has made significant investments in the areas of computer-aided design tools and automated test equipment. This year, it will double its investment in marketing and sales programs to ensure the message reaches the consumer.

Today, Commodore offers the widest available range of microcomputer products, from entry-level computers to sophisticated 32-bit business systems. Commodore is well-known for the C-64, for instance, and is becoming increasingly recognized for its growing range of business computers — the Commodore 128 and MS-DOS compatible PC10/PC20 and the Amiga; plus a variety of software. □

WOC III Seminars

The seminars to be held at The World of Commodore III show are listed here as completely as was possible at press time. All the seminars will be held in the French Room at the International Centre. Use Entrance C.

Thursday, December 5

2:00 p.m. Machine Language for the C-128: Jim Butterfield will discuss machine language for the C-128 at the beginner level, and then open the floor to your questions.

5:00 p.m. Graphics by Amiga: There's never been a personal computer with graphics like this. Computer graphics artists from the Sheridan Computer Graphics Laboratory will show you some of the fantastic images the Amiga's advanced hardware makes possible.

7:00 p.m. The Sound of Amiga: Amiga comes with four channels of stereo sound and a bass response and octave range that exceed many stereo speakers. Wes Wraggett, head of the Electronic Music Department at the Royal Conservatory, will demonstrate the sounds of Amiga in jazz, classical and rock.

Friday, December 6

11:00 a.m. Here Comes Halley's Comet: Author and broadcaster David Onley will lead a seminar into outer space.

1:00 p.m. Capabilities of the PC 10/20: Details to be announced.

2:30 p.m. The 'Paperback' Series for the Commodore 64: the Writer, the Planner and the Filer for home and school. Inexpensive, sophisticated and easy to use — see how these fourth generation programs can be the answer to your needs. David Foster and Frank Winter will lead the seminar.

4:00 p.m. Graphics by Amiga: see schedule for Thursday.

7:00 p.m. The Sound of Amiga: see schedule for Thursday.

Saturday, December 7

11:30 a.m. Graphics by Amiga: see schedule for Thursday.

2:00 p.m. User Groups: A panel discussion featuring members of the TPUG Board of Directors and other user group representatives, and chaired by TPUG President Chris Bennett, will address such questions as: What is a user group? How can it help you, the user? How do you start a user group?

3:30 p.m. Anything You Want To Know About The C-128? Bring your questions to this clinic featuring Jim Butterfield.

Sunday, December 8

11:30 a.m. The Sound of Amiga: see schedule for Thursday.

2:00 p.m. User Groups: see schedule for Saturday.

3:30 p.m. Anything You Want To Know About The C-128? see schedule for Saturday. □

Directory of Exhibitors

The following companies will be exhibitors at World of Commodore III. More exhibitors are expected to book space after press time, so the list is not complete.

A.M. Soft, Scarborough, Ontario

Abacus Software, Grand Rapids, Michigan

Advantage Computer Accessories, Mississauga, Ontario

Ahoy! Magazine, New York, New York

Canadian Computer Dealers Association, Willowdale, Ontario

Canadian Software Source, North York, Ontario

Commodore 64 Users Group of Canada, Montreal, Quebec

Commodore Business Machines, Scarborough, Ontario

Computer Odyssey, Hamilton, Ontario

Computer Specialties, Melbourne, Florida

Comspec Communications, Toronto, Ontario

The COMTEL Group, Santa Ana, California

CPU Electronic Systems, Mississauga, Ontario

Cricket Distribution, Cobourg, Ontario

CW Communications, Peterborough, New Hampshire

Desktop Computer, Kitchener, Ontario

Digital Solutions, Willowdale, Ontario

Discount Computer Supplies, Downsview, Ontario

Electronics 2001, Willowdale, Ontario

EMJ Data Systems, Guelph, Ontario

Fiscal Information, Daytona Beach, Florida

FS! Software, Faribault, Minnesota

Gold Disk, Mississauga, Ontario

Grolier/Mindflight, Markham, Ontario

Innovative Technologies/Comm. Canada, Don Mills, Ontario

Laing Marketing, Brampton, Ontario

McGraw-Hill Ryerson, Scarborough, Ontario

Micropace Computers, Champaign, Illinois

Microphys Programs, Brooklyn, New York

Mississauga Computer Club, Mississauga, Ontario

Nanosec, Ogden, Utah

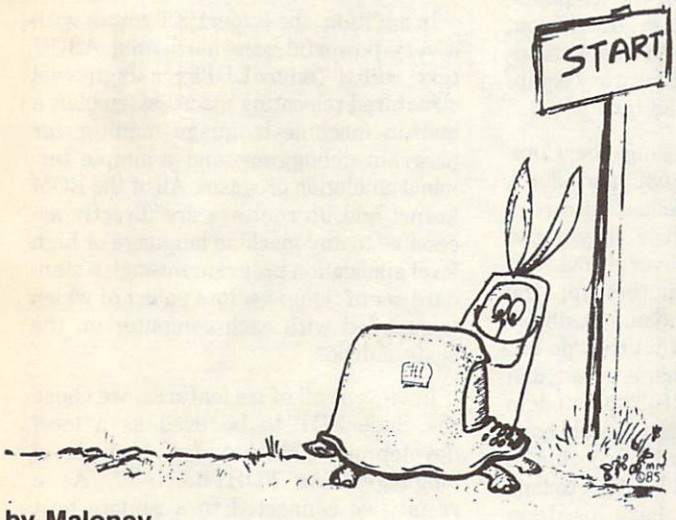
Niagara Commodore Users Group, St. Catharines, Ontario

Norland Agencies, Milton, Ontario

Phase 4 Distributors, Calgary, Alberta

Progressive Peripherals & Software, Denver, Colorado

VIC 20 and C-64 Speed Differences



by Maloney

The VIC 20 may be small, but it's the fastest Commodore computer (at least it was until the C-128 came along). It has been suggested that its speed advantage over the C-64 is due to additional refresh time required to service the 64's larger memory. Not so, says Maloney, who in this article presents the true explanation of the speed discrepancy.

I am a software hacker, not a hardware hacker. I also realize that a rudimentary knowledge of the operation of system hardware is beneficial to me as a programmer. The appendices of the *Programmer's Reference Guide* for both the VIC 20 and the C-64 contain a wealth of information about the ICs in these machines. Anyone who wants to go beyond **10 PRINT "HELLO"** is a darned fool if they don't give these guides at least a glance.

Every digital computer contains a system clock — an oscillator that generates a square wave. In the VIC 20 and the C-64, the clock frequency is approximately 1 MHz. The first half of the square is called 'phase 1', and the second half, 'phase 2'. The 6502 (VIC 20) and the 6510 (C-64) microprocessor units (MPUs) need to access the address and data buses only during phase 2.

The VIC breakthrough

Even though the VIC 20 has outsold nearly every other computer in the world, few people acknowledge its technological brilliance. Commodore decided that insofar as the 6502 MPU did not need control of the buses during phase 1, they could design a video interface controller (thus the name 'VIC') to access memory during phase 1. The VIC is the master; the MPU is the slave. When the VIC 20 needs access to screen memory to convert the data there to a video signal, the MPU also has full access to the memory, and the MPU operates at full speed. (The only concession is that the memory chips need to be twice as fast.)

The C-64 difference

The VIC 20's memory chips are static, and do not require any refresh at all. By contrast, the C-64's memory is dynamic; it *does* have to be refreshed in order to retain its contents. There are sixty-four clock cycles during each horizontal scan line, and only forty displayed columns. Thus the VIC-II (the C-64's VIC chip) has twenty-four 'free' cycles per line. It uses five cycles to refresh memory, and it does so during phase 1 of the clock. In short, memory refresh is totally transparent: it does not slow down the MPU at all.

So why is it slower?

The VIC-II chip is much more complex than its older brother. It has display modes that the original VIC chip doesn't have. It also has sprites. Because of these extra features (and the difference in the architecture of the VIC 20 and C-64), the VIC-II has to 'turn off' the 6510, for certain data fetches. Every eighth displayed raster line, the VIC-II has to access character pointers from the video matrix, and it must disable the MPU to do so.

There are also times when sprite data must be fetched: the 6510 is inoperative then, too. All told, the 6510 is shut down for about six to seven per cent of the machine's clock cycles. This is the reason that the C-64 is slower than the VIC 20.

If you care to prove it to yourself, type in the following:

```
10 ti$="000000"
20 for i=1to1000:next
30 print ti
```

Run this program, and note the time. Then add the following lines:

```
0 poke53265,peek(53265)and239
40 poke53265,peek(53265)or16
```

Run this version, and note how much faster it is.

A helpful hint

If you actually performed the above exercise, then you noticed something more than the increase in speed — the screen blanked. Bit 4 of location 53265 controls the video display function of the VIC-II. (The memory refresh function is not affected.) By resetting this bit to zero, we can disable the display, and the 6510 MPU will be in full control.

This is the reason that the C-64 blanks the screen during tape operations. If it did not do so, then the 6510 might (*would*) miss some data. It is also the reason that the VIC-1515 printer will not work with most C-64 software; the MPU in the printer does not receive the steady stream of data that it expects, and the system locks up. The 'C-64 Assembler Development System' blanks the screen when sending its output to the printer; it will work with an unmodified 1515. (There is an upgrade ROM available for the 1515 for approximately $25 (US). Contact Commodore for details.)

You can apply this information in a practical way. If your program does complex number crunching or searching, and if you don't need a constant screen display, then just turn it off, and enjoy a six to seven per cent speed increase. □

The Revival Of The SuperPET

by Avy Moise

Avy Moise is the principal author of Super-OS/9, TPUG's adaptation for the SuperPET computer of Microware's OS-9 operating system. This article is the first of a series describing various aspects of Super-OS/9.

Sometime in 1980, our research team at York University realized that the services offered by the Computing Centre were less than satisfactory. We noticed a substantial increase in the VAX minicomputer's response time during an interactive session. The situation became unbearable when we could not start a program and expect it to run successfully to completion in a reasonable time (one day).

As a result of our dissatisfaction with the mainframe computer, we conducted a survey to find out the kind of application programs our university members run (both students and professors). The results were astonishing. More than 90 per cent of the users on the system at any given time were running **EDT**, a full-screen text editor. Only five per cent of the people were executing 'number crunching' jobs.

This disproportionate usage of computer resources is consistent with the fact that, in a university environment, students write programs mostly as part of their course curriculum, while researchers either enter new data into the computer or create new programs to test their latest theories. The survey demonstrated that, at York University, mainframe computers were used for text entry, rather than for their powerful number crunching and string manipulating capabilities.

As a result of this survey, we came to the conclusion that it would be better to use a small microcomputer such as a PET to enter all the data, develop our programs and correct syntax errors. Once the text has been entered and stored as a file on our local disk drive, all that needs to be done is to dial up the mainframe computer, upload the files, and execute the programs that we have so cleverly developed. If everyone on campus were to follow this route, it could reduce the computer overhead by ninety per cent, thus generating better yield on number crunching jobs.

For example: I was asked to shop around for a microcomputer to be used in an office environment or in the laboratory. We were looking for a computer that could create documents in true ASCII form, and that would be able to perform file transfers over the telephone with a remote host computer. In addition, we wanted the computer to be able to interface with any of our laboratory equipment using the IEEE-488 bus.

At the time, I was using the Commodore PET models 8032 and 2001, which I liked for their excellent full screen editing functions and their easy-to-use BASIC interpreter. However, I could not recommend these computers for the above applications. The main reason for rejecting the PETs was that they do not support the true ASCII character set, and do not have a built-in RS-232C modem port. Some may argue that we could have written a simple translation program to convert the text from PET ASCII to true ASCII, and we could have used an IEEE-488 to RS-232C converter box, and we could have purchased the right software packages... True, but we had decided that our ideal computer should already have all of the above capabilities built in.

I was ready to give up, but for the persistence of a salesman in one of my favourite computer stores, who said: "If you are so picky, why don't you buy a SuperPET?"

"SuperPET?", I replied. "What is a SuperPET?"

A week later, I was among the first to use a SuperPET, a computer that is one of the best-built machines Commodore ever produced, but that never had a chance to prove itself — until now.

What is a SuperPET?

For those of you who have never heard of the SuperPET, it is a Commodore PET model 8032, dressed up with additional hardware and complementary software. The added hardware consists of a 64K memory expansion board, a true RS-232C telecommunication interface and a Motorola 6809E microprocessor. The extra software, which was provided by WATCOM, includes the following languages: microBASIC, microFORTRAN, microAPL, microCOBOL and microPASCAL. All these languages — even the BASIC — are highly structured, and support variables with long names, and subroutine calls with an argument list.

In addition, the SuperPET comes with a very powerful screen-oriented ASCII text editor (**microEDIT**); a high-level structured relocating macro-assembler; a built-in machine language monitor for program debugging; and a simple terminal emulation program. All of the ROM kernel and i/o routines are directly accessible to any machine language or high level application program through a standard set of 'jump-vectors', a list of which is supplied with each computer on the system disk.

In view of all of its features, we chose the SuperPET to be used as a local development station for high level languages like FORTRAN 77. As a result, we connected to a remote host computer only after an application program was first written and tested with the SuperPET. This reduced our connect-time from six hours per day to less than thirty minutes per day — just long enough to upload, compile and run the programs. When the results were ready, we downloaded the data onto our local storage (dual 4040 drives) for further analysis and graphic display.

After a year of use, we realized that the micro-interpreters that came with the SuperPET were too slow to run long and complex programs, and we sought a way to speed up the SuperPET.

There are two ways to speed up a program. One is to manually convert it into machine language, using an assembler. The second method is to use a compiler (a program that translates high-level instructions to machine code). After exhaustive market research, we sadly realized that there were no existing compilers for the SuperPET; nor was it expected that any would be written.

Another year passed, with very little professional software development done for the SuperPET. Only then did we become aware that Commodore had no

intention of supporting the SuperPET, that WATCOM did not wish to add any new software to the list of existing programs, and that all other software manufacturers were busy writing programs for the newly-born Commodore 64. It became obvious that if TPUG, ISPUG (International SuperPET User Group) and the local SuperPET chapter did not do anything about this sad situation, the SuperPET (and most likely the PET 8032) would become a thing of the past.

TPUG and the Toronto SuperPET chapter came to the rescue.

Enter OS-9

In one of our monthly meetings, Gerry Gold asked me to collaborate with a few ISPUG members in writing a BASIC compiler tailored after microBASIC. I replied that it would take less time to adapt the SuperPET to run an existing operating system that supports an existing BASIC compiler, than to write a compiler from first principles.

He immediately realized that adding an existing popular operating system for the SuperPET was the solution, and may be the key for the revival of this abandoned computer. In his research, Gerry came up with two candidates: OS-9 and Flex. OS-9 was chosen, for two major reasons.

First of all, OS-9 is closely related to the AT&T Unix System V operating system. Secondly, the source code for the OS-9 operating system was designed to be portable across systems. Bill Dutfield stepped in at this time to correctly point out that the SuperPET has only 32K of contiguous memory whereas, from reading about OS-9, Bill had found that some application programs may require in excess of 40K of RAM. As a result, we designed an MMU (memory management unit) to give the SuperPET (when running as an OS-9 computer) 64K of contiguous RAM, and 25K of virtual disk.

Gerry presented our plans for a SuperPET facelift to the TPUG executive, and TPUG agreed to sponsor the OS-9 project. On January 1st, 1985, a SuperPET ran Super-OS/9 (OS-9 Level I, Microware version 1.2) for the first time ever.

We did not know then that our version of OS-9 was the most complete and faithful implementation of Microware's OS-9 Level I. Super-OS/9 is also the richest, most versatile and most powerful implementation of an OS-9 operating system, thus putting the SuperPET in the forefront of all 6809-based microcomputers. □

Library Additions

TPUG's library of public domain software grows month by month. Hundreds of disks containing thousands of programs are available to TPUG members at the nominal cost of ten dollars per disk. Considering that each disk is packed with good programs, at today's software prices, this is a fantastic value.

In order for the library to keep growing, our librarians need a constant supply of new programs. If you have written a program or a collection of programs that you think might be an asset to the library, please send it to: TPUG Program Library, 101 Duncan Mill Road, Suite G7, Don Mills, Ontario M3B 1Z3, Canada. If your contribution is accepted, you will be sent the library disk of your choice. If, for some reason, your contribution is not needed, your original disk will be returned to you.

VIC 20 Disk (V)TL

Presented by Richard Best

Mathematically-inclined users will find several programs to their liking on this disk. **Funct plot.v5k**, for example, plots third-order polynomial equations in multicolour mode on an x/y grid. There is also a very handy and well-written routine called **hex to dec.v**, for converting decimal to hex, or hex to decimal. It calculates numbers up to 7 digits. Meanwhile, **permutations.v** lets you enter 3 to 6 items and watch the VIC reorder them. You might use this program to play word games or select lottery numbers.

Those with a yen for self-improvement will be interested in **morse code.v**, which lets you practise Morse Code by listening to random letters played by the VIC, or by requesting letters to be played. You can vary the speed, volume and pitch of the tone. When you feel that you have improved yourself sufficiently at Morse Code, try **typing tutor.v8k**, an update of an earlier release. This program prints a target word or phrase on the screen for you to type. The score is printed every 15 words. There are 19 levels, including capitals and numbers, and there is an optional time limit. Any expander will work.

A handy subroutine that you can add to your own programs is **scrn prnt.sub**, which will generate a text or graphics screen image (low-res only) on a graphics printer. Meanwhile, telecommunicators will appreciate **p-term.v12k**, a terminal program that works with an auto-dial modem. You can select BBS numbers from a menu, the data for which is contained in the program (lines 6110 through 6440), and may be updated by the user. This is a Punter protocol program that runs from disk or tape. The associated file **term/vic.c2**, also on the disk, is a patch to accommodate 20K expansion.

The remaining programs on this disk will only work with a disk drive. One is **drive test.v**, which performs five performance tests on a 1541 drive. It checks accuracy of formatting, read/write, mechanics and track positioning. Be sure to use a scratch diskette when using the program.

Superdir.v is a menu-driven disk utility with a number of handy features. One-letter commands let you print a directory on the screen or printer, load a program, scratch files, check status and more.

Pix loader.vsx is a machine language loader that lets you load the following 16 files from the disk. Each pair of files generates a high-quality, hi-res picture with a superexpander. The show is menu-driven.

File master.v12k is a flexible and easy-to-use file manager. Everything you need to know to use the program is included in the menus. The data manipulation routines are very powerful, and allow editing, sorting, and printing formatted output.

```
0 vic disk (v)tl
10   "list-me (v)t-1/1" prg
7    "list-me page 2"   prg
4    "funct plot.v"     prg
4    "hex to dec.v"     prg
5    "morse code.v"     prg
1    "scrn prnt.sub"    prg
7    "permutations.v"   prg
19   "typing tutor.v8k" prg
16   "p-term22.v12k"    prg
7    "term/vic.c2"      prg
9    "drive test.v"     prg
6    "superdir.v"       prg
4    "pix loader.vsx"   prg
3    "exp. curves+"     prg
13   "exp. curves"      prg
3    "circular circ.+"  prg
13   "circular circ."   prg
13   "ripple"           prg
3    "ripple+"          prg
13   "ellipses"         prg
3    "ellipses+"        prg
13   "squares"          prg
3    "squares+"         prg
13   "airwolf"          prg
3    "airwolf+"         prg
13   "boat"             prg
3    "boat+"            prg
13   "columbia"         prg
3    "columbia+"        prg
28   "file master.v12k" prg
```

PET Disk (P)TM

Presented by Mike Donegan

The major program this month is a freeware offering, **Editor 4032**, a utility program that enables you to examine and edit the tracks and sectors on a 4040 disk. The loader for this program is the file **editor4032 ldr.f**. Associated files include a data file, **editor 4032**; numerous word processor files containing documentation (**editor 00/wp** through **editor 19/wp**); and **lister.z**, a program to print the documentation files. Further information on the program is available from the author for a fee.

You will also find two programs to do with sheep shearing — **shears scoring.z** and **old shears.z**; and a program for car rally enthusiasts, to help keep track of contestants and their points — **rally system.z**. The latter program uses two data files, **open heats.d** and **open finals.d**.

Jim Butterfield's computer version of Pentominos is on this disk in a BASIC version (**pentominos.z**) and a machine language version (**pentominos.p**). Instructions are contained in a file called **pentominos inst.z**.

Four other programs round out the disk: **lottozahlen 2.z** (Lotto 649 in German); **control chr$.z** (a table of the control characters used on various Commodore machines); **print dir 8050.z** (a utility that prints 8050 directories alphabetically in two columns, with block count and addresses); and **mag index.8**.

```
0 pet disk (p)tm
23   "list-me (p)tm.l"  prg
12   "editor 40321dr.f" prg
71   "editor 4032"      usr
3    "editor 00/wp"     prg
7    "editor 01/wp"     prg
6    "editor 02/wp"     prg
5    "editor 03/wp"     prg
4    "editor 04/wp"     prg
7    "editor 05/wp"     prg
4    "editor 06/wp"     prg
```

Software order form

NAME _____

STREET ADDRESS _____

CITY/TOWN/P.O. _____

PROV/STATE _____ POSTAL/ZIP CODE _____

TELEPHONE _____ MEMBERSHIP NO. _____

TORONTO PET USERS GROUP, 101 Duncan Mill Road, Suite G7, Don Mills, Ontario M3B 1Z3 416-445-4524

disks

To order club disks by mail, send $10.00 for each 4040/2031/1540/1541 disk (4040 format), discount price 5-10 $9.00 each, 11 or more $8.00 each; and $12.00 for each 8050/8250 disk (8050 format). We do honour purchase orders from school boards.

These disks are for use with a _____ computer and a _____ disk drive.

Please send me the following:

3 Letter/No. Code	Description	4040 or 8050 Format	Price

Total $ _____ .00

tapes

To order VIC 20 or Commodore 64 library tapes, send $6.00 for each tape.
To order PET/CBM or Commodore Educational Software, send $10.00 for each tape.

These tapes are for use with a _____ computer and a datasette.

If for a PET computer, what model - _____ - BASIC - 1.0( ); 2.0( ); 4.0( )?

3 Letter/No. Code	Description	Price

Total $ _____ .00

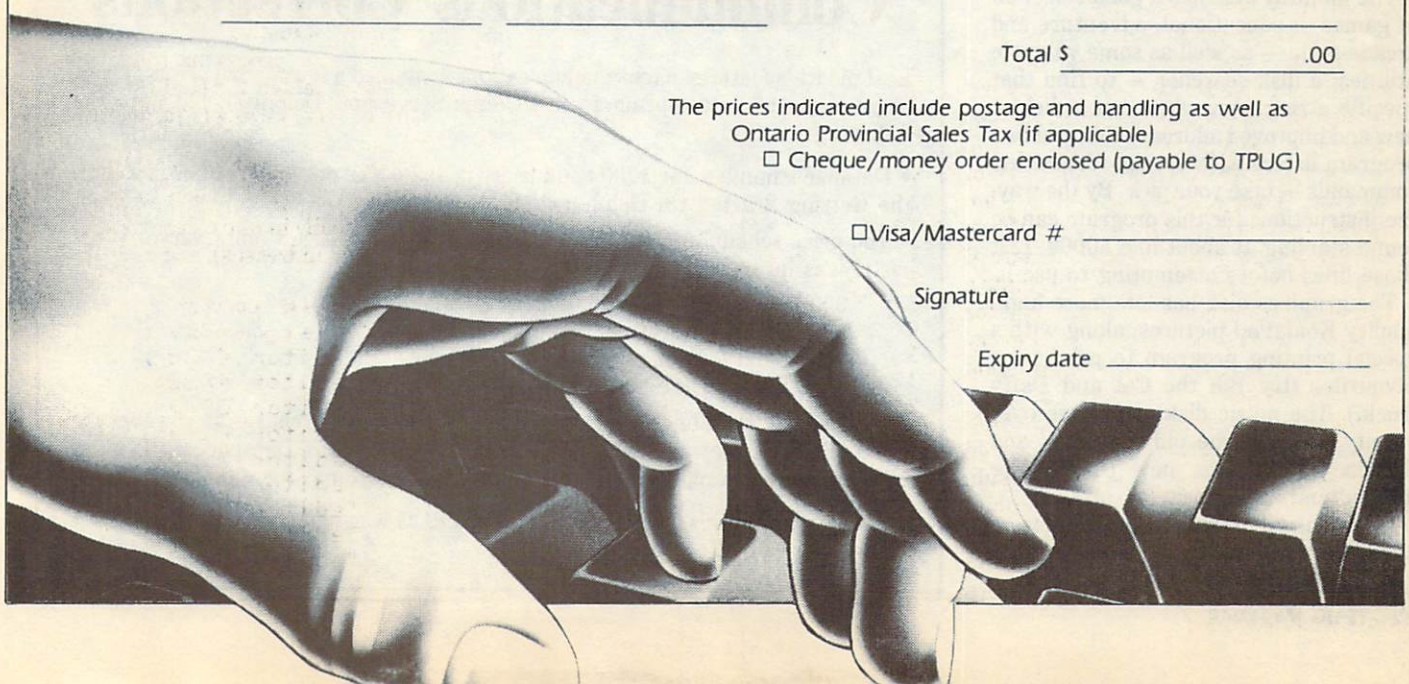
The prices indicated include postage and handling as well as Ontario Provincial Sales Tax (if applicable)

☐ Cheque/money order enclosed (payable to TPUG)

☐Visa/Mastercard # _____

Signature _____

Expiry date _____



```
4     "editor 07/wp"       prg
7     "editor 08/wp"       prg
5     "editor 09/wp"       prg
5     "editor 10/wp"       prg
4     "editor 11/wp"       prg
4     "editor 12/wp"       prg
4     "editor 13/wp"       prg
4     "editor 14/wp"       prg
5     "editor 15/wp"       prg
5     "editor 16/wp"       prg
3     "editor 17/wp"       prg
6     "editor 18/wp"       prg
15    "editor 19/wp"       prg
49    "shears scoring.z"   prg
13    "open heats.d"       seq
1     "open finals.d"      seq
32    "rally system.z"     prg
46    "old shears.z"       prg
4     "lottozahlen 2.z"    prg
13    "pentominos.z"       prg
6     "pentominosinst.z"   prg
6     "pentominos.p"       prg
33    "mag index.8"        prg
16    "control chr$.z"     prg
20    "print dir 8050.z"   prg
12    "lister.z"           prg
```

C-64 Disk (C)TM

Presented by Derick Campbell

I have so many submissions for the TPUG library, that before I tell you about this month's disk, let me take this opportunity to ask for help. *Help!* I need volunteers to assist in making up the monthly disks; it's too much for one person. If you have some spare time, and feel up to the exciting task of compiling monthly disks, then don't wait, call TPUG (445-4524) now!

This month, we received twelve disks from the Fox Valley 64 Users Group. I took the best of their material (we already had a lot of it) plus some others, and came up with three disks: the monthly disk, a graphics disk and a music disk.

The monthly disk has a good selection of games — educational, adventure and arcade-style — as well as some valuable utilities: a disk searcher — to find that specific string somewhere on a disk; a new and improved address book; and two program listers with special formatting commands — take your pick. By the way, the instructions for this program can be found starting at about line 50000. List those lines before attempting to use it.

The graphics disk has lots more high-quality KoalaPad pictures, along with a special printing program to print your favourites (try Bill the Cat and Daffy Duck!). The music disk comprises over twenty songs, some old ('Beat It' and 'Maniac') and some new ('Hard For Money' and 'Gloria').

I am a new librarian. Send me letters and disks with your suggestions and programs, and remember to call TPUG if you want to help out.

Next month's disk will feature the **SIDplayer** and over 50 songs! There are also several disks of freeware that should be all checked out by then and ready to release.

```
0 c-64 disk (c)tm
8     "list-me (c)tm.1"    prg
26    "scenario.c"         prg
25    "geography.c"        prg
8     "lister.c"           prg
35    "dominoes.c"         prg
87    "bartender.c"        prg
35    "wug.c"              prg
5     "disk search v2.c"   prg
21    "factor race.c"      prg
19    "t.v. satellite.c"   prg
56    "adventure.c"        prg
29    "mystery spell.c"    prg
38    "ustf lister.c"      prg
13    "cupid.c"            prg
32    "game of life.c"     prg
76    "address book.c"     prg
23    "adbk delete.c"      prg
3     "print instruct.c"   prg
12    "instructs file"     seq
9     "speedscript file"   prg
```

COMAL Book Disks

Presented by Victor Gough

and Donald Dalley

This month I would like to describe the BOOK series (K)Bx, which is one of the seven categories in the COMAL library of over 2500 programs. There are now ten disks in the book series, which cover the programs in most COMAL books.

Disks (K)B1 and (K)B7, for both editions of Len Lindsay's *COMAL Handbook*, cover the examples of keyword usage with useful programs.

COMAL 80 is Commodore's new tutorial text for the incredible 2.00 cartridge. Its disk, (K)BA, contains simple (but helpful) programs and demos, and useful peripheral programs (1520 plotter, lightpen and joystick).

All six of *The Amazing Adventures of Captain COMAL* series are covered. The *Functions and Procedures* disk (K)B6 has many procedures to allow some of the cartridge features to be included in disk COMAL programs. The companion book explains how to make use of them. Any *Captain COMAL* publication is available *only* from the COMAL Users Group, USA.

For beginners: TPUG sells an excellent inexpensive introductory reference guide to COMAL written by the creator of the language, Borge Christensen. COMAL 0.14 resides on many of our disks, including the original (K)Z2. For people new to programming, *Beginning COMAL*, by Borge Christensen, and *Structured Programming With COMAL*, by Roy Atherton, are valuable texts. The companion disks are (K)B2 and (K)B4 respectively.

Advanced programmers of machine language, with the 2.00 cartridge, should consider the *COMAL 2.0 Packages* book, by Jesse Knight. Use disk (K)B9.

Disks for all future books that have public domain programs will be included in our library. Any book mentioned can be ordered from the COMAL User's Group, USA, and check your local bookstore for books from Reston or Ellis Horwood publishers. □

Communications Corrections

Last month's feature on telecommunications contained a few factual errors. Those of you who are attempting to use CompuServe and Delphi should note the following:

- Datapac's number for 1200 baud users is 868-4100, not 868-4001 as stated in the Getting Started On Delphi article.
- The price schedule for CompuServe given in the article CompuServe: What Is It? was incorrect. The actual prices are:

  300 baud (off-hours): $6.00/hour (US)
  300 baud (prime time): $12.50/hour (US)
  1200 baud (off-hours): $12.50/hour (US)
  1200 baud (prime time): $15.00/hour (US)

In addition to the above rates, there is 25 cent/hour surcharge if you use the CompuServe 'Gateway' phone line (865-1451 in Toronto). Datapac and Tymnet have their own surcharges (phone Datapac and Tymnet for details).

- By the way, as this issue went to press, TPUG was still not up on Delphi, but we will be soon. Keep trying. □

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Type of disk: ☐ C-64 ☐VIC 20 ☐ PET ☐ SuperPET (10 disk set)

Reviews

Super-C
from Abacus Software
C language compiler
for Commodore 64

Review by George Carter

So why did I spend my one-week summer vacation learning C, you may ask?

Part one of the answer is that from my perspective of twenty years in data processing, it appears almost certain that C will be the most important programming language of the next decade. This is partly driven by the growing popularity of the Unix operating system, but also has a lot to do with the drive for easy 'porting' of software from one machine to another. Because C runs fairly efficiently on many machines, with only minor conversion effort required, it is increasingly popular for serious program development.

More specifically, C should be important in the context of the Amiga, since the BASIC on the Amiga is dramatically different from what Commodore owners are used to, and the assembly (machine) language is a whole new ball game. Besides, C and 68000 processors just seem to go together. (If you read into this an implication that the Amiga is a large part of my personal computer plans, that would be quite correct.)

Next question: how does **Super-C** stack up as a tool for developing software? The short answer is that it works, but it isn't much fun.

Super-C is a C language compiler for the C-64 and C-128, with 1541 or 1571 disk drive. A variety of printers is supported, but a printer is not required. This review was done using an early-model C-64 with a more recent version of the 1541.

The package includes an editor for writing and modifying source language, a compiler that produces 6502 machine-language modules, and a linker that combines modules into usable programs. This is all controlled from a main menu, which also allows loading C programs for testing. The final part is a file-copy utility — tested for this review, but not used extensively, since I also have a PET with a 4040 dual disk.

Super-C is a complete version of the language, except for 'bit fields'. However, the C language is by definition incomplete; for example, the language proper includes no input/output facilities at all. This omission is handled by a 'standard library' of functions, which every version of C includes.

The **Super-C** standard library is workable, but not as rich as most, according to the *C Language User's Handbook*. (This 489-page book was written by Weber Systems Inc. staff and published by Ballantine Books — Random House of Canada, Toronto. It is almost guaranteed to tell you more about C than you want to know.) For example, the 12 class tests are missing, along with functions to translate to lower or upper case.

Super-C comes on a copy-protected disk; the registration card allows ordering a backup disk for 10 dollars (US). Anyone who is planning to do heavy-duty program development should consider this cost as part of the purchase price; being without the system for any length of time could be disastrous. Because the C disk is copy-protected, your programs must go on another disk. Making a minor change to a program means the following steps:

- load the menu program;
- load the editor;
- swap disks, load your source code, change it and save it;
- swap disks, load the compiler;
- swap disks, do the compile;
- swap disks, load the linker;
- swap disks, do the link;
- load your program and test it.

Not a lot of fun — a minimum of eight minutes for a one-character program change.

The editor is adequate for program development. One nice touch is an 'extra text' area. The compiler produces a disk file of error messages, which can be loaded and moved to extra text. You then load your source code and flip back and forth fixing up your errors. Without this feature, a printer would be almost mandatory. But I do wish the editor would produce standard sequential files that could be easily manipulated by other programs. And I did manage to crash the editor during an extended session of changes, compiles and tests.

The compiler and linker worked as expected. None of them is enormous; I wish there was a combined editor/compiler/linker for developing small programs without all the disk swaps.

As a novice to C, I didn't do any programs that would qualify as benchmarks. However, a hexadecimal file dump program ran very noticeably faster than an equivalent BASIC program.

The **Super-C** manual is over 200 pages of excellent content. Unfortunately, it has numerous typos and layout errors; the examples are pretty clean, though. If you have a choice, avoid this first printing. The manual does not provide detailed memory maps, nor is there any indication of how to add machine-language functions.

As a development system, **Super-C** is a bare minimum. There are no debugging aids — not even the ability to produce a cross-reference of fields used in a program.

In summary, **Super-C** does provide a working environment for learning and using C. The C-64, with its limited memory and slow disk drive is an awkward machine for this kind of thing. Then again, some of us developed 700-line assembly-language programs on cassette-based PETs. Something that works is better than a dream of what may be available in the future.

George Carter is a Toronto-area consultant, and long-standing TPUG member.□

Three More Spreadsheets
for Commodore 64

Review by Dave Powell

***Cal-Kit**, from Batteries Included; **Practicalc II**, from Computer Associates; and **Better Working Spreadsheet**, from Spinnaker.*

Cal-Kit, **Practicalc II** and **Better Working** are three of the better-known spreadsheets available today for the Commodore 64. A few months ago I spent some time checking out these packages in preparation for my talk on spreadsheets at the TPUG conference. I had one surprise — **Practicalc II** and **Better Working** turned out to be pretty much the same. Both are written by Sandy

Ruby (who also wrote the original **Practicalc**), and seem to have only cosmetic differences in the software. The manuals are similar, too. This certainly cuts down on the amount of work necessary to review them.

Cal-Kit was new to me. It takes a different approach to spreadsheeting, based on giving the user simplicity and just enough function. The package comes with twenty prebuilt spreadsheets (or templates) that can be used 'as is', or changed to suit a different circumstance. Beginners should get results very quickly with this approach.

The manual explains things very clearly, step by step. Each template has its own instructions. The range of functions may deter experienced users, because it is very limited. Formulae may use only the four basic arithmetic operations and exponentiation. Brackets are allowed, and **SUM** works on a range of cells. There just isn't the huge choice that **Multiplan** has, for example, but that could be an advantage — it's easy! Besides, how often do you use anything else?

Don't look for the income tax template advertised on the cover, unless you live in the US. The Canadian version drops it entirely.

Practicalc II (and everything goes for **Better Working**, also) is the sequel to **Practicalc**, which I have always liked. All of my complaints (see my review 'Three Spreadsheets' in the November 1984 issue) have been addressed. This product begins to rival **Multiplan** in terms of function, and is easier to use. Everything, including numerous help screens, fits in memory, so there is no tedious waiting for a function to be retrieved from disk.

Among the many improvements are a new text-processing facility, individual column widths, **IF-THEN**, disk commands, better printing, and stored spreadsheet customization (column widths, formats, and so on). All of this loads in just over a minute.

Unfortunately, the emphasis in the manual is on an Apple version, and C-64 differences are documented in a separate booklet, which is sometimes frustrating. This is one difference between **Practicalc II** and **Better Working** — the latter has a single manual that incorporates the C-64 differences in the text, although it is still primarily an Apple manual.

This is an excellent spreadsheet, well worth the small premium in price over the original **Practicalc**, and better than most of the early C-64 spreadsheets. **Multiplan** still has the edge in functionality and versatility (**Practicalc II** can't automatically tie in separate sheets, for instance) — but **Multiplan** is slower to use. Registered **Practicalc** owners have a chance to buy **Practicalc II** for half price — if that option is still open to you, take it!

You're about to buy your first spreadsheet? If you're a programmer, get **Practicalc II** or **Better Working**: you'll appreciate the additional control you get. If you have business needs, consider **Multiplan**, but if you can't find a discounted or second-hand copy, the price difference (if you care) might make you choose one of the former two.

Computer or spreadsheet neophytes can hardly go wrong with **Cal-Kit**, and even experienced users might appreciate the time saved in having ready-made applications. □

BAID64
from Mikrologix
BASIC enhancement package for C-64

Review by Dave Powell

BAID64 Utility Program *by Mikrologix Software Company. Available from CPU Electronic Systems Corporation, 2652 Slough Street, Mississauga, Ontario, L4T 3T2. $49.95 (Cdn.), $39.95 (US).*

This product is a mix of a BASIC toolkit, a DOS wedge and BASIC extensions. The disk commands are the standard collection, plus merge and start address commands. The toolkit adds ten goodies to the normal **DELETE**, **RENUM**, **AUTO**, and so on. Among these are **DUMP** (variable values) and **TRAP**, which are useful for debugging. **HMEM** and **LMEM** change BASIC memory pointers, and **HPRINT** prints the current screen in either character/graphic format or hi-res, depending on the value of the **TEXT** toggle.

The major part of **BAID64** is the set of BASIC extensions. These are implemented by replacing BASIC in ROM by a customized version. This means, of course, that programs that use these facilities need to have **BAID64** resident first. This makes them more trouble to load, and non-transportable. Because BASIC is changed, some peeks and pokes will no longer work.

The extra commands help with the movement, selection and colour of sprites (but not their definition); sound commands (**NOTE**, **PULSE** width, **RATE** (ADSR), **SOUND** volume, and **WAVE** form); and high resolution commands, which include drawing straight lines and single points in a selected colour, and moving data between two hi-res screen areas. These extra commands are still at a fairly low level; for instance, the programmer has to pack a byte with two four-bit values for attack and decay before using the **RATE** command.

BAID64 allows BASIC lines to be indented, without using colons, and each line can be up to 120 characters long, although some limitations are noted. The manual is looseleaf, and fairly complete. It needs better examples, and could be better organized.

This product puts several useful utilities together in a single package. Many of the individual pieces can be found in the public domain, but possibly not in so convenient a format. Is that convenience worth the price? It depends on what your program library already has, and what features you would use. □

The Best VIC/Commodore Software
by Jim and Ellen Strasma
from Publications International Ltd.
192 pages, coil bound

Review by Anne E. Gudz

Publications International, Ltd., 3841 West Oakton Street, Stokie, Illinois 60076. ISBN 0-88176-148-6.

This is an excellent software review book for owners of the VIC 20 or Commodore 64. The Strasmas review word processors, business programs, home applications, educational applications, networking (communications), games (strategy and arcade) and programming aids.

The book is well organized and easy to read. Each review includes the following information: a description of the product, who it is sold by and what system it is for — as well as requirements, approximate price, format, protection, warranty details, and even user group rating. Other aspects such as documentation, performance, reliability and ease of use are also rated, on a scale of 1 to 10.

The book itself is soft-covered and coil-bound, imitating the 'personal computing' and 'reference guides' for Commodore products.

This book has one drawback. As with other software guides, the information it contains may quickly become outdated. Even keeping this in mind, however, *The Best VIC/Commodore Software* is still an excellent addition to your software library. □

VIC 20 programs
from Laing Marketing
$9.95 each

Review by Richard Best

Laing Marketing, Inc., 411 Horner Avenue, Toronto, Ontario.

We need more people like Bill Laing. Bill recently started Laing Marketing, a Toronto-based software house that is actually building a catalogue of low-cost VIC 20 software, and he sent a few tapes to TPUG for review. The programs are all interesting and of high quality, although there are a few negative points.

Pedes & Mutants

The three space games are generally good. **Pedes & Mutants** pits a ship against mutated creatures, in a variation on the 'Centipede' theme. Graduation to a second, slower screen gives an occasional rest from the exciting action of the main game. Sound and graphics are both excellent.

Space Escort

Space Escort has an unusual thesis. The player must escort a freighter to a planet, while fighting off a variety of aliens and avoiding space mines and debris. This one liberally awards bonus ships. Sound, graphics and action are all good.

Time Destroyers

Time Destroyers, for the expanded VIC, was a little disappointing, on the other hand. Having nearly bankrupted myself on **Defender** a couple of years ago, I was thrilled to see the same game on my VIC 20. However, **Time Destroyers** merely *looks* like **Defender**. The action makes one think of BASIC, and the aliens seem to have an unfair speed advantage. I kept looking at the 6-digit scoreboard and my 3-digit score, and wondering about the gaming skills of the programmer.

Zargon's Kingdom

Zargon's Kingdom, for the expanded VIC, is an interesting adventure game. There are five different screens, each filled with tunnels, ladders, objects to ride on, and fearsome creatures. The action is slow, but the game is interesting enough to keep you playing.

Multisound Synthesizer

Multisound Synthesizer is also more interesting than your average music-maker program. The program allows the player to create tunes and save them on tape or disk. Sound quality is easily modified through menus, and all four VIC voices are available. What makes this program especially enjoyable is the built-in drum machine that allows you to add a drum track to the melodies you create. The only oversight here is that the two-octave keyboard is not configured like a piano.

All of these programs are on tape. While we all know tape to be slow going, I was shocked at just *how* slowly these things load. I've concluded that there must be a lot of copy protection in place — about five minutes worth, in some cases.

What's worse is that the loading must be attended. **Zorgon's Kingdom** especially suffers from being on tape, since the only way to restart after losing all your men is to reboot. Once loaded, though, the programs run without a hitch.

The only other complaint I have is that a lot of the on-screen documentation is semi-literate. Attention programmers: Syntax is important — but so is grammar.

Operation Whirlwind
from Broderbund
Military strategy game
for Commodore 64

Review by Dave Dempster

Operation Whirlwind, by Broderbund, is a solitaire simulation attack. Your army has to cross two rivers and mixed terrain in order to capture a town. This is basically a board game transferred to computer. All those horrible picky little details, such as phase, remaining strength, movement, range and blocking terrain, are quickly and efficiently handled by your machine, leaving you to explore and enjoy the flow of the game.

The graphics, colour and display of **Operation Whirlwind** are superb. The screen is split between the tactical display and a message/data screen. The map scrolls over three screens wide by about four screens long. Forest, town, river, road and rough terrain are well displayed. Enemy units consist of infantry and armour, with off-board artillery support for the bad guys.

As the game commences, the enemy are all hidden. Your units consist of infantry, light tank, heavy tank, reconnaissance, engineer, HQ and artillery, with a range of movement, fire and ability to take punishment.

The game proceeds through five phases. First, you designate units to be 'combat ready' or 'dug-in' (where they are immobile but stronger on defence and gain strength as they rest). You can then move those 'ready' units. During this phase, you may uncover previously unseen enemy units as they fire at you, these units then being identified on your display. Each of your units has an activity level that determines movement and fighting capability. If all a unit's exertion goes into moving, it will be unable to fight — in other words, you have apparently force-marched it to exhaustion! In the combat phase, you designate targets for each of your units — this game does not permit coordinated attacks, per se. The computer will also not permit you to fire if you've already done so; if your line of fire is blocked by terrain; or if the enemy is out of range. In the final phases, you designate and carry out assaults on enemy troops located next to your units; or, in the case of engineer units, you assault a river crossing to repair a bridge.

The mechanics of the game are straightforward and easily learned, with helpful prompts negating the need to consult the well-written and comprehensive manual. The '0' level of difficulty allows you to learn and play without becoming discouraged; however, the higher two levels offer all the challenge you can handle — and as you complete the final mop-up in the town, you hear the sound of the impending counter-attack.

You can save a game in progress and finish it later — a nice touch, as the game can last as long as thirty-five moves, which takes considerable time. I got mildly annoyed in that enemy units seemed capable of shooting at me (and hitting), while the computer insisted that blocking terrain precluded my responding. Worst of all, the game allowed me to send an expendable unit up a road but when my next (and necessary) unit tried it, I hit mines and was stopped. The game plays in turns (except that, during combat, enemy artillery begins to shell you); thus, you've time to think, and the game does not leave you behind. If you're a board gamer, or new to wargaming, you might particularly appreciate this aspect.

This is a sophisticated, professional piece of software that will provide many hours of enjoyment and challenge. □

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Rhapsody 64
from King Microware
Integrated business software package for the Commodore 64
Price: $64.95 (Cdn.)

Review by Louise Redgers

Rhapsody 64 is the latest addition to the list of multifunction business programs. It is a word processor, a database manager, a spreadsheet and a spelling checker, all rolled into one. This program is a welcome addition to the C-64 business software list, which is all too short.

When I followed the directions in the manual, I was unable to load **Rhapsody 64** on my 1541 — the only Commodore drive that it will run on. When I got a directory of the disk and loaded in the first program by name, however, it loaded with no problems at all. I then loaded the demo as recommended and let it run. This thing drove me crazy as it all flew by on my screen and I tried to read it, only to find out later that this is normal behaviour for the system. After the load is complete, you can go through the screens at your own speed. The demo is impressive in showing off the features of what appears to be a very easy-to-use system.

Unlike any word processor I have ever used on my Commodore 64, with **Rhapsody 64** you don't need to use embedded commands — what you see is what you get. This is a very simple word processor to use. It requires very little knowledge of formatting commands, and is therefore great for the novice. It seems particularly appropriate for the harried small business owner who may not be a skilled typist, and who does not want to spend a lot of time learning obscure command sequences every time a little word processing task needs to be done.

The database manager is equally simple and user friendly. You can set up a simple mail list in no time, and use it in conjunction with the word processor to generate labels or quick letters. Screen set up is easy after a few attempts. Once again, this is a beginners' database. It lacks the mathematical functions of programs like **The Manager**, and the record manipulation abilities that are possible for the sophisticated user of **The Consultant**, but if these programs are more than you need, **Rhapsody 64** is just great. It is nice to have everything on one disk and easily accessible. One very annoying thing about other products is that you pop in one disk to do word processing and another to do your database, and then you have to move files around to link the two. **Rhapsody 64** also has a spelling checker — something that is very handy if your spelling happens to be a bit shaky.

The spreadsheet was by far the most utilized piece of software for my purposes in this package. It is easier to use and less confusing than the old **Visicalc**, which I found annoying because of the restrictions placed on my ability to type in headings without running into column problems after each eight letters. This system, with the help of the manual and demo, was very easy to use and manipulate. Good as it is in itself, the absolute seller is the graphing capabilities that come with the spreadsheet. Setting up bar graphs in colour is very straightforward, and great if you wish to use the computer screen to demonstrate your point. I have yet to see anything that is easier to use, that comes all in one box and that takes the spreadsheet data so readily.

Overall, this package is designed for the computer novice who wishes to use business software without the bother of learning about the computer first. The manual is written in clear tutorial format, but lacks a quick help section. For me, the selling feature was the spreadsheet/graphing system, which got me over my phobia of those products. **Rhapsody 64** is definitely a worthwhile addition to the software marketplace. □

Thinking FORTH
by Leo Brodie
from Prentice Hall
soft cover $16 (US)
hard cover $23 (US)
300 pages

Review by R.C. Walker

One would guess from the title of this book that it is directed towards those desiring to program more efficiently in the FORTH language. This is only partly the case, since the techniques presented can usually be used with any programming language.

The preface states that a knowledge of FORTH is not required for this book. However, all examples are illustrated in FORTH, so such knowledge would be beneficial. Those who don't know FORTH will find enough information in the appendices to profit from the book's examples. If you are not a FORTH programmer now, you may decide to adopt the language after reading this book. FORTH is especially adapted to the techniques presented, being simple and non-restrictive.

The layout of the book follows the software development cycle, from problem definition through implementation. Tips may be found throughout, though they are not applicable in all cases, and some are contradictory. You will find this to be true of many of the techniques. Brodie teaches what most of us learn the hard way: every problem is different, and will probably have to be handled in a different manner — no one technique is applicable in all situations.

Brodie's matter-of-fact style is refreshing. I particularly appreciate his humour, whether it be an occasional cartoon, phrase or programming example. It complements the book without dragging, as attempts at humour in a serious work often do. The only fault I could find was that a few typographical errors managed to slip through.

In the book's first chapter, Brodie points out that FORTH has elements of both high and low level languages, of operating systems, compilers, interpreters and assemblers. This many-faceted nature makes FORTH hard to classify. Brodie calls it a programming environment for *creating* application-oriented languages.

The remaining chapters each consider one aspect of program development, generally from a FORTH perspective. Among the topics covered are analysis (of the problem), preliminary design, detailed design, implementation and data handling.

An interesting epilogue discusses FORTH's effect on thinking. Many FORTH programmers will tell you that FORTH is not a language so much as a philosophy. For some, this is true. Thinking in FORTH can improve your ability to program in other languages. It can become a way of thinking that has application in many areas of your life.

If you are a programmer who wants to solve a software problem rapidly and more easily, with results that other programmers can understand, with code that is simple and elegant, then this book is for you. If you are also a FORTH programmer, this book is *doubly* for you. You will continually go back to the tips and techniques covered, and the book will definitely repay the effort of several readings. I recommend it highly. □

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An Epyx Saga

Fast Load
Cartridge
from Epyx
Fast program loader
for Commodore 64
and 1541 disk drive

Review by Mike Martin

Epyx is selling an interesting addition to the Commodore 64 computer. **Fast Load** is a cartridge containing a fast load program, a DOS wedge and a machine language monitor. Its list price in the US is 50 dollars, but it is available through some discount department stores for 30 dollars. *There are two versions of the cartridge*, with big differences. If you have the first version, you need to send it back to Epyx for free replacement.

The first version was marketed prematurely, to compete with a couple of similar disk-based programs. The first cartridge does not handle access to disk or printer very well, and is useful mostly for games. The improved cartridge isn't perfect, but performs much better. For example, the first cartridge would load a terminal program, but would not access the disk drive for downloads. It would load Broderbund's **The Print Shop**, but could never find the printer. With **WP64**, Steve Punter's improved word processor, it printed fine, but would not save to disk. (I won't tell you the sad story that accompanies that discovery.)

How do you tell which cartridge version you have? Look at the instruction sheet. If it came with a photocopy of a plain, typewritten page, you have the old version. Send it to Epyx (1043 Kiel Court, Sunnyvale, CA 94089) for replacement. If the instruction sheet in your package is typeset and on a paper folded into booklet form, with instructions for the monitor on the inside, you have the new cartridge.

The cartridge plugs into the cartridge port, but has no provisions for the addition of another cartridge, such as one with programming information. The advertising states that it will "change your 1541 disk drive from a lumbering hippo into a leaping gazelle". The gazelle does occasionally stumble. They say it speeds up the load from disk by 500 per cent. In my experience, that seems correct. Most of the public domain programs from TPUG work well with the cartridge, and load quickly. Some disk utility programs, such as **Disk Kit**, work fine. Even most of my heavily copy-protected software will work, but it is *very* important to run tests of all the features before beginning an important task using the cartridge. With the new version, I input 91 measures of music on **Master Composer**, and then discovered that the program wouldn't save to disk. After several moments of panic, I tried turning the disk drive off and back on. It worked!

I think the cartridge is well worth the cost. Changing the default from tape to disk is helpful. The extra speed in loading is great. A non-destructive disk directory is almost worth the price alone. And the convenience of having it all power up with the computer, instead of having to load it in every time, is most welcome. **Fast Load** adds those 'little' features that I have always wished were standard on the C-64. □

Fast Load
Cartridge
from Epyx
Fast program loader
for Commodore 64
and 1541 disk drive

Review by Malcolm O'Brien

The people at Epyx must be very pleased. They've managed to hold the rapt attention of C-64 users for quite some time now. **Summer Games** was very impressive, and a big seller. It was still the hot new game when **Impossible Mission** was released. And **Impossible Mission** extended the enchantment. I was amazed to hear the C-64 do a Boris Karloff impersonation!

Epyx has a new product — the **Fast Load** cartridge — that is proving to be just as popular. The company's tag line is "Strategy games for the action-game player", and they have been immensely successful in that field. It was somewhat

Shades of HAL . . .

I beg to differ with the remarks in the June issue, suggesting that "the new versions of (Epyx) **Fast Load** . . . are said to work very well and should give you no trouble".

I have the version of this cartridge which had an indentation on the back of the box (number 3 or 4 — who knows?), which is allegedly 'trouble-free'. During a weekend of heavy BASIC programming, I experienced nothing but frustration when **Fast Load** screwed up my directories, putting them into endless loops, rewriting sectors of the directories where they were not wanted, and producing what seemed like 57 varieties of other errors.

About the only thing this cartridge does well is load programs at high speeds. The other 'bonus' utilities are a waste of time — better versions are available in the public domain. The part which copies individual files or a whole disk loads in material at the fast speed, but puts it on the new disk at the normal slow rate. The disk doctor is in hex, rather 'user unfriendly' to all except computer geniuses. When looking at a directory, you can't stop the listing; and when making use of the **File Utility**, you therefore can't look at the directory while performing operations like scratch, copy and so forth. And the ML monitor is completely unlike any other I've encountered — **Supermon** and **Hesmon**, for instance.

In short, if you want to do serious work with your C-64, I would strongly recommend removing **Fast Load** from the computer; or turning it off, if you have an expansion board. Merely 'disabling' it by the built-in commands with the cartridge plugged in may result in trouble, since some memory locations remain the same, whether it is 'disabled' or not.

Michael Quigley
Vancouver, British Columbia

Paralyzed printer

The letter '**Fast Load** Lament' in the June/July issue sent me to the word processor. I have a lament about Epyx **Fast Load** that never seems to come up in reviews. First of all, it loads all of the 'home-made' programs nicely and speedily. It does not load many of my commercial programs. Those that it *does* load work fine until I get to the printer activity. Any command to print falls on 'deaf ears'. The only exception so far has been **Net Worth** which, however, is sometimes very difficult to load using **Fast Load**. I have been unable to print even from my own simple programs, using the standard Commodore commands. (I have an MPS802 printer). I dropped Epyx a line about these aggravations, and got no response. This represents a monumental flaw to me, since most of what I do involves using the printer. I regret having bought the program, and can't believe that no commercial magazine reviewers experienced this defect.

Gerald T. Smith
Florrisant, Missouri

surprising, therefore, to see them bring out a cartridge-based utility.

And what a utility! There's something for everyone here. For the new user, the ability to load programs quickly makes the cartridge worth having. For the intermediate user, there are simple (and fast!) disk tools. The advanced programmer will appreciate the machine language monitor. I know what you're wondering. "How fast is it?" Glad you asked.

Most of my computing time is spent using **PaperClip**. I went out to buy this cartridge with the sole intent of getting **PaperClip** up fast. When I loaded it in the standard way it took one minute and seventeen seconds (*zzzz*). With **Fast Load** installed it took sixteen (16!) seconds. How's that for an improvement? On an 8032 with an 8050 drive, **PaperClip** takes fifteen seconds to load. Needless to say, I was very pleased.

Let's start with the simple stuff. A **$** followed by **RETURN** will list the directory to the screen without erasing the program in memory. **RUN/STOP** will not abort the listing, but this is not something I'm going to quibble about. **/FILENAME** (no quotes or > required) will load a BASIC program. To save a program, just hit the left-arrow and give the name. **%programname** is easier than **LOAD programname,8,1**. If you want to save machine language, or an area of 'raw' memory, you can use the monitor. Finally, you can hold down the Commodore logo key and push **RUN/STOP** to load and run the first program on the disk.

You'll also want to be able to read the disk status and send DOS commands. No problem. Type @ or > to accomplish the former and follow either character with the desired command for the latter (**>I0** or **@I0**, for example, to initialize the drive). Now you have the simplicity and functionality of your favourite wedge without having to load it in.

The Disk Tools will allow you to: format, copy or BAM copy a disk or copy, scratch, lock, unlock or rename a file. All well and good, but I saw something I didn't like. I formatted a disk in the standard way, and selected a disk to copy. It had 30 blocks free. The BAM copy took eight minutes but, when it was finished, I was surprised to see that the disk name and ID had been changed too! You're treading dangerous ground when you change a disk's ID. I reformatted the disk with Thomas Tempelmann's **Fast Format** and decided not to use that Disk Tool again. I will continue to use **Fast Format and Fast Backup** for those functions, but will certainly lock, unlock, rename and scratch with **Fast Load**.

The machine language monitor has a number of unusual features, as well as an unusual omission — no mini-assembler. This means that there is no way — unless you're a walking op-code encyclopedia — to type in a machine language routine. To do this, you'll have to use another monitor (like **Supermon**) or a symbolic assembler (like **PAL**). This is a painful omission, and probably my main complaint with the cartridge but, to be fair, the number of C-64 users who are writing machine language is probably small compared to the number of users who would like to speed up their 1541s.

It is important to note that early versions of **Fast Load** were flawed. This had such disastrous results as scrambled directories and clobbered files. There are three versions extant. The original version had a photocopied typewritten sheet that did not include instructions for the machine language monitor. Version 2 had typeset instructions, as does Version 3.

Apart from the format of the instructions, how can you find out which version is on your dealer's shelf? With Version 1, if you push the Commodore logo key with **RUN/STOP**, the screen will display **up-arrow ***. In the newer versions, this has been replaced with **up-arrow 0:***. Although the documentation says that there is no way to re-enable **Fast Load** after disabling it, there *is* a way, and it will tell you if you using Version 2 or Version 3. First, type the British Pound sign, then type **RETURN**. Select **D** from the menu to disable **Fast Load**. Now type **SYS 57194**. If this re-enables **Fast Load**, you're using Version 3. Versions 1 and 2 can both be re-enabled by **SYS 57176**.

All in all this is a very handy utility and, in my opinion, its pros far outweigh its cons. So get it, and get it *fast*. □

Dear Epyx:

I have just this week purchased **Fast Load**, and my experiences are all bad. I thought I was alone with this until I opened the *TPUG Magazine* and found that a Mr. Krull of Agincourt, Ontario, has also had the same bad problems.

In my case, I purchased the cartridge and, following the instructions to use the Commodore key and **RUN/STOP** to load, received only a bunch of garbage on the screen. At no time did this function work. And in loading a BASIC program by typing **/filename**, I either received a syntax error or the whole program was more or less scratched. I say 'more or less' because bits of it would be retained — like the name.

Thinking it was just me, and wanting to update my household accounts, I started in on same (I use **Personal Accountant** by Softsync, Inc.). I now have no directory for my personal accounts — the directory is *gone* — and I have no way of retrieving all those accounts I have already entered. Yesterday I took the **Fast Load** cartridge back to the computer store, and they gave me a new one. This one loads, but the drive or computer locks up, and the file is lost.

Frankly, I just can't afford **Fast Load** and until these — I suppose you could call them 'bugs', but I call them faults — are corrected, I suggest that you get the product off the market. I can't believe that you have not also heard from other users that there are very bad problems with it.

Anita A. Feick
Sandusky, Ohio

Products Received

Presented by Astrid Kumas

The following products have been received by TPUG Magazine *in recent weeks. Please note that these descriptions are based on the manufacturers' own announcements, and are not the result of evaluation by* TPUG Magazine.

Chord-Power

Chord-Power for Commodore 64 from New Arts Co., P.O. Box 2700, Huntington Beach, CA 92647. For current price contact New Arts Co.

This program, together with a five-page 'easy-reader' type manual, is designed as a chord reference for guitar players, both beginners and professionals. The manufacturer states that **Chord Power** will display and play over 8000 chords.

The main menu lists the following five options:

- Display chords (main menu)
- How to display chords
- Chord formula construction
- How to use the function keys
- Quit

When the user chooses option 1, a guitar fretboard screen appears together with the list of eight function keys and their assignments. The user responds to the question at the bottom of the screen by entering the name of the chord desired. The chord is played and at the same time displayed graphically: the guitar fretboard shows the notes in the chord and its formula appears on the screen. The chord can be displayed in five possible forms.

Option 2 provides 19 pages of information on how to enter the proper chord symbols, add a note to a chord, and define the lowest-sounding note.

The third option provides an explanation of chromatic and major scales, and shows how the chord patterns are constructed.

I Speak BASIC

I Speak BASIC To My Commodore 64 by Aubrey B. Jones, Jr., from Hayden Book Company, 10 Mulholland Drive, Hasbrouck Heights, New Jersey 07604. Price: $9.95 (US).

Aubrey B. Jones, the author of the book, describes it as "a field-tested computer literacy course that introduces students to BASIC language programming". There are many books on BASIC programming for beginners, but not all of them are 'field-tested', and this is perhaps the factor that makes Jones' book *I Speak BASIC To My Commodore 64* different from all the others. The content of the

Still Sizzling...

Votalker C-64

Votrax has introduced an addition to its Votalker family of speech synthesizers that can speak text automatically as it is entered into the computer and spell words upon command.

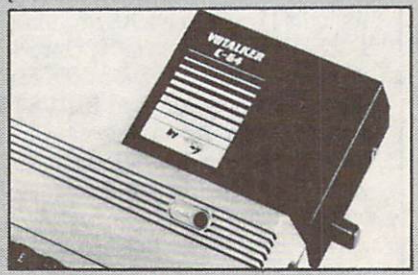
Votalker C-64's capabilities include a screen echo that allows all words, numbers, punctuation marks and other symbols to be automatically spoken as they are printed to the terminal screen.

The unit contains its own amplifier, speaker and external speaker jack, and plugs into the C-64 expansion port. It comes equipped with the SC-01A speech chip, speaks in unlimited vocabulary and has a **SPEAK** command that vocalizes text printed to the screen. **SPEAK** can be used with numbers, phrases and complex expressions, and has pitch, volume and rate control to create more natural-sounding speech.

A **MODE** command offers a choice among three types of text vocalization:

- A conversation mode that reads text in a natural way;
- A verbatim mode that reads text and pronounces symbols;
- A character mode that spells each word, and pronounces numbers and symbols.

Votrax says that **Votalker C-64** can be used as a powerful educational tool for children in the early grades who are learning to read and spell, or it can be an invaluable aid for the visually impaired who can use it as a talking proofreader.



Votalker C-64 is priced at $99.95 (US), and is available directly from Votrax or selected dealers. Until the end of 1985 **Votalker C-64** purchasers are being offered **Trivia Talker II**, a talking question-and-answer game, at no additional cost.

For more information, contact Tad Jones, Votrax Inc., 1394 Rankin Road, Troy, MI 48083, (800)-521-1350 in Michigan, or call collect (313)-588-0341.

E-Link Interface

Progressive Peripherals and Software is shipping their newly-released Commodore serial-to-IEEE interface. The **E-Link** is designed for compatibility with Commodore IEEE peripherals, and is totally transparent to the Commodore 64. **E-Link** has an independent power supply, is microprocessor controlled, and uses no internal Commodore 64 memory. The interface will retail for $99.95 (US).

For more information contact Progressive Peripherals and Software Inc., 2186 South Holly, Denver, Colorado 80222, (303)-759-5713.

Mindscape Games

Mindscape has announced three new graphic adventure games for the C-64 and C-128. **Quake Minus One**, **Shadowfire** and **Lords of Midnight** feature colourful, high resolution graphics and joystick-controlled visual commands.

Each game's suggested retail price is $29.95 (US).

For more information, contact Mindscape Inc., 3444 Dundee Road, Northbrook, IL 60062, (312)-480-7667. □

book, and the way the material is organized and presented, should appeal to readers of all ages. It can be used as a textbook to study from, as a workbook to go through numerous examples, and as a reference book in which to look up some important definitions and points when necessary.

The book contains fifteen chapters, all organized in a similar fashion. Short introductions preceding each part tell the reader what exactly will be learned on the following pages. Then there is a simple and brief explanation of each point, supported by illustrations, diagrams or tables. Definitions and main points are summarized at the end of the chapter, then revised again at the beginning of the next chapter. Exercises and assignments are also included in each chapter.

The first two parts of the book deal with general computer terminology, describe basic parts of a computer, and then introduce the reader to the Commodore 64 keyboard. The following chapters teach BASIC programming, starting with elementary concepts, like key words, commands and statements in BASIC, and then go on to more complex ideas, including arrays, subroutines and functions.

Chartpak-64

Chartpak-64 from Abacus Software, P.O. Box 7211, Grand Rapids, MI 49510. Retail price: $39.95 (US).

Charts and graphs are invaluable tools in analyzing the relationship between different variables such as sales-budget-time, temperature-humidity, health-diet and so on. **Chartpak-64**, designed for the Commodore 64, simplifies their preparation. The user types in the data in as many as four sets, each set including up to 200 entries, then selects the chart type (pie, bar, line or scatter chart or graph).

Charts can be printed out in small or large size. (The small size prints one printer pixel for each screen point, the large one is double in both directions.) **Chartpak-64** supports the 1526, 1525E, MPS801, Epson, Gemini, Okidata (b/w and colour) and Siemens P88 printers.

Chartpak-64 is a fully menu-driven, interactive program. By choosing a number from the main menu, the user can input and modify data, define, display, save and print out the charts, execute file commands and save/restore the graph screen. It will handle 'DIF' files and charts, file conversion and data reduction — a useful feature that allows four arithmetic operations on data sets. The following data reduction techniques are included in **Chartpak-64**: data set average and standard deviation, least-squares and exponential smoothing. Two-dimensional graphs can easily be plotted using the least-squares method.

The manual and the program disk come with sufficient tutorials to give a good inside look into **Chartpak-64**. Abacus Software is aiming this program at business and schools.

Cheatsheet

Leroy's Cheatsheet for Easy Script from Cheatsheet Products, P.O. Box 8299, Pittsburgh, PA 15218.

For users who are learning **Easy Script** on the C-64, and for those who use it quite often, but not often enough to remember all the commands, this keyboard overlay will be helpful. I use it myself at home. Switching from CBM 8032 (which I use at work) to C-64, and using different word processors causes problems sometimes, and this is when I really appreciate not having to dig into the manual.

For current price and availability contact the manufacturer at the above address. □

Calendar of TPUG Events

Meeting Places

Brampton Chapter: Central Peel Secondary School, 32 Kennedy Rd. N. on the second Thursday of the month, at 7:30 pm in the Theatre.

Business Chapter: TPUG Office, 101 Duncan Mill Rd., Suite G-7, Don Mills, on the third Tuesday of the month, at 7:30 pm.

Central Chapter: Leaside High School, Bayview & Eglinton Aves. on the second Wednesday of the month, at 7:30 pm in the auditorium. For 'advanced' computerists.

COMAL Chapter: York Public Library, 1745 Eglinton Ave. W. (just east of Dufferin) on the last Thursday of the month, at 7:30 pm in the Story Hour Room (adjacent to the auditorium). Note: location may change in October — for latest information call 445-9040.

Commodore 64 Chapter: York Mills CI, 490 York Mills Rd. (east of Bayview) on the last Monday of the month, at 7:30 pm in the cafetorium.

Communications Chapter: York Public Library, 1745 Eglinton Ave. W. (just east of Dufferin) on the first Wednesday of the month, at 7:30 pm in the Story Hour Room (adjacent to the auditorium). Note: location may change in October — for latest information call 445-9040.

Eastside Chapter: Dunbarton High School (go north on Whites Rd. from the traffic lights at Highway 2 and Whites Rd. to next traffic lights; turn left to parking lots) on the second Monday of the month, at 7:30 pm.

Hardware Chapter: York Public Library, 1745 Eglinton Ave. W. (just east of Dufferin) on the second Tuesday of the month, at 7:30 pm in the Story Hour Room (adjacent to the auditorium).

New Users Chapter: TPUG Office, 101 Duncan Mill Rd., Suite G-7, Don Mills, on the third Monday of the month, at 7 pm.

SuperPET Chapter: York University, Petrie Science Building (check in room 340). Use north door of Petrie to access building. On the third Wednesday of the month, at 7:30 pm.

VIC 20 Chapter: York Public Library, 1745 Eglinton Ave. W. (just east of Dufferin) on the first Tuesday of the month, at 7:30 pm in the auditorium.

Westside Chapter: Clarkson Secondary School, Bromsgrove just east of Winston Churchill Blvd.

Are you interested in organizing some other interest group in the Greater Toronto area? Please let the club office know, by mail, phone or TPUG bulletin board.

NOVEMBER

MON	TUES	WED	THURS
			1
4 Eastside	5 VIC 20	6 Communications	7
11	12 Hardware	13 Brampton Central	14
18 New Users	19 Business	20 SuperPET	21 Westside
25 Commodore 64	26	27	28 COMAL

DECEMBER

MON	TUES	WED	THURS
2 Eastside	3 VIC 20	4 Communications	5
9 Commodore 64	10 Hardware	11 Central	12 Brampton
16 New Users	17 Business	18 SuperPET	19 Westside COMAL
23	24	25	26

Bulletin Board

Peninsula Commodore Users

Owing to space limitations, we no longer publish TPUG Associate Club lists on a regular basis. However, we are happy, when space permits, to introduce our readers to Commodore users' groups on an occasional basis. Readers in Virginia, for instance, should know about the **Peninsula Commodore Users Group**, P.O. Box L, Hampton, VA 23666. It was organized three years ago, and has over two hundred members. They meet the second Friday of each month at Christopher Newport College, room 145, in Gosnald Hall. PCUG publishes a newsletter, and about six months ago they started a bulletin board that has been very successful. For more information, contact acting PCUG president Daniel Hubble, 872-8618.

One-liners

Here's a fast UNNEW for the C-128 that you can type in after a reset, to recover a crashed program:

```
poKepeeK(45)+256*peeK(46),1:
sys20214:delete63999
```

If you were using a graphics screen when your program crashed, you should define a graphics screen in direct mode before attempting the **UNNEW**.

While we're on the subject of the C-128, Darrell Grainger recently reported a possible bug in the 1571 disk drive. Apparently, this drive occasionally times out instead of returning a 'read error' message, resulting in a 'device not present' message instead. One condition that can give rise to this effect is if the drive door is accidentally opened during a save operation. Other kinds of read error may also produce this effect.

And if you ever want to do an 'exclusive or' of two numbers in a Commodore BASIC that lacks an **XOR** function, you can use the following:

```
c=(aorb)and(32767-(aandb))
```

This is equivalent to the C-128 instruction:

```
c=xor(a,b)
```

Unclassified

This space is for the ads of TPUG members. Wanted or for sale items only. Cost is 25 cents per word. No dealer ads accepted.

For Sale: 4040 disk drive $700. E. Cowan, Box 605, Parkhill, Ontario, N0M 2K0.

For Sale: Commodore 8032 computer, 8050 Drives, MX-80F/T Printer, WP4+, Basic Compiler, Manager and Kram. $1700.00/Best Offer. Call Mike (416) 431-1597.

For Sale: SuperPET, 4040 Drive, 4023 Printer, WP4+, Oracle, CalcResult. $2000.00 or best offer. Kingston (613) 389-6115.

For Sale: 8032 plus 8050 dual drive plus MX80F Epson printer — excellent condition. $2000.00. Call (416) 274-5244.

CBM 8096, 8050, 8023P. Silicon Office, CalcResult, manuals, more. Best offer. Call Ron (416) 920-1994, days.

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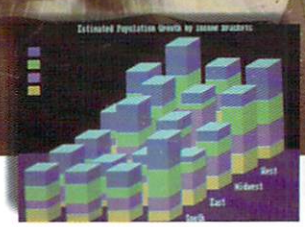

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