THE TORPET

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The INDEPENDENT Commodore Users' Magazine **No. 24 October 1983**

C-64, VIC and PET Printers

What is CP/M to Commodore?

Butterfield and his PETs (see page 4)

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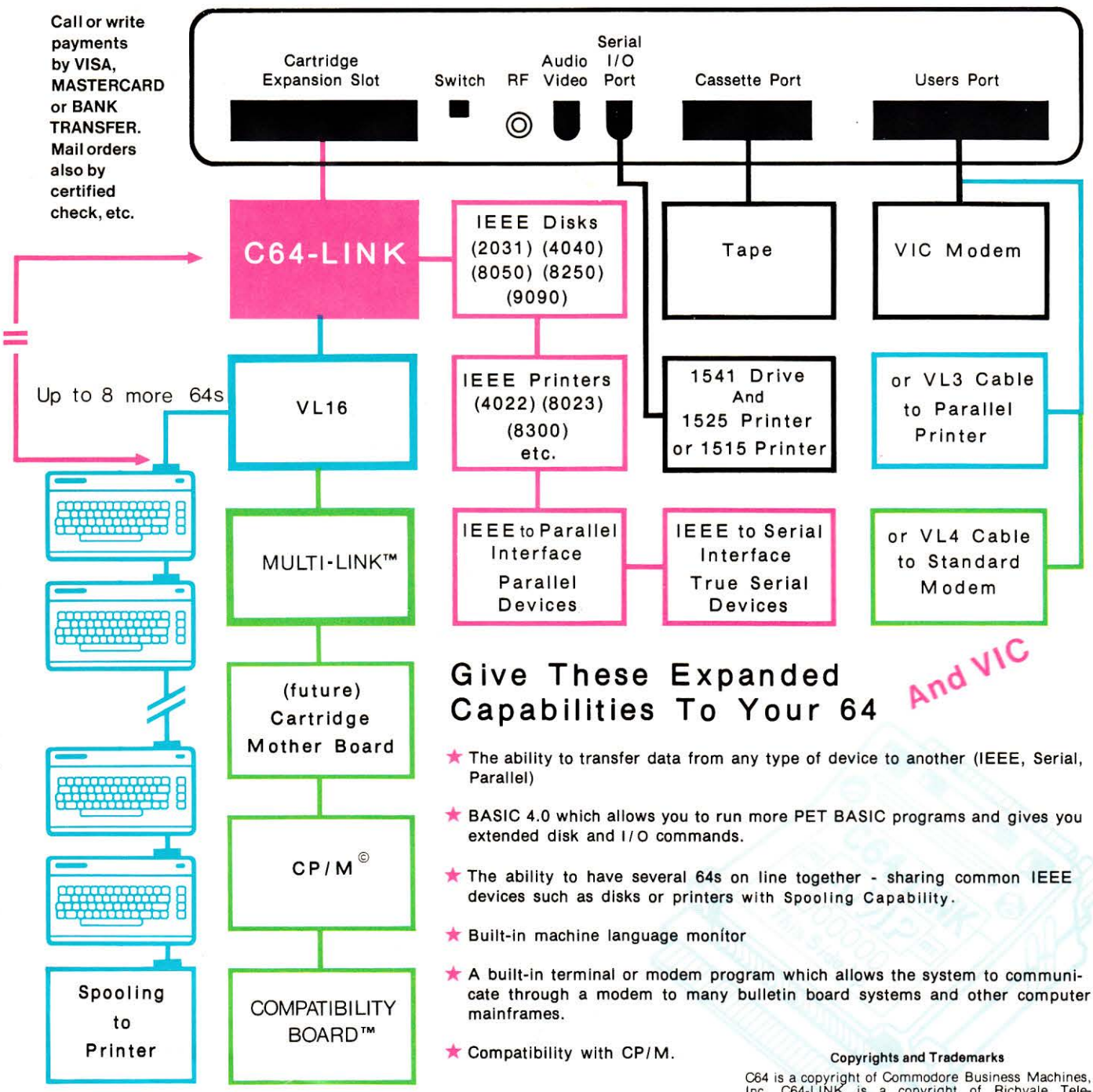

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CALENDAR OF TPUG EVENTS
☆ FALL SCHEDULE ☆

ANNUAL BUSINESS MEETING - Thursday, October 6, at Leaside High School, Bayview & Eglinton Aves. at 7:30 p.m. in the auditorium. Regular members are voting members.

CENTRAL CHAPTER - Leaside High School, Bayview & Eglinton Aves. at 7:30 p.m. in the auditorium for **PET/CBM/SuperPet**

Wed. Oct. 12
Wed. Nov. 9
Wed. Dec. 14

VIC 20 CHAPTER - York Public library, 1745 Eglinton Ave. W., (just east of Dufferin) at 7:30 p.m. in the auditorium

Tue. Oct. 4
Tue. Nov. 8
Tue. Dec. 6

NOTE: New location and date for VIC 20 meeting. If driving (whether from the east or the west), approach the parking via the street east of the library (Glenholme), and keep bearing to the right. The parking lots for the library and for the separate school are both right behind the library. Both parking lots should be available.

Commodore 64 CHAPTER - Earl Haig S.S., Kenneth & Princess Aves. (6 blocks north of Sheppard, 2 blocks east of Yonge) at 7:30 p.m. in the auditorium

Mon. Oct. 31
Wed. Nov. 30

WESTSIDE CHAPTER - Wed Sept. 21 at Sheridan College, Trafalgar Rd., Oakville at 7:00 p.m. in the cafeteria--**Moving in October** to Clarkson Secondary School, Bromsgrove just east of Winston Churchill Blvd. (south of the QEW) at 7:30 p.m. in the Little Theatre for **PET/CBM/VIC 20/Commodore 64**

Tue. Oct. 18
Tue. Nov. 15
Thu. Dec. 15

MACHINE LANGUAGE CHAPTER (6502) - Call Jim Carswell at 416/531-9909 for additional information.

VIC 20/Commodore 64 Assembly Language and Communications Group - Earl Haig S.S., Kenneth & Princess Aves. at 7:30 p.m. in the auditorium

Wed. Oct. 5
Wed. Nov. 2
Thu. Dec. 1

TPUG ASSOCIATE CLUB CHAPTER MEETINGS

PET Educators Group (Windsor)
- meets at Windsor Separate School Board Media Centre, 1485 Janette Ave. on the 3rd Wednesday of each month (not July & August) at 7:00 p.m.
Contact John Moore **519-253-8658**

London Commodore Users Club
- meets at Althouse College of Education on the last Monday of each month at 7:00 p.m.
Contact Dennis Trankner **519-681-5059**

Genesee County Area Pet Users Group
- meets at Bentley High School on Belsay Rd. on the 3rd Thursday of each month at 7:00 p.m.
Contact Gordon Hale **313-239-13669**

Sacramento Commodore Computer Club
- meets at SMUD Building Auditorium 6201 S Street on the 4th Monday of each month at 7:00 p.m.
Contact Geoff Worstell **916-961-8699**

Michigan's Commodore 64 Users Group
- meets at Warren Woods High School in Warren on the 3rd Tuesday of each month at 7:00 p.m.
Contact Chuck Ciesliga **313-773-6302**

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LETTERS

WARNING!

I'd like to bring your attention to an article in the February 1983 TORPET. This article, by John Ason (Interfacing A Commodore 64 to A Vudeo Monitor), on Page 34, mentions the use of Audio Cable (Part #42-2371 Radio Shack) for Video hookup. Upon doing this, I have blown my Commodore 64. I am told that Audio Cable (32 OHM) is not proper Impedance for Video (75 OHM) hookup.

After making numerous 'phone calls, I was told the repair would cost between $80 - $120. I decided that I'd call Commodore service in PA. I explained the unfortunate circumstances to Gary Bombich at Commodore. Fortunately, he offered to replace my computer with a new one; if I sent him copies of the incorrect ad. To say the least, I was quite happy with this offer and considered it worth the long distance 'phone call.

Perhaps you should print another article on this subject specifying 75 OHM (possibly mini 9u) cable be used instead.

I certainly hope no one else has encountered this situation besides Mr. John Ason and myself, but under the circumstances, we may see a flock of blown-up computers, due to other similar articles I have read.

1. MIDNITE PAPER (Aug/Sept. issue)
2. CHIP CHATS*(Sept. issue) *Central Fla. Com Users Group

Well, at least I'll get to replace my year-old 64 with the latest model at no charge. I only hope this model will be better than my original one.

Concerned Member
Tim Bartels
#2959

The article of Ian A. Wright in #22 of THE TORPET, was very informative. I, too, have been experiencing 1541 disk drive problems and I hope to use my drive better as a result of the "Tips & Tricks" in the article.

Two points may add to the article. When the red light on the disk drive flickers during a LOAD or SAVE, it probably means the head needs alignment. Get it fixed. Ian Wright mentioned the problem of SAVING onto a single diskette using both a 1541 and a 4040 drive; a similar problem occurs when you SAVE on one drive before and after a disk alignment. It causes bad troubles. On this second point, I have a question. If a disk has been used on one drive, can it be reNEWed on another drive or on a realigned drive and give good results?

Brian Schott
#4550

I bought my first PET in 1979, and am on my third, 8032 + 8050 + MX80. I am letting my subscription to COMPUTE, COMMODORE (the micro magazine) and MICROCOMPUTER PRINTOUT lapse because of the dearth of articles, other than VIC and 64. I hope that your newsletter and club library will be more appropriate to my hardware and interests.

J. A. Gray #9802
Dhahran, Saudi Arabia

The TPUG organization is doing an excellent job and I congratulate all involved in the running of the administration and the production of the TORPET.

Donald Warf #1446
Thunder Bay, Ontario

You are doing such a fine job with the club and the TORPET--each new issue amazes me.

It was interesting to see M. Bonnycastle's remarks concerning the lack of documentation with the contest entries. That is exactly the remark I made last month concerning the club library programs. Some simply defy you to find out how they run.

If I might make a suggestion: Some of us are abysmally uninformed about computers and know little of the specialized language. For example, what is a boot and how is it used? Perhaps a short article written by one of the resident experts could assist us. By the way, I noticed the "New Additions" listings. Thank you! That's a big help.

Gordon W. White #3401
St. Catharines, Ontario

Greetings to TPUG from Florida and congratulations on a better than ever TORPET. Keep up the work!

B. W. Putriment #2601
Shalmar, Florida

I have just finished rereading T.S.'s letter on page 3 of the May TORPET, and I, too, feel some frustration with TORPET and TPUG, but the nature of my frustration is missed in that letter.

Let me start by saying that I am not a computer novice nor am I new to micros or PET/CBMs. I have worked as a D.P.(data processing) professional for more than 10 years, so I think that my problems are shared by most associate members.

Although the club librarian has worked hard to maintain current listings of available software, everyone seems to assume that the readers know what this software does and which pieces work together with others.

The very articles to which T.S. refers in his letter stated that there was free w.p. (word processing) software available from the club. If one doesn't live in Toronto, how is one to find this software in the library? What do all the programs which start out "wp*" do?

I am willing to help work on the project which is called for, and I think that only remote associate members have the interest.

Andy Wasilewski #2093
Raleigh, North Carolina

I think that you have done a great service for PET users. You have added a great deal of value to the Commodore Hardware and I hope they appreciate your efforts. I know I do. Thanks,

Jack Awbrey #5269
Alabaster, Alabama

Cover Story

CATS AND COMPUTERS

by Jim Butterfield

I'm not alone in this. Several other computer users tell me that they, too, have a three-way interaction: themselves, computers, and their cats.

Two of my feline freeloaders accept the fact of the computers. If there are important announcements to be made about food service or the opening of doors, they usually know where to find me. Maud or Cobweb will come to the door of my study, make the appropriate demand, and then wait for me to comply.

Sasha, however, fancies herself as a programmer.

I thought at first it was the warmth of the computer that led Sasha to perch on top of it while I was at work. After all, cats like warm places. Liz Deal tells me that cats on the disk file can become significant problems--the shedding of cat hair into the disk mechanism does not seem to improve disk performance. Fortunately, my disk is safe: it has a printer perched on top, and Sasha won't go near it.

For a while, keyboard and screen were of interest. I have had a number of cryptic messages left on the computer by little paws trailing across the keys. None of it ended up as viable program lines. For months, the flashing cursor was of interest. There seemed to be a mouse inside the CRT, and from time to time, a paw would flash down and across my line of vision to tap at the cursor.

The real truth of Sasha's interest in computers seems to be involved with lines of attention. Cats have a marvellous way of detecting when attention is being paid to something. And if that something is not themselves, they often feel that they should do something about it.

Most cat owners have noticed the television thing. The cat notices that a lot of attention is going in the direction of the TV set. The cat's brain sorts it out this way: "If attention is being paid in that direction, and if I go in that direction, then attention will be paid to me". The cat marches in front of the television set and arches its back, waiting to be admired. It always seems to come as a shock to the cat when viewers are less than enthralled.

I think sitting on paper fits into the same category. (For non-cat owners: most cats finding a piece of paper seem to feel that the most clever thing in the world is to sit on it; they will do so and then look around for someone to admire them). Cats observe that humans seem to pay a lot of attention to pieces of paper. Thus, sitting on any paper that may be found will ensure that they get attention. It doesn't work, but this does not seem to discourage most cats. It has occurred to me that cats would make splendid paperweights if they didn't get distracted and ramble off to do something else.

My examination of many program listings and dumps has been abruptly aborted by the arrival of eight pounds of sepia fur on the document in question. The cat always looks so pleased. It purrs, grins, and looks for admiration for its cleverness. This psychology usually works; it's hard to give the heave-ho to an animal that is so visibly pleased with itself.

And in fairness, it's often a good thing to have an occasional forced break in an intense train of thought. It's easy to get caught up in some coding wrangle and lose touch with other things that need to be done...such as going to bed at a reasonable hour.

During his Commodore days, Karl Hildon, editor of "The Transactor", asked to use some equipment in my house for display at a trade show. Later, Karl told me that he had a lot of trouble at that show. Not until the exhibit was in place did he notice the numerous faint paw prints on top of the computer. He would be talking to show attendees, glance over at the computer and start to giggle. Karl never asked to borrow any equipment from me again.

Maybe it's a good thing to have distractions such as cats around, to break the intense chain of concentration that we can get caught in. Then again, I wonder if I'll ever have the courage to buy one of the newer input/output devices that are now being used with computers. It's called ... a mouse.

CP/M

WHAT REALLY IS CP/M?

by Steve Rimmer (Computing Now!, April, 1983)

Reprinted by permission from (Computing Now!, April, 1983)

A very long time ago, eons measured in machine cycles, a company down in California that wasn't much of anything at the time released a disk operating system written for the 8080 processor called CP/M. Nobody was particularly sure what CP/M was, or what it was good for, or why they needed it right then because, in fact, you had to own a middle Eastern sheikdom to even afford a disk drive at that particular juncture of history. However, Digital Research put ads for the thing in Byte and Kilobaud and obviously managed to sell enough of it to stick around.

As the price of disks, and computer hardware in general, came down, and more people got into doing practical things with their computers above and beyond making the lights on the front panel count up to sixteen in binary, there came to be a need for a way to intelligently deal with disks. Early disk users were constantly being forced to re-invent the wheel of file handling and error trapping, which was a drag, and, as such, people started to buy disk operating systems. It was at this time that CP/M began to be recognized for what it truly is; a slow, archaic, poorly written piece of software which just lucked out and happened to do exactly what a lot of people happened to want to do. The lads at Digital Research began to take in money.

There are two groups of people in the world as regards CP/M. First off, there are the enlightened few. Secondly, there are about four billion examples of the totally mystified. If you are within the latter contingent you might want to read on and see what all the furor is about.

Central Control

A good way to explain exactly what CP/M is...somewhat...is by using a PET. A PET can't actually run CP/M, as it has entirely the wrong processor and is actually quite aside from the whole topic. However, ignore that. It happens that machine code programs which are written on one PET (or, in fact, any CBM computer) will run on any other type of PET due to the existence of a ROM architecture called a Kernel. This is also referred to as a "jumbo jump table".

A jumbo jump table is a minor waste of memory which lives up at the very top of the CPU's address range, up in the FF's. All it is, is a great string of JMP instructions to other routines in the ROM which could have been jumped to directly. However, as it is, these routines are at different locations in every different permutation of PET that's been released. The locations of their corresponding JMPs in the jumbo jump table, however, are all the same. Thus, for example, a programmer can write a program which jumps to location $FFD2 to print a character on an old ROM 8K PET and know that it will run just as well on a brand new VIC 20. All the useful I/O is handled through the jumbo jump table.

This is what CP/M does, on a grander scale. It consists of two bits, primarily. First, there's the CCP, which takes what it is given, both in terms of instructions from the human world and calls from machine language programs and deals with them. Secondly, there is the BIOS. The CCP is the same on everybody's system, and, whenever it wants to communicate with some peripheral, like the screen or a disk, it flags a character at the BIOS and says something like "this goes to the screen. Where the screen happens to be is your problem. I'm going for a nap."

The BIOS is system specific. It is written especially for whatever computer is using it. It knows which ports have which peripherals and how to deal with all the

CP/M

I/O. It is, in the normal course of events, the only thing which needs know what system a program is running on. The actual software can go from an Osborne to a Multiflex to a Xerox to a Northstar and on and on without ever having to have a single byte changed.

Highly useful stuff, this, and it's all the theoretical headbending we're going to get into. For, you see, CP/M does a great deal more. It's not just a peripheral handling routine. When you buy a CP/M package you get between one and two dozen useful little programs, called utilities, and, as the documentation on them isn't all that explicit as to exactly what they're for, it may be worth a dig to find out just what all the file names do when you let 'em rip.

COMmunism

When you turn on your computer and load up the CP/M disk, the machine will start itself up, called a "cold boot", print a copyright notice and give you a

A►

which is called a prompt. It means that you are "logged on" to disk drive A. This, in turn, means that anything you do will happen to the files on disk drive A unless told otherwise. A bit of a waste if you've only got one drive on your system, I suppose...

If you type a B: and a carriage return you'll be logged onto disk drive B. A letter with a colon after it always refers to a disk drive.

If you change the disk in the drive you are logged onto, you will have to get the attention of the computer again and tell it that you've upset its precise little environment by causing it to execute a "warm boot". A warm boot is what happens whenever the machine wants to return to just being logged onto a disk, and looking at a prompt, after running a program. Since you haven't run a program you'll have to do it by hand by typing a CTRL C. this will give you a new prompt on a new line.

A CTRL C is just a way of making the machine ignore the fact that what it's looking at isn't exactly what it was expecting, which is what it will see if you've swapped disks unexpectedly.

There are a few other CTRL codes that CP/M will recognize. CTRL H is the backspace, and is probably generated without your being aware of it by the DEL key of your computer. CTRL X will wipe out a whole line of text without backspacing to the prompt by hand. CTRL R will retype a line, which isn't very useful on a screen, but was good when computers used teletypes. As was mentioned previously, CP/M has its archaic bits.

CTRL P echoes everything on the console out to the printer. Hitting it once toggles it on, and hitting it a second time shuts it down again. CTRL S stops whatever is happening on the screen until the CCP receives a second CTRL S... essentially a "HOLD" key.

The Built-ins

CP/M can do five things all by itself, none of which are much good all by themselves, but they do take on enormous proportions later on. Specifically, it can execute the built in commands ERA, SAVE, REN, DIR and TYPE. These are **erase** a file from the disk, **save** some pages of memory as a file on the disk, **rename** a file on the disk, put up a **directory** of the files on the disk and **type** a file from the disk onto the console...which is what CP/M likes to call the screen.

First off, it is useful to note that when you put a file on the disk with CP/M...a file is anything that's stored, such as a program, a text file and so on...the system stores the file proper somewhere, but, before doing this it puts the name of the file and a pointer to where it will be on the disk into what is called the directory track. This means, for example, that when you tell the CCP to get you a particular file, it doesn't have to go through the whole disk...which would take many

minutes...but just to scan through the directory and get the location of what you're after. This also means that erasing a file just involves destroying its name and its pointer on the directory track. Later disk writings will overwrite its actual contents as the space it occupied before erasing won't be protected by pointers.

DIR produces a directory simply by printing up the directory track in an attractive format.

There's an interesting thing about DIR, though. It can use wild cards. Wild cards are called "ambiguous specifiers". The wild card symbol is an asterisk. Whenever you use a wild card you are telling the CCP "this part of whatever I'm talking about can be anything that will fit." File names in CP/M consist of eight letter names left of the period, a period (you might have guessed that) and a three letter extension. The extensions are meaningful; we'll get to that. If, for example, you wanted to see what files were on the disk which had the extension .COM, you could use a wild card with DIR. DIR* .COM refers to all .COM files. If you wanted to know what files began with the letter Q, you could say DIR Q*.*.

Wild cards work with DIR and ERA. If you ask ERA to use *.*, which means all files with names (all files), it will ask you if you really want to go ahead and kill off everything on the disk.

The built in commands, as is usually the case with all CP/M programs which relate to the disks, can also use disk specifiers. For example, if you wanted to know what files were on disk B you could log onto it and then call for DIR, or you could say DIR B:, which would look at B while still on A. You can also say B:DIR, which is not quite the same thing, as it is saying "log onto disk B for a second and do a DIR".

All the otner commands associated with CP/M are called **transients**, as they get loaded into RAM, executed and then trashed. A transient is called a COM file. The CCP is set up so that the only kind of file it will recognize as a runnable program and thereupon try to execute it one with the extension COM.

A COM file can be invoked...a fancy way of saying "run"...by typing its name. PIP COM is a runnable COM file. To do a PIP you'd just type PIP and a carriage return. Now, as to why anyone would want to PIP.

PIP And Other Wonders

When you get your CP/M disk, it will have a number of programs on it, as we've said, and none will immediately make sense because they're not really supposed to. Exactly what you get will vary with the supplier of your CP/M package. CP/M suppliers are software houses which, essentially, take the generic CP/M package, write BIOS's to suit specific popular computers and then package the whole works up in a reasonably understandable fashion. Among these software houses are Lifeboat, National Multiplex/Pegasus, Pickles and Trout and Magnolia. Most of these suppliers also add their own utilities to the pot, which will confuse things.

The most useful program on the disk is called PIP, which stands for Peripheral Interchange Program. Its primary use is in copying disk files, but it has a large number of options available on it. We won't look at them all, as some are really obscure, but it will be useful to understand exactly what PIP can accomplish.

PIP is set up to provide communication between any peripheral on a system, and CP/M treats virtually all I/O as peripherals. This includes the disk drives, the printer, the screen and keyboard and any ports. It is an interesting bit of prehistory, actually, to see what CP/M calls its peripherals...excluding the drives there is CON, for console, LST, for the list device, PUN, and the **card punch** and RDR for the **card reader**! What, no card reader on your system? It doesn't matter...nobody else has one either. These virtual devices are just references, and can be assigned to any ports you like.

The CON is usually assigned to the keyboard and screen. The LST is the printer. The PUN and RDR become the serial port and we're out of the vacuum tube age.

PIP can, first off, be used just to communicate between disk drives, which is what it defaults to doing if it isn't told to work with one of its assigned peripherals.. To move a file from one drive to another, one can say PIP A:=B:FILENAME. One can also change the name of the file in the process by specifying a destinatiion file name for PIP to load the data into, i.e., PIP A:WOMBAT.DOC =B:PENGUIN.DOC. If both disks involved happen to be the same, you'll copy the file on the same disk.

If there happens to be a file called WOMBAT.DOC on disk A prior to PIPing, most versions of PIP will cheerfully overwrite it. Some tell you about it and inquire after your feelings on the matter.

In the same way, PIP can be used to communicate with its peripherals. For example, you could say PIP PUN: =A:WOMBAT.DOC to send a file out to the serial port. In this way, files can be PIPed between two machines which don't have other, fancier communication software.

PIP has a number of options which can be selected by toggles. Toggles are enclosed in square brackets after the stuff we've just been looking at and are valid for the one command line only. There are quite a number of these things, but only a few are immediately useful. To wit, these are V,E,F and Z.

All PIPing should be done with V toggle in use, as it causes PIP to verify what it copies. Thus, moving files around should be done as PIP A:=B:WOMBAT.DOC[V] to insure that what you send is what you wind up with:. The E toggle causes whatever is being PIPed to be echoed up to the CON device, i.e., the screen. The Z and F toggles are used together, and have one practical function of stripping off the high order bytes in text files created by some word processors, such as Wordstar.

There is actually a heap of other things that can be done with PIP, but these functions tend to be more specialized, and, as such, can be dug out of the Digital Research manual if and when they're required.

Another useful disk utility is STAT, which is very much less complicated than is PIP. If you type STAT you will find out how much free space is on the disk in question.

ASM is a Z-80 assembler. It takes a text file of Z-80 machine code mnemonics and does the first pass of an assembly which will eventually produce a COM file. These text files are identified by the extension ASM. You may have DUMBTERM.ASM on your disk. If you were to type ASM DUMBTERM.ASM you would be on the way to getting DUMBTERM.COM...which is probably a bit pointless as this file is usually already provided. However, it's the idea that counts.

ASM also checks for compilation errors.

It is beyond the scope of this article to get into writing Z-80 ASM code. Suffice it to say that once you have done so, or obtained some from some other source (infinitely easier), you can ASM it and, if it is error free you will have, along with your ASM file several other files with the file name of your original ASM file but the extensions PRN and HEX. PRN is a second text file which has the original ASM file's statements plus the resulting object code plus any ensuing error messages. Hex is just the object code in textual form.

The HEX file contains a bunch of hexadecimal numbers which must be converted into actual bytes. This is done by a second utility called "LOAD". If you type LOAD WOMBAT you will get a file called WOMBAT.COM which can be executed. The PRN and HEX files can be erased afterwards.

DDT is another assembly language tool which, once again, is too heavy to cover in this article. Basically it is a very complex run time environment simulator which permits the programmer (yourself) to execute

programs in a controlled setting so you can watch them and keep them paranoid. It has a dis-assembler for looking at little bits of object code and a simple interpretive assembler for doing "patches"...quick fixes on your program.

SYSGEN is the system generator. It is primarily useful when you are making up new disks. It can copy the system from an existing disk onto a new one. Depending upon whose SYSGEN you use, you may be able to specify a number of the parameters involved in this transfer. SYSGEN can also take a system out of memory and install it on a disk, which permits one to modify the CCP and then install it as a working system on a new disk.

FORMAT sets up the data storage format for a new disk. In most cases, you can specify single, double or extended density formatting. There is an obvious trade off here; high density means more data on the disk, but it also means that each track occupies less area, which means that glitches that arise in the magnetic surface are more likely to cause later problems. Extended density disks will tend to have shorter useful lives for this reason, and very cheap disks will often not be much good formatted at high densities. Disk errors will show up as BDOS ERROR, WRITE ERROR, READ ERROR and so on.

DUMP is a program which will take any sort of file and display it on the screen. On the left hand side of the display will be the file in object form, a bunch of hex numbers. In the more useful versions of DUMP the right hand side of the screen will have ASCII characters for all the printable hex values which permits one to get oriented amidst the stream of data flowing by. DUMP is executed by typing DUMP WOMBAT.COM, or whatever.

Further Adventures

Knowing how CP/M works is only half the battle. You can actually get that, for the most part, from the Digital Research books if you are prepared to dig a little. Well, a lot then. However, there are a number of conventions which have grown up around CP/M in the years since it was first handed down from on high and these are very useful to keep in mind.

First off, it will be noted that one Digital Research transient which we haven't looked at is the one called ED. ED is described as a "powerful contextual editor. ED is too archaic even to contemplate using, and is best ignored if you have something better to hand.

Wordstar is coming to be pretty well universal on CP/M systems. It's expensive but worth it, as it does double duty as a word processor and program editor. The D option does letters and text, providing justification and generally messing things up with control characters. N is for non-documents, such as ASM files.

You can't Wordstar with a COM file. You also can't TYPE one.

Files come in all types. Wordstar consists of WS.COM, which is what you type to get it going, plus two or three OVL files, depending upon which version you have. These contain the overlays, which include the menus and certain optional routines which get called in upon command. Wordstar also creates files, these called BAK files, which contain the version of the document being edited prior to editing.

BAS files are programs created by MBASIC, the CP/M version of Microsoft disk basic. MAC files are ASM files for a different assembler program, called MAC. MAC itself produces a different type of file called SYM, for symbols. MAC'd files are still LOADED in the usual way.

Then there are C files, for files to be used with a C compiler, usually BDSC. DOC files refer to on-disk documentation. If, for example, you get a file called PROGRAM.COM and another called PROGRAM.DOC, the COM file is to be run and the DOC file is to be TYPEd to see what's going to happen. Tarry not over a program called DOC.COM, which is a utility.

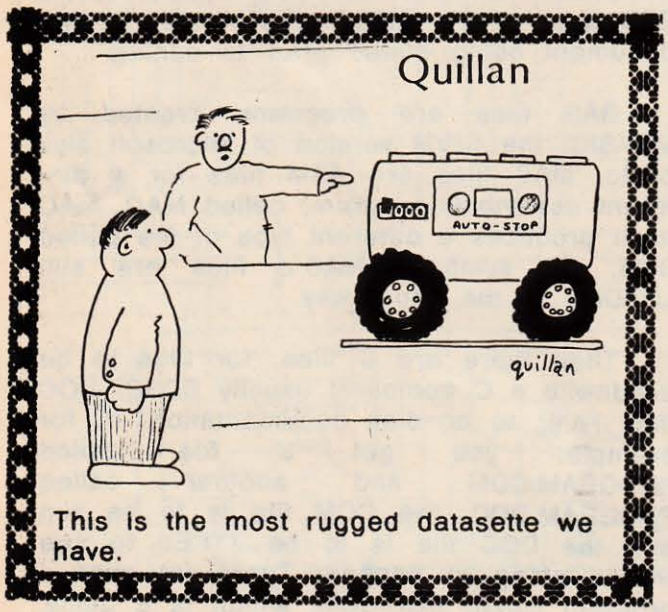
There are also OBJ files, for object code. These are just COM files that won't

run because the CCP wants to see the word COM. These can be renamed into COM files and executed.

$$$** files are encountered only when something has gone wrong. For example, if you try to PIP a file onto a disk which has a bad sector or insufficient room to accommodate it you will get a file with the right name but a **$$$** extension, indicating that it's a disaster. **$$$ files frequently occupy no space at all on the disk, being there only as indications that something is amiss.

Lastly, there are QQQ files, or squeezed files. If a normal file with an extension is squeezed, the middle letter of the extension will be changed to Q. If it had no extension, all three letters become Q. However, it's interesting to note that a squeezed file retains the name of the original unsqueezed file at the beginning of it, and, even if the squeezed version is renamed prior to unsqueezing the straight file will come out with its original name and extension.

Squeezed files are files that have been specially compacted to take up the minimum amount of room.



This is the most rugged datasette we have.

In DISKguise

This is certainly not all there is to CP/M; it's a vast and complex operating system. However, these have been some of the more useful conventions and general bits about the system which should make getting into it a little easier. Many disk operating systems have tried to improve on this aging beast but none have even begun to approach its widespread use. There are more sophisticated programs available for CP/M than for practically any other small operating system, and, while it's far from optimum in many respects, its very lack of specialization has made it suitable for a huge number of applications.

You just have to ignore the references to card punches.

(We could have written a new article but this one seemed so well done we wanted to share it with any of you who missed it. -ed.) ●

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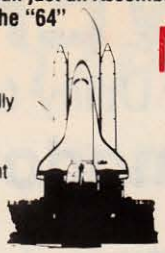

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CP/M

CP/M ON THE C-64

by Fred Wallace Windsor, Ont.

CP/M is a registered trademark of Digital Research

Few accessories from Commodore have been as eagerly anticipated as the CP/M package. Like so many programmers, I use CP/M daily and could never really understand why it was so long in being made generally available to us Commodore types. After all, I first saw one of Commodore's demo machines running it almost a year ago. And doesn't each and every C-64 carton promise its availability? Nevertheless, it's out now, and with visions of being able to run all my "big machine" FORTRAN programs in color, I eagerly rushed out for an early copy.

The package supplied by Commodore consists of three major parts: a somewhat oversize cartridge which plugs into the expansion slot at the rear of the C-64, a diskette in 4040/1541 format containing the operating system and skeleton programs, and a manual. Installation was no problem as the instructions given were complete and correct: you just plug the cartridge in, and then use the familiar

```
LOAD"*",8
RUN
```

sequence to start the program.

In my case, however, this marked a substantial gap in my testing. I could not get the system to go, and investigation proved that the problem was caused by several bad sectors on the diskette. They would not read even on another 1541. The dealer exchanged it for me, and then I found that while this one would run, a couple of the important programs supplied on the diskette would not. Back again! The third copy eventually proved to be readable, but despite claims from the dealer involved that he was not having a problem with them, I consider two bad out of three to be a pretty rotten track record. In any case, protect yourself by making sure you purchase from a dealership which is going to be able to help in case something like this happens to you.

WHAT'S CP/M?

But just what is CP/M and why would you want it on your C-64? CP/M stands for Control Program for Microprocessors and it is an operating system which was introduced a number of years ago by Digital Research. It was among the first serious attempts to create a "machine independent programming environment for small machines: that is, a given program could be run, theoretically, on any micro using an Intel-type processor without modification. The operating system would take care of the differences between the machines and permit the program to do its job without having to worry about details such as whether the peripherals were memory - or I/O-mapped.

The attempt was successful to the point that there are now thousands of programs which are "CP/M compatible", and that is of course the attraction. After all, nobody really wants to re-invent the wheel if all that is needed is transportation. The sole catch in the procedure is that you are not processor-independent: you can only run CP/M programs on a processor which is or has a compatible instruction set to the Intel 8080 or 8085, or the Zilog Z-80.

That's why we need the cartridge: it contains a Z-80 chip with support circuitry to enable it to share the memory, peripherals, and busses of the 6510 contained in the C-64.

CP/M

HOW IT WORKS

Although the two processors are both "on the buss" (as long as the cartridge is plugged in), the circuit is arranged so that only one of them can actually be alive at any one time. The C-64 powers up in the normal "BASIC" mode as usual, and in fact the cartridge could be left plugged in all the time so long as a program or game does not accidentally trip the location which transfers control over to the Z-80. Code for the 6510 and for the Z-80 can be freely mixed in memory so long as one doesn't try to run the other's code.

The LOAD/RUN procedure brings into memory a small machine-language program whose sole purpose is to bring in from the diskette the rest of the code - some of it for the 6510 and some (most of it) for the Z-80. When the procedure is complete, things have been arranged so that the Z-80 is now the "main" processor and the 6510 is used to handle I/O procedures through the KERNAL routines. From this point on the C-64 acts as if it were a terminal connected to a Z-80 based micro system.

UP AND RUNNING

For those already familiar with CP/M, the running system is by and large a faithful reproduction of others you have used, with some notable exceptions. The most immediately noticeable is the limitation imposed by the 40-column screen. Most CP/M programs assume 80 columns and may need modification. In addition, DO NOT automatically assume that you can simply run out and purchase an 80-column adapter or program for use with CP/M: most will not work since they rely upon having access to memory areas which are now the domain of the Z-80 chip. Ask the supplier if he can certify compatibility.

The second major difference is speed. CP/M makes heavy use of the disk, especially during such activities as the program development cycle, and the 1541 will be a real disappointment to most people here. Somehow it doesn't seem that slow when it's running BASIC stuff, but when you have to wait nearly 25 seconds for a simple WARM BOOT (a kind of master reset required at the end of just about every CP/M program's execution), it does tend to wear a little thin. Fortunately, the package has been designed to work with the IEEE adapter and associated fast disks, and I have a feeling any serious CP/M'er is going to want one of those really quick.

But the real crunch comes when you want to use commercial software. After all, we now have our machine running a "universal" operating system - let's go get some of those fancy programs that are for sale by the hundreds in the magazines and start running them! Great idea, except the Commodore disk format is different from other 5 1/4" formats, and is not supported by other manufacturers. Of course, this is a temporary barrier, but is a real factor when the inevitable question "What do I do with it now?" is asked. Until Commodore and third-party vendors catch up, only programs entered into the machine by hand are available.

PLUSES AND MINUSES

Devoted Commodore users will miss the screen-edit functions for program creation and modification. ED, the standard CP/M editor which is supplied on the system diskette, is line-oriented and seems archaic after using the full-screen BASIC editing. A full-feature screen edit will doubtless be among the first accessory programs to be made available.

My compliments to the Commodore people for taking such thought with the FUNCTION keys. Under CP/M, each key can be "firm-programmed" to stuff a text string into the keyboard buffer, even including the carriage return. They come already set up with such universally-useful strings as "STAT *.* <CR>", which at least for me save quite a bit of typing.

The manual supplied with the package is unusually high in detail content: an acknowledgement I suppose of the fact that the majority of people buying it are already

quite computer-literate and will want to immediately start poking around in its innards. There are listings of some of the key software, which should enable customizations to be made. But the edition I received contained a polite note apologizing for the fact that some 14 pages (including the module schematic) had been selectively removed by Commodore.

I was somewhat disheartened to discover that not all of the C-64 kilobytes of memory available can be utilized by CP/M -- this is mostly due to the memory sharing described earlier: some memory must be reserved for functions which the 6510 performs. In fact, though, the 48K which is available (44K if you have the IEEE adapter) is sufficient for all but some of the more complex business and scientific software.

The diskette format has been cleverly worked out so that it is not possible, without some really deliberate work, to accidentally overwrite any areas while running the C-64 in its BASIC mode: the diskette allocation map has been prewritten to make it appear to be full at all times. The minus comes when you discover that the normal 170K which is available to BASIC has shrunken to 136K under CP/M. Again, some space was required to store operating-system-related material.

My greatest disappointment, however, was in discovering that one of the devices NOT supported by CP/M at the time of this writing was the serial line (RS-232 port). I have another machine sitting next to the C-64 just loaded with CP/M software, and all I need to transfer it is a serial link. I also make use of a number of bulletin boards, and all I need to access them under CP/M is a serial link. This hole in the machine is primarily a hardware limitation and has caused a remarkable flurry of activity on the data services (notably Compuserve) so I fully expect there to be a solution very quickly from one of the midnight-oil crew. In the meantime I'm working on my own solution short of typing in megalines of code.

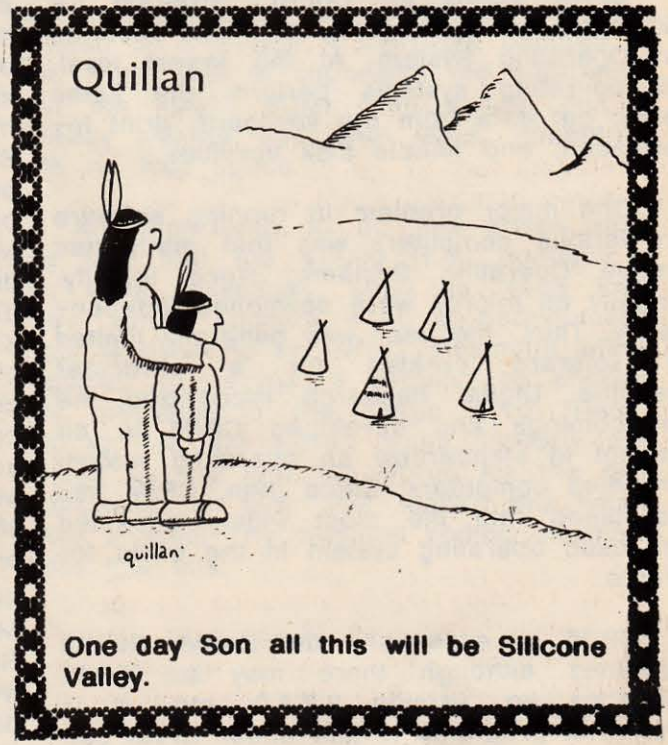
IN CONCLUSION

If you've always wondered what CP/M is, and already have a C-64 and disk drive, this package plus one or two of the excellent texts on the subject is a really economical way to learn (I've listed a couple of my own favorite books below). Similarly, the combination is useful for development of small Z-80 programs, especially if you already have a PROM burner on the unit. As a serious contender in the market for experienced CP/M users, though, it will not be terribly useful until a means of intermachine transfer of programs is made available, despite the attraction that color and sound may have as enhancements to CP/M programs.

TEXTS ON CP/M

1. Cortesi, David E. Inside CP/M, A Guide for Users and Programmers

2. Zaks, Rodnay The CP/M Handbook with MP/M



One day Son all this will be Silicone Valley.

CP/M

CP/M NOW A REALITY WITH COMMODORE

by Tony Ning & Rick Denda — **Toronto, Ont.**

Good news for all you Commodore enthusiasts. CP/M is now available on 4000/8000 series machines via the Madison Z-RAM board. In case you are wondering why there is so much interest in CP/M, quite simply, it is currently one of the most popular Operating Systems available for micro-computers. CP/M will open doors to a range of good software that easily could multiply the number of applications available for your Commodore systems ten-fold. Furthermore, since Commodore recently announced CP/M compatibility options for the C-64 and most of their next generation computers, it would be timely to describe CP/M in some detail.

WHAT IS CP/M?

CP/M stands for Control Program for Microprocessors, a fancy term to describe an Operating System. At the lowest level, all operating systems perform the same tasks: get data from the keyboard, print information, and handle disk activities.

One major problem in running software on various computers was that many had unique Operating Systems ,since initially, virtually all micros were developed independently. Thus, the user was generally limited to software created for a particular machine. Digital Research recognized the shortcomings and developed CP/M in an attempt to standardize an operating system for small computers. Since then, CP/M has blossomed into the most widely accepted and used operating system in the world for micros.

CP/M is essentially the same on all machines although there may be small variations eg. version 2.2,3.0, etc.. it is likely that programs written under CP/M can run on machines which support it. That's quite incredible . The result, more software has been written in CP/M than any other Operating System in the micro-computer industry today.

CP/M ON COMMODORE SYSTEMS.

CP/M usually comes in the form of programs that reside on disk and are loaded into a specific memory location in the computer. In the case of Commodore computers, there are two hardware requirements that are not present for CP/M. Since CP/M was originally designed around the 8080 microprocessor and Commodore equipment uses either a 6502, 6510, 6809, etc.. the instruction sets are not compatible, thus an 8080/Z80 microprocessor must be added to the Commodore computer. The second requirement is that the system must have at least 48K of user memory or RAM. For the 4032, 8032, and Superpet, CP/M can be incorporated by using an add-on CP/M board. The most popular board is the Madison Z-RAM board which is available from most Commodore dealers or you may contact the Canadian distributor Computer Workshops Ltd, 465 King St. E. Unit 9, Toronto, Ont. M5A 1L6, phone (416)366-6192. The Madison board consists of a Z-80 microprocessor (8080 compatible), a 6502 processor and 64K of additional RAM. When used in conjunction with a 4032, 8032 or SuperPET, a total of 96K usable memory is available to support programs requiring 96K RAM like VisiCalc 96, WordPro 5 Plus, and Silicon Office. The Madison Z-RAM board sends a standard RS-232 signal through the user port and will support RS-232 printers, modems and other RS-232 peripherals.

CP/M

Please note if you are planning to install the Z-Ram board primarily for the use of CP/M, you should have 80-column screen since most CP/M based programs require an 80-column output. If you have 4000 series PET, I suggest you contact your local Commodore dealer who will be able to install an 80-Column upgrade provided you have a 12"screen version. The MADISON Z-Ram board can be installed without special tools or great expertise and comes complete with detailed installation instructions as well as a comprehensive manual on CP/M. The Z-Ram board mounts inside your computer directly under your CRT(monitor). In fact it utilizes its mounting screws.

A decision as to whether or not to add CP/M to your Commodore computer should probably be based on the following criteria:

1. Are you now, or in the near future planning to run programs under CP/M ?

2. Do you require 96K of RAM and do you not mind paying an additional $245.00 to obtain CP/M compatibility (difference between the COMMODORE 64k memory expansion and Z-RAM board cost),to obtain CP/M compatibility?

3. Do you plan to write programs that you may wish to run on the new generation Commodore computers which will support CP/M?

4. Do you wish to have additional language capability such as: COBOL, FORTRAN, PASCAL, PL/1, APL, C-BASIC?

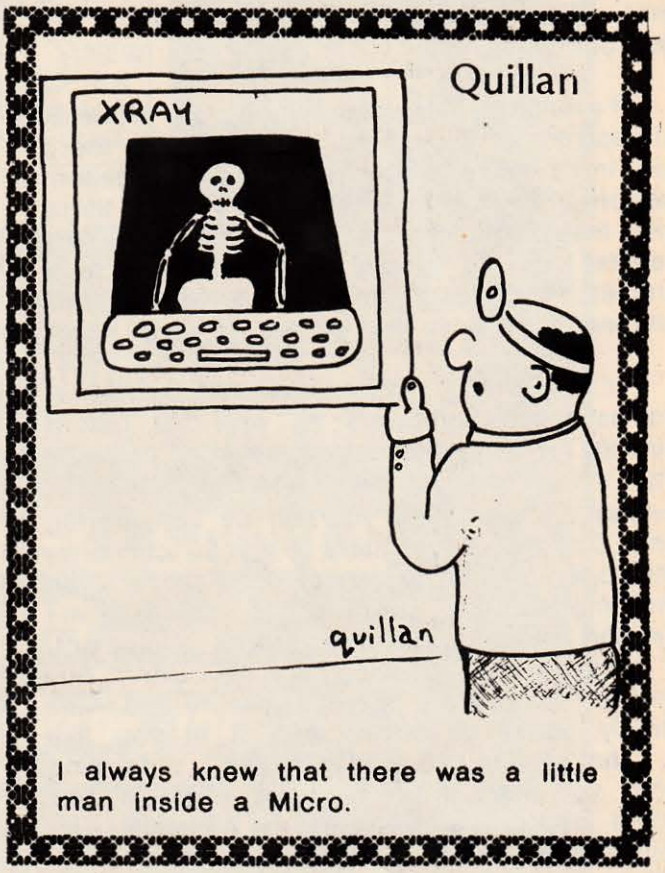
If you answered yes to any or all of the above, you should probably consider buying the Z-RAM board.

As far as CP/M for the VIC and the C-64 is concerned, there will be a CP/M card available soon, and I will keep you posted on further developments; or you may call me at (416)366-6192.

In the seven years that CP/M has been around, thousands of programs have been created that run under it, written by over 100 companies. Applications range from languages, development utilities like assemblers, to application programs such as ACCOUNTING, DATA-BASES, FINANCIAL-PLANNING, and WORD PROCESSING. There is also a range of vertical application packages available under CP/M which currently may not be available in Commodore compatible software.

P.S. **Good news:** CP/M plug-in module, also providing 80-columns of display, is now available for the Commodore 64.

Reference for the CP/M board and CP/M for C-64 includes Word Processor at $399 (Canadian). Both available from Computer Workshops Ltd., 465 King St., E., Unit #9, Toronto, Ontario, phone (416)366-6192, or contact your local Commodore dealer.



I always knew that there was a little man inside a Micro.

PRINTER

SELECTING A PRINTER

by Gene Wilburn Mississauga, Ont.

Printers are to microcomputers what speakers are to stereos. Cheap speakers and expensive speakers both reproduce the same notes, but to the ear there is a discernible difference in the quality of the sound. Likewise, a cheap printer and an expensive printer both produce the same words of your word processing text, labels, or listings, but the eye sees a noticeable difference in print quality. In general, if you want the best possible print, with no sacrifice in speed or features, you must be prepared to pay for it -- anywhere from $2000 to $4500. For a business or professional organization, with high-volume use and with a corporate image to maintain, a printer of this quality is essential. The home computer user, however, will probably have reservations about buying a printer that costs four to ten times as much as the computer itself.

Fortunately, in the world of printers, cheap does not mean bad. Just as there are inexpensive speakers that give excellent performance for their size and price, there are less expensive printers that are very satisfactory. As always with hardware purchases, the trick is to balance your wishes and needs against the fullness of your wallet.

If you are in the market for a printer, do as much homework as you can before buying. Read the printer surveys in computing magazines to see what is currently available. Don't limit yourself by considering only Commodore printers -- your computer will operate with most of the printers on the market. Be sure to do some comparison shopping. As with stereo equipment, it always pays to shop around. Don't buy the same model printer your friend has simply because you've seen it. If you like it, that's fine, but above all, determine what <u>you</u> want from a printer. Try to become as "printer literate" as possible. The following sections contain some information, points, and tips that may assist you with your purchase.

DAISY WHEEL VS. DOT MATRIX

The first decision to make is whether to buy a daisy wheel or a dot matrix printer. Daisy wheel printers are named for the shape of their interchangeable type element, which resembles a daisy, i.e., the element has a central hub from which spokes radiate daisy-fashion. On the ends of the spokes are pre-formed characters that are, literally, hammered onto the page during printing. The daisy wheel functions in the same manner as the ubiquitous IBM Selectric typewriter "golfball" and the finished product looks as if it had been typed on a Selectric (without Whiteout tracks). Some high quality printers like the NEC Spinwriter, use an element that looks more like a thimble than a daisy, but the idea is the same. Daisy wheel printers are the most expensive printers for microcomputers. Some of the better-known manufacturers of daisy wheel printers are C. Itoh, Diablo, NEC, Qume, and Radio Shack.

Dot matrix printers, on the other hand, do not have pre-formed characters. Instead, a grid of pins (a matrix) is hammered onto the page. For each character of the alphabet, a different pattern is hammered, forming characters made up of little dots. You've undoubtedly seen examples of this on bills or computer printouts. There is no disputing that dot matrix printing does not look as nice as daisy wheel printing. However, if the matrix is dense enough, it can approximate the look of pre-formed characters -- a look that has been dubbed "correspondence quality" by printer manufacturers. Alas, the dot matrix printers that do a really convincing job of this tend to be nearly as expensive as high-quality daisy wheel printers.

In general, the majority of dot matrix printers are considerably cheaper than a corresponding daisy wheel model. The cost of both types of printers has been falling, and you can buy a very good dot matrix

printer in the $400 to $1000 range. There are also some advantages to matrix printers. For one thing, they are often faster than daisy wheels and the better ones are much more versatile. Many matrix printers allow you to change pitch, typeface, and character width on the fly, with control sequences from the computer. With a daisy wheel printer you would have to stop printing midway on a page, manually change the print wheel, print some more, stop again, and then change it back, to achieve a similar result. Furthermore, some matrix printers can print high resolution, dot-addressable graphics -- an important feature if it tickles your fancy. Matrix printers are great for printing program listings and they tend to be relatively compact and lightweight. All in all, a good dot matrix printer is very satisfactory if you don't require IBM Selectric quality printing. Manufacturers of popular dot matrix printers include Epson, Centronics, C. Itoh, Mannesmann, NEC, Okidata, Star Micronics, Radio Shack, and Leading Edge.

There is a new breed of daisy wheel printer on the market. Some of these, like the Olivetti Praxis, are really electronic typewriters with a printer interface, some, like the Brother and Smith Corona, are stripped-down daisy wheel printers. All are priced competitively with good dot matrix printers, and all are abominably SLOW! Ten characters per second is top speed. They've not been around long enough to have an established track record in terms of dependability, but they should be investigated by the home user who has more time than money. A printer that can double as a typewriter may be of especial interest to writers.

INTERFACES

Most printers connect to either an RS-232 serial interface or to a parallel interface. Daisy wheel printers most often require a serial interface, but some allow the option of parallel. The majority of dot matrix printers connect to a Centronics parallel interface. This can be a slight problem for Commodore computer owners because Commodore, a few years back, settled on the IEEE-488 parallel interface as its standard. Consequently, to use the majority of non-Commodore printers, you must add an IEEE-488 to Centronics cable for parallel interfacing. Once this is done, you can use most of the parallel-interface printers on the market. Be aware, however, that Commodore graphics in BASIC listings will not print properly on non-Commodore printers.

SPREADSHEETS AND WORD PROCESSING

If you use a printer primarily for listing programs, the quality of the character sets is not critical, but if you intend to use your computer in professional applications, you should pay careful attention to the character sets that are offered on a printer. If you need to print out wide financial spreadsheets, for example, either buy a printer with an extra wide carriage for wide paper, or make sure that a regular-sized dot matrix printer has a 16.5 cpi (characters per inch) setting. For a daisy wheel, insist on one that will accept 15-pitch daisies. For listing programs on a daisy wheel printer, make sure you can purchase an ASCII daisy wheel. Otherwise you will be missing important symbols such as < and >.

Many of the better daisy and matrix printers have a typeface called proportional." Proportionally-spaced typefaces are very smart looking -- the characters are fitted together more attractively than with the equally-spaced "monospace" characters of most typefaces. However, there is a "gotcha" in this. Columnar display and right justification of proportional type is tricky and requires special support from your word processing software. If you like your current software and it doesn't support proportional, then don't spend anything extra to get proportional spacing on a printer -- you'll never get the benefit of it. If, however, you decide you can't live without proportional spacing, then toss out your word processing software and buy a package that fully supports it.

PRINTER

One last word about word processing. If you're using a word processing package that you really like, then stick with the printers it supports! Don't expect the software author to rewrite the program to your specifications. There are a lot of printers out there and no WP package can support them all.

OTHER CONSIDERATIONS

Printouts look best when you can see them. Many computerists, however, use their ribbons so long that their printouts look as if the ribbons were unacquainted with ink. To minimize the tendency to use ribbons too long, bear in mind the cost of ribbons when selecting a printer. Carbon ribbons for daisy wheel printers are very expensive and they don't last long. Cloth ribbons for dot matrix printers are, on the whole, more reasonable, but the ribbons for some brands are dear enough to make your wallet cry "Ouch!" If you select a popular brand of printer, chances are that you will find some good buys on ribbons from time to time. Select a rarified model and you may have to import ribbons at a premium. Simple supply and demand.

Check out how a prospective printer feeds paper. Most popular dot matrix printers use a pin-feed mechanism to accommodate standard-sized continuous-form paper -- the kind with holes on the sides and perforations between the sheets. This is a desirable feature. But what if you want to feed in one sheet of letterhead stationery at a time? If this is important, make certain it also has friction feed. If you need to print on various sizes of continuous-feed stock, such as labels, then select a printer that also has available an adjustable tractor-feed mechanism. Tractors are particularly important for daisy wheel printers. Daisies jiggle around so much during printing that continuous-feed paper gets out of alignment if it is not controlled by a tractor-feed mechanism.

The speed of a printer should not be overlooked. Anything slower than 80 cps (characters per second) requires a lot of patience. Also, check out the noise a printer makes. Most daisies are quite noisy and can create a disturbance in an office area. If a model is noisy, see if there is a silencer hood available. Dot matrix printers sound annoyingly like angry mosquitoes. Not much you can do about it except introduce a new house rule: "no printing after midnight."

CONCLUSION

Printers lack the pizazz of modems, the challenge of joysticks, and the elegance of light pens, but, with the exception of a disk drive, a printer is the most useful peripheral you can add to your system. The next few years should bring some interesting new developments in the way of affordable ink-jet printers and perhaps even home-priced laser printers but, in the meantime, there is a good selection of reasonably-priced equipment that should meet your needs. Happy printing!

A Ylimaki

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Buying a printer is like buying a car.

When you enter a car lot, the first thing that strikes you is the variety of cars on display. You take a look at that medium range car. It's the right size for the family...and the dog. It's within your price range, the gas mileage is quite good and it will also be big enough to take a few hockey players and their equipment to the arena. That's the car.

This is the kind of thinking process that is required when buying your first printer. You have to be prepared to make "trade-offs" to select the right printer for yourself. After I started looking for the "ideal printer", I soon discovered that the only ideal printer is the one that does the things you want it to do best. It may not do everything you want, but it should do well those things that you need most.

If price is no object, all you have to do is buy the top of the line printer and all your problems are solved. But for the rest of us, there are certain perimeters that force us to make a selection based on specific personal needs and a certain price range. I had decided that my price range would be about $1,000.00.

I did not make an exhaustive study of printers. If I did, I would still be looking. You have to make some trade-offs even in the amount of time you want to spend searching.

Basically there are two kinds of printers - the dot matrix and the letter-quality. The dot matrix machines create letters and symbols with a series of dots. The greater the number of dots, the better the reproduction. Letter-quality printers "type" perfectly-formed letters when a hammer strikes a rapidly revolving "Daisy wheel". For superb-looking reports, the letter-quality printer can't be beaten. It's like a computerized electric typewriter. It was this kind of printer - the Smith-Corona TP-1 to be specific - that encouraged me to look into printers seriously. I needed a printer that would produce nice looking reports as well as having sufficient speed to print out copious data I had stored on diskettes.

The Smith-Corona is an excellent printer, but at 12 characters per second (CPS) I felt it would take me a long time to transcribe all the notes I had stored on diskette. And, besides, most of the notes did not have to be letter-quality because they were solely for my personal use. But, occasionally I would need a machine that produced high quality printing. From the very beginning you have to think about trade-offs.

There are also letter-quality printers that have a typewriter keyboard. Besides being able to hook up these machines to your computer, you can also use them as regular typewriters. I didn't need that extra capability.

I also considered the Commodore dot matrix 8023p printer. The big advantage here is the ability of the Commodore to print all the PET's graphics. These printers can provide hard copy for your programs. But my needs did not include program listing at that time, although it would have been nice to have had this feature. At this point abilities were still in the elementary stage. What I primarily scrutinized was the correspondence mode. This is the one which generates the machine's best letter-quality. With all the beautiful things this CBM printer can do, I was not very impressed with the correspondence mode. (I knew I was going to miss the program listing ability of this machine.)

During the Computer Fair at the International Centre recently, I had an opportunity to talk to several sales personnel about printers. I discovered there are a number of dot matrix printers that have su-

perb correspondence quality **and** they were within the price range I had selected.

I zeroed in on two dot matrix printers: the Okidata-92 and the Epson. Both are excellent. They did all the things I wanted a printer to do and much more. But the main thing that appealed to me was the quality of the letters in the correspondence mode.

This decision was a tough one. Actually, it could have been decided with the toss of a coin. When I finally selected the Okidata, it was more from a personal preference for the style of print of the correspondence mode than anything else. Another person could have looked at the same printing output and chosen the Epson.

But, the decision-making process was not over yet. Now that I was ready to buy, another question presented itself: Is this the right time to buy a printer? Are not the costs of printers coming down...just as they are for computers? Should I not wait for a while and take advantage of the new technology that is being built into printers?

For anyone who does not need a printer right away, a pause can be justified. But I had two diskettes filled with notes that I wanted to transcribe into hard copy. Any lengthy hesitation would have been disastrous. I did not want to spend long hours running off those notes I had on diskettes.

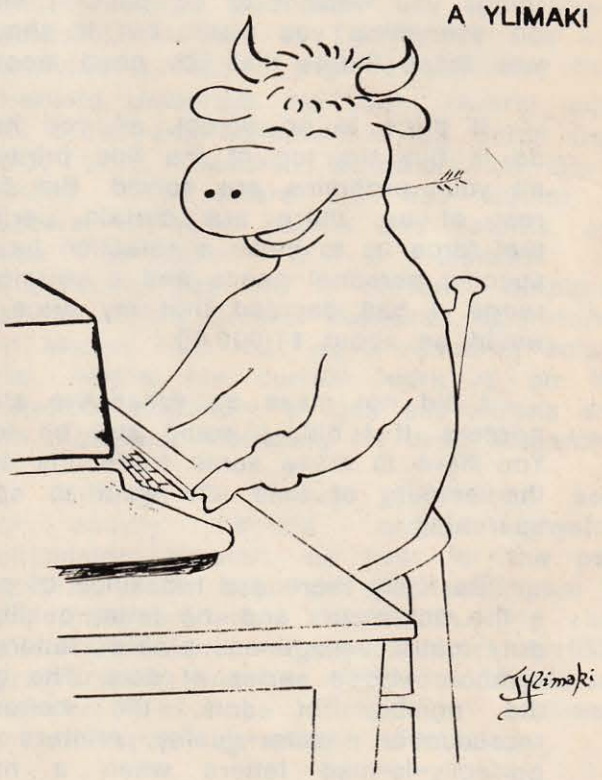
Another question also arose: Where should you buy the printer? Advertisements for printers revealed a wide price range. Without hesitation I decided I would buy the printer from a local dealer. As a first-time printer buyer, I knew that there would be questions about the printer's use after I had purchased it.

Then there was the question of price amongst dealers. In making the rounds, I found that they were prepared to sharpen their pencils when it came to quoting on their equipment. Competition is stiff. So when the dealer realizes that you are ready to buy, he will give you his best price. That's all you can ask for and nothing more. The dealer is entitled to a fair profit. Besides, a buyer should be prepared to share in the cost of that after-sale information that will be needed to take full advantage of the printer's potential.

Now I know that as time goes by I will need different capabilities in a printer that I may not have in the one I purchased. PET graphics and program listing may become a necessary feature. And, printers of the future will make hard copy production even more exciting than it is now.

Well, all will not be lost. I'll probably get the same feeling I did when I realized my family needed a bigger car. That's the way life goes. Besides, I might be able to sell my printer through TORPET's classified ads. After all, there may be someone out there for whom this printer would be the "ideal printer."

A YLIMAKI



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DELETE	

BASIC COMMANDS - HIRES

PLOT	FLIP
HGR	WCHAR
SCREEN	DRAW
ALT	COPY
NORM	PIC
	PSAVE

LORES

LGR	HLIN
LCOL	VLIN
LPLOT	

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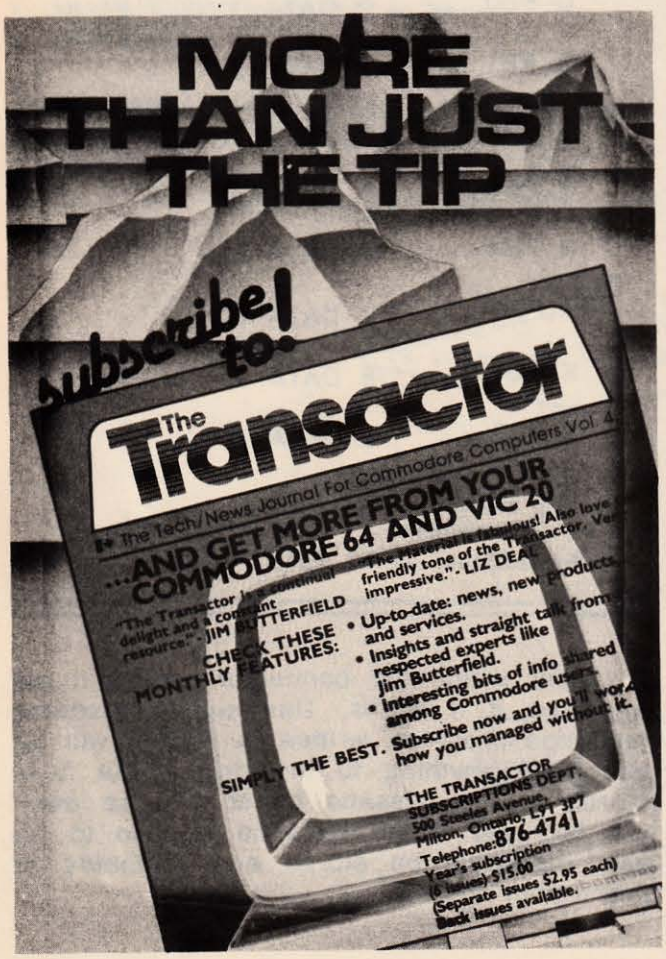

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PRINTERS

PARALLEL PRINTERS & THE VIC-20

by David Quinn — Kingston, Ont.

Many VIC 20 owners would like to use a better quality printer than the VIC 1515 or 1525 offered by Commodore. Unfortunately, Commodore has not made interfacing easy for either parallel or serial printers. TORPET and numerous other magazines have received many letters on this subject and so I would like to offer some experiences in the hope that others can avoid the pitfalls and frustrations in trying to use a Centronics type parallel printer with a VIC 20.

Generally speaking, parallel printers are cheaper than serial ones and so this makes them seem more attractive. My choice was the NEC 8023A-C, since it offered many features as standard which other popular printers offered as optimal extras, eg. graphics or tractor-feed, etc. But, how can it be hooked up to the VIC?

About a year ago advertisements began to appear in the magazines for interfacing hardware, all costing about $100. It was an answer to my problem. I decided to order one from a company in the U.S.A., which is a member of TPUG. After four months and several 'phone calls it arrived. I was all set to start printing! The thing didn't work - and I returned it. Two months and several 'phone calls later it arrived, again with the word "repaired" on it... it still didn't work. Four months later this company has still not replied to me. I wonder how many other customers have suffered similar disillusionment and disappointment.

NOTE: Advertisements from this company have not appeared in the magazines in the past few months.

I could not afford to risk another $100, but desperately wanted to print. The user port of the VIC can be set up as an eight-bit parallel output port and the standard Centronics parallel port of the printer can receive the signal directly. This is how they can be wired together with a direct connection. The VIC plug has to be soldered. Ribbon cable can be used but I would also recommend soldering the Centronics plug.

VIC User Port	Centronics
Plug (24 pin)	36 pin (AMP 552470-1)
Pin M CB2.....	Pin 1 DATA STROBE
C PB0.....	2 DATA 1
D PB1.....	3 DATA 2
E PB2.....	4 DATA 3
F PB3.....	5 DATA 4
H PB4.....	6 DATA 5
J PB5.....	7 DATA 6
K PB6.....	8 DATA 7
L PB7.....	9 DATA 8
B CB1.....	10 ACK
A GND.....	19 GND

After wiring the connector, check it out and see if it works. This simple machine language program, written in BASIC, will let you poke anything to the printer but it is stored in the cassette buffer and so cannot be used if the cassette is also to be used (It could be stored and protected at the top of BASIC).

```
10 FOR D =1 TO 22 : READ A : POKE D+830,A : NEXT D
20 DATA 169,255,141,18,145,162,21,142,132,3,173,28
30 DATA 145,45,132,3,9,160,141,28,145,96
40 SYS 831
50 N$ ="THIS IS A PRINTER TEST"
60 FOR X =1 TO LEN(N$) : Y =ASC(MID$(N$,X,1))
70 POKE 37168,Y : NEXT X :POKE37168,10
```

Obviously a short program has serious limitations but it could be fun (and quite a challenge) experimenting with it to get it to suit your needs.

To those of us who can bypass this challenge there is an absolutely marvellous, inexpensive cassette tape program available. It is written by Dave Middleton and is loaded and run, using only 180 bytes of memory, which are protected by the program. Any program can be subsequently loaded and run. Addressing the printer is then carried out within or without a program as though the printer were the 1515 or 1525 i.e. PRINT#4 etc.

In addition to this ease of use, I have been able to make use of every feature of the NEC 8023 through CHR$ commands, including changing print styles, double width, super- and subscripting, line feeding forward and reverse to N/144's of an inch (super for graphing) etc. The 2K printer buffer quickly frees the VIC keyboard for other use during printer operation. The one thing it ignores is Commodore symbols eg. reversed heart or reversed Q, when listing programs. If you really want these in your program listing then you can replace them with CHR$(147) and CHR$(17) etc. which will be printed.

This superb program "Centronics Interface" by Dave Middleton VP077 is available for £4.95 (less than $10) from:

Audiogenic
PO Box 88
Reading, Berkshire
ENGLAND

I believe that they will also supply an interface cable but I have not seen either advertised through Audiogenic's North American dealers. The cassette arrived by airmail two weeks after ordering. (Needless to say, I have no connection with this company.)

I hope that these few comments will be of some help to any TPUG members contemplating using a non-Commodore printer. I would be happy to try and answer any questions readers may have.

The Commodore 4023 Printer

by Edwin Stark Willowdale, Ont.

The 4023 is an updated version of the 4022P with two major improvements. The print resolution is 8x8 just as on the PET. A full 8x8 character can be defined. The second improvement is the choice between tractor and friction feed. The format control is basically the same as on the 4022P, eg., line spacing, and number of lines per page. Note that the line spacing was changed from 216 to 144 steps per inch which might lead to software incompatibilities with the 4022P.

The manual was rather weak on how to set up the printer. Commodore should at least hold on to its share of this area of the printer market with the 4023 which has the same list price as the 4022P ($350.00).

PRINTERS

THE SMITH-CORONA TP-1

by George Shirinian Toronto, Ont.

Can a dedicated Commodore user find happiness with a non-Commodore peripheral? This was the big question on my mind when I decided that my need for a letter quality printer could no longer be denied.

I had been using the reliable old Commodore 2022 dot matrix printer for quite a while with no problems, but when the Smith-Corona TP-I, the most inexpensive letter-quality printer available, came onto the Canadian market at a list price of $1,095.00, I decided I should investigate.

The TP-I is not sleek in comparison with many dot matrix printers, standing 16.5 cm high (6.4 inches), 49.5 cm wide (19.5 inches), 34.3 cm deep (13.5 inches), and weighing in at 9.4 kg (20.7 pounds). It looks quite elegant, nevertheless, and is compact when compared with other daisy wheel printers. The basic colour scheme of white with black trim complements the PET/CBM models very nicely. The overall look of the machine and crisp feel of the controls is one of quality. The Smith-Corona brand name also helps to inspire confidence.

The method of paper handling is friction-feed, although a tractor-feed option is available for $189.00. This is good because I find that continuous-feed paper goes out of skew at least every 3 pages and needs monitoring. The TP-I accommodates single sheets and continuous-feed paper up to 13 inche wide. [illegible]e spacing (1, 1.5, and 2) and top-of-fo[illegible] can be set manually on the machine or via software. There is also a position eliminating the stops so the paper can roll freely, as well as a fine adjustment for positioning the line. These are useful when dealing with pre-drawn forms where the print has to line up in a specified area.

I took delivery of a machine set at 10-pitch, i.e., it prints 105 characters maximum across a 10.5 inch line. It is also available in 12-pitch, or 126 characters per line, which simply means the letters are slightly smaller and there is less space between the letters. There is a set of 88 printable characters available in 6 different type-faces in 10-pitch, 3 different type-faces in 12-pitch. The plastic print wheels are easily changed and inexpensive at $8.95. Their print is well-formed and letters line up straight and even, giving a quality, professional image.

You can print different type faces on one sheet by lifting up the printer's cover, if your reflexes are very good, at the point you want the change of type to occur. The printing will halt and allow you to change the print-wheel, ready to resume where it left off. This is possible, but not an easy procedure.

The quality of print is said to vary with the type of ribbon you use. There are 3 types of ribbon cassette: fabric, multi-strike and single-strike film, at a uniform price of $7.95. Each, in turn, gives sharper print quality.

I have used both the multi-strike film, which combines fairly sharp print with economy, and the single-strike. In the former, the film advances very slowly in the cassette so that the same area of the ribbon is struck over many times. Once the end of the ribbon is reached, it must be discarded. This ribbon is well designed, so that by the time an area of the film has passed by the print wheel, there is little life left. Sometimes the letters are not as uniformly dark as might be expected, and this is a characteristic of multi-strike. This is most noticeable when using a bold type-face, such as Judicial. Of course, the single-strike film eliminates this and if you look closely, the print is darker. I have used the multi-strike ribbon for some 300 pages of printing before it had to be replaced.

The force with which the print hammer strikes the print wheel is adjustable through 5 steps. This facilitates printing through multiple sheets or can compensate for varying line voltages. I found the factory-set middle position to be just fine.

This printer is microprocessor controlled, so that, although it is uni-directional, it is logic-seeking, in that the head moves only so far across the line as the print requires before returning, and does not move at all for multiple line-feeds. This feature saves time during printing as well as wear on the machine.

Both parallel and RS-232 compatible models are available. The machine I received is parallel, which required me to install a parallel interface. Now, I like equipment that you can just plug in and use. I don't like tinkering with hardware and I wasn't too crazy about having to spend an additional $190.00 for an interface. Imagine how I felt when I learned I would have to open up the printer and wire a jumper from one of the resistors to pin 18 on the interface connector, in order to provide the +5v of power necessary for the interface to work!

In fairness, I should say that I could have waited for the dealer to do this for me, but I chose to do it myself. The dealer gave me a copy of all the necessary information, including a diagram, which made the job much easier than I had anticipated. I worked slowly and carefully and the whole job was completed within half an hour. To my delight, it worked right the very first time. If you are going to do this wiring yourself, be sure to ask your dealer for the notes and diagram, as they are not included with the printer. Note that opening up the printer yourself will void any warranty that may be implied. Mind you, I found no warranty expressly stated, but check with your dealer.

The interface attaches to the IEEE port and the PET to IEEE cable attaches to it. I can recommend the ADA1600 or 1800 parallel interface. It works well and allows you to use the disk drive without keeping the TP-I on (while some others do not) although you still can not use the printer without the disk drive. This does not affect, by the way, my 2022, which is still connected normally and works with or without the disk drive on.

With the interface in place, I experimented briefly with printing out brief messages and listings, and, apart from ignoring the PET graphic characters, the printer responded acceptably. The purpose of acquiring a daisy-wheel printer, however, is for word processing with a text editor, such as WordPro.

Using the TP-I with any text editor makes life very easy. A text editor lets you set your margins very conveniently, as well as top of form, if what you are printing runs to longer than one page. Many programs, WordPro included, provide the option for different types of printer codes. For the TP-I be sure to answer 'A' for ASCII during set-up. From here on I will discuss certain commonly used special features of WordPro that the beginner may not be familiar with. (By the way, these are the same for PaperClip.)

The underline feature of the TP-I works very well with WordPro. Simply press [CONTROL] [LEFT SQUARE BRACKET] at the beginning and [CONTROL] [RIGHT SQUARE BRACKET] at the end of the word or phrase you would like underscored. The printer will automatically backspace and underline as it prints each letter. The underscoring properly leaves white between the line and even the lowest descenders.

If you want to draw a line by itself for, say a signature, using the square brackets technique would be unnecessarily slow, with all its backspacing. You can draw an underline, without backspaces by using the "special character value" function.

There are some characters on the TP-I's print-wheels that are not directly supported on the PET's keyboard. To access them you must assign a "special character value" to one of the digits 0 through 9. You do this by placing on a format line,

(preferably a separate one). [CONTROL] [CHECKMARK] 0=95 [RETURN] (to produce the underline character, for example). Once this value has been assigned, you merely have to press [CONTROL] [SEMI-COLON] 0 at the beginning of the space where you want the line to appear, and keep repeating this the number of times you want the underline character printed. The back-arrow key, when using BASIC and not WordPro, will also produce the underline character.

The following characters can be printed only by using the "special character value technique. The printable characters are followed by their values: 1/4=21, 1/2=22, ¢ =23. These characters are accessible outside of WordPro, of course, by printing them as CHR$ values, e.g., ¢=CHR$(23). The list of printable and control characters and their values can be derived from pages 26-27 of the TP-I manual.

One trick to watch out for, and this is a characteristic of WordPro that occurs with all printers, is that your centering and right margin justification will be affected when using the special control codes for underlining and special characters. WordPro sees the codes as characters and justifies the right margin accordingly. The printer, however, does not actually print the codes; rather it acts upon them. Thus, [CONTROL] [SQUARE BRACKET] at the beginning and end of a word will leave two blank spaces at the end of that line. In order to compensate, you may be able to add forced spaces in the text yourself, to appear in the same line as the control codes, and must sometimes perform manual hyphenation. Another method is to reset the left or right margin of the specific line in question. For 40-column users these remedies will be possible only after you have printed out your text once first, to see where the end of the line is, and then made the adjustments necessary to each specific situation.

In overall use I found the TP-I to give good print quality and be quite reliable. I have used it up to three hours at a go of more or less steady printing without any failure.

There are a few shortcomings of this equipment that should be pointed out. First, I must say that I find the noise level a little distracting. Although Smith-Corona rates it at 63-69 db, it generally measures 70 db or higher. There is a fan that runs as long as the machine is on, whose noise level alone is disturbing, at first. The clatter of the machine is inevitable, I suppose, but should be taken into consideration for applications where noise is a factor.

The TP-I has been berated by reviewers for its slowness. It is rated by Smith-Corona at 12 characters per second, which certainly makes it one of the slowest printers on the market. I did a rough timing test myself, which produced an average speed of 8.9 c.p.s. In perhaps more understandable terms, this means it took from 4.75 to 6.05 minutes each to print various pages of the text of this article, 56 lines per page, 60 characters per line.

It should be noted, also, that the TP-I lacks certain features that other letter-quality printers provide, such as variable pitch settings, superscripts, subscripts, and double-strike for bold printing. These are available, mind you, only on printers costing twice as much as the TP-I, or more. If you do not need these fancy features, however, I have no hesitation in recommending the TP-I for serious home or small business use, where letter-quality and economy are of greater importance than features and speed.

Can a dedicated Commodore user find happiness with a non-Commodore peripheral? The answer in the case of the Smith-Corona TP-I printer is a definite yes.

NOTE: Between the time this review was prepared and was printed, Smith-Corona announced the TP-II. It is basically the same as the TP-I, but includes both serial and parallel capability as well as selectable pitch setting. Speed is the same. Canadian price is not yet known.

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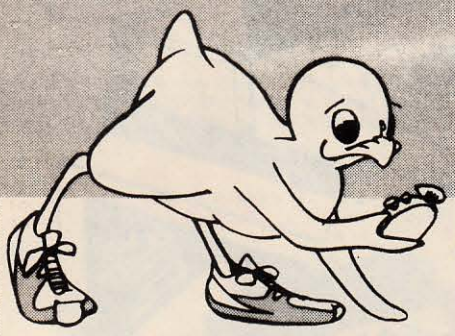

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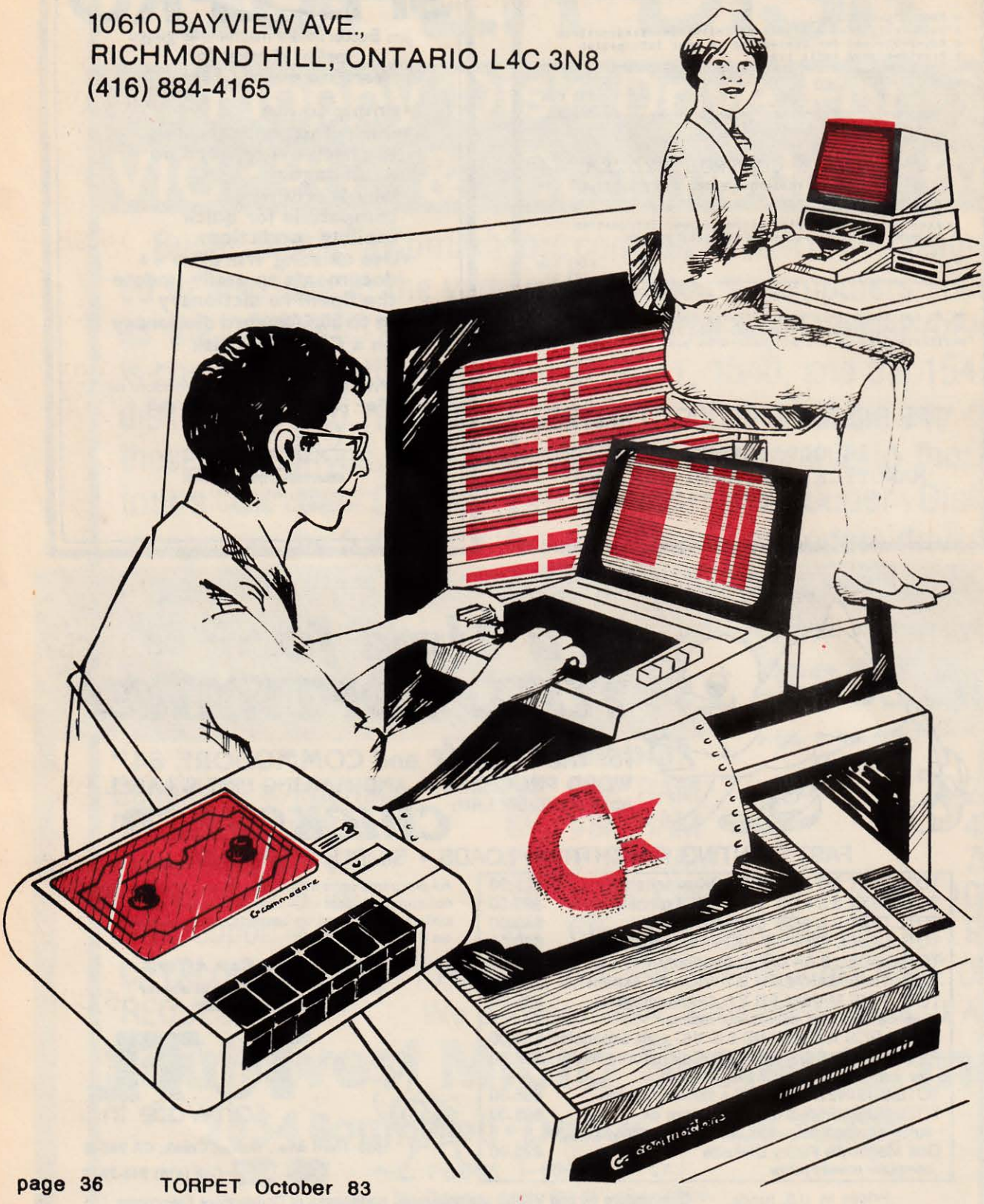

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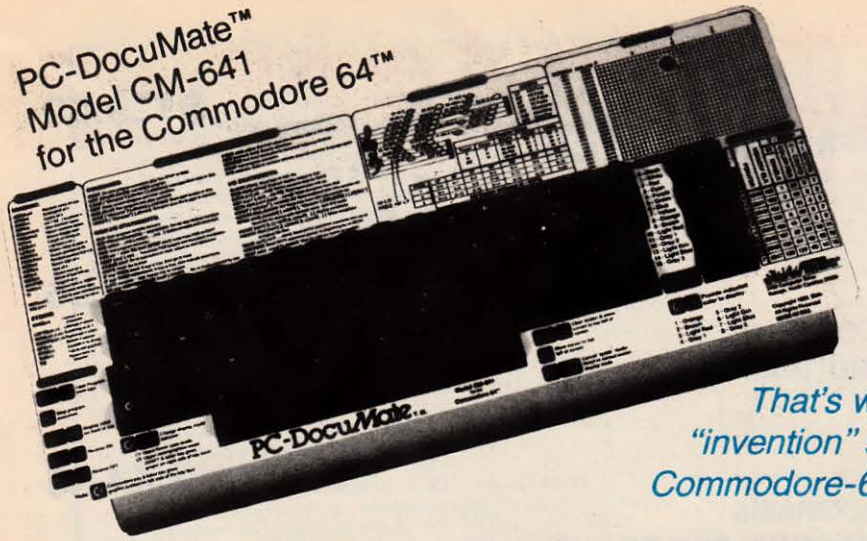

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INCONVENIENT MANUALS

The user's guide was a nuisance and the programmer's reference manual was just plain inconvenient to use. We found the control key combinations confusing and the introduction to BASIC to be too "basic" for our needs. We needed a simple solution to our documentation problems.

So we decided to surround the keyboard of each PC with the information we wanted. We decided to print whatever we needed on sturdy **plastic templates** which would fit the keyboard of either the VIC-20 or Commodore 64.

SIMPLE SOLUTION

This was the simple solution to our problem. Now we could have the essential information right at our fingertips.

On the left side and top of the templates we put **BASIC** functions, commands, and statements. On the lower left we used **key symbols** to remind us of how to use SHIFT, RUN/STOP, CTRL and the "Commodore" key. Over on the bottom right side we put some additional keys to help remember about CLR/HOME and RESTORE. But we were still a little confused.

STILL CONFUSED

We found we were confused about music programming, color graphics, and sprites. On both the VIC-20 and the CBM-64 templates we carefully organized and summarized the essential reference data for **music** programming and put it across the top—showing notes and the scale. All those values you must POKE and where to POKE them are listed.

Then to clarify **color graphics** we laid out screen memory maps showing character and color addresses in a screen matrix. (We got this idea from the manuals.)

For the VIC-20 we added a complete memory address map for documenting where everything is in an expanded or unexpanded VIC.

For the Commodore 64 we came up with a really clever summary table for showing almost everything you ever need to know for **sprite** graphics.

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PRINTERS

THE MX-80/FT(iii)

by I.A. Wright — Toronto, Ont.

EPSON MX-80FT(iii) - A dot matrix printer that includes new ROMs for Graftrax-plus allowing high density graphics and special character sets along with 66 character sets. The printer is available from many computer stores, the manufacturer is E.S.S.N.A. Ltd., 21 Progress Court, Unit 18, Scarborough, Ontario, M1G 3V4. The cost of the printer is about $1000.00 (Canadian) but there is some room for haggling.

It seems that whenever we ask what kind of car, stereo, or printer we should invest in, the reply is "...what do you want to use it for?". This makes emminent sense because a 3/4-ton pick-up is not the most useful vehicle for inner-city commuters. Similarly, a daisy-wheel printer is not the most effective at producing graphics.

My answer to the question of "What use?", was as follows:

- as a teacher, I will print tests, course outlines, and reports. I also need to draw graphs and charts.

- as an administrator, I will need to print hardcopy database reports.

- as a club director, I will be printing form letters, minutes and press releases.

- as a programmer, I will need printouts of programs that include cursor controls and graphics.

- as a writer, I will be preparing manuscripts for (very picky!) editors.

- in addition I would like to be able to design and build graphics for such things as letterheads, or written presentations of statistical data.

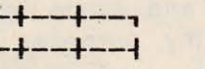
My decision was to buy an Epson MX-80/FT(iii). What follows is a somewhat biased review since this is the only printer that I own. I have, however, used Commodore's 2022 and 4022, and also used the Radio-Shack Daisy Wheel printer.

The Epson (I will use this abbreviated name) is the result of a number of upgrades of a printer that was first introduced to North America in 1980. The original version, the MX-70, was an instant hit because its price and features were outstanding. Since that time the Epson line has built an enviable reputation for reliability among printers. The "new" Epson is not "state of the art" but may be considered a "standard" against which other printers can be measured.

As noted above I have many uses for my printer, and some require "trade-offs" against the others. Each improvement to the original MX-70 has increased the versatility of this machine. There are many printers that will produce true letter-quality" print, but they cannot produce high density graphics. Other printers are faster, but compared to the Epson they do not offer as many type options as standard equipment.

The Epson can produce a bewildering variety of characters. Although most are not commonly used, it is nice to be able to use bold-faced italics, for example, when trying to emphasize a point to a callous editor.

There are 66 possible combinations of type, plus built-in character sets. One character set consists of characters that allow building chart outlines such as:



Another character set allows the printer to write some foreign symbols such as the French accents, German umlaut, Spanish tilde, pound symbol and franc symbol. To produce these characters can require some "fiddling", using compressed mode and overstrike, but once programmed, you can call up this feature easily.

PRINTERS

Many of the special type-fonts available with the Epson are useful to specific users. For example, mathematicians and scientists use the super- and subscript mode quite often. Businessmen can print tabbed columns of numbers either using the internal tabs or by setting their own. The use of compressed mode allows up to 132 columns on 8 1/2" paper. Also by double striking, two carbon copies can be assured. A high-res graphic can be drawn using the 120 dots per inch horizontal spacing and 72 DPI vertical spacing. This is VERY high res! For example, here is a graphic from the Epson manual:

One difficulty with all of these character sets is that they require a fair amount of work to institute. To draw the graphic above took four blocks of programming - mostly in numeric data statements. Without access to a printer utility, or to a programmer, many of these functions will be beyond the implementation skills of the occasional user.

The Epson has "correspondence-quality" print, not "letter-quality". For a dot-matrix printer the Epson produces a very good type. By calling up both emphasized and double-strike printing at the same time the result is a print quality that is suitable for almost any written material. This "ultra" print is slow and beats up a ribbon, but for some of my purposes it replaces the daisy wheel.

Speaking of speed, the Epson is rated at 80 c.p.s. (characters per second) but this figure can be misleading. If you choose to underline, or bold print the print head must repeat lines and will be slowed down. Printers can be logic-seeking or "dumb". The Epson will skip over spaces without moving the print head, and it is also bi-directional. This can reduce the time taken to print a page of a letter dramatically. The Epson can be considered a mid-speed printer. The daisy wheels are generally slower; the data printers are often faster. I have found the Epson much faster than any typist, and at warp speed compared to me!

The FT part of the Epson name refers to the fact that this printer has a removable tractor mechanism. A tractor feed allows the use of continuous form paper with each sheet attached to the next one. The paper has holes along the sides and is thus 9 1/2" wide and of almost infinite length. The sheets are perforated so that when separated they become the standard 8 1/2 x 11". A tractor system makes printing multiple pages or copies very easy, but this same system gets in the way of printing a single sheet. The Epson allows you to remove the tractor mechanism (it unclips) and then engage the roller system for single forms. This feature means that I can switch from printing a manuscript to printing pre-formatted individual student reports in seconds. To a businessman the ability to switch from inventory forms to letterhead would be equally easy. One unfortunate feature is that the paper feeds into the machine, past the print head, and then through the tractor mechanism. The result is that a sheet of paper is often wasted. In my estimation, this is one of the most serious faults of this printer. Another mediocre feature is the paper catch-tray is somewhat poorly designed. I have replaced the Epson tray with one from a 4022 Commodore printer which has a larger area and a lip at the back. This tray allows me to leave the printer running while the multiple sheets fold themselves neatly and do not re-feed into the printer. I have "customized" the Commodore tray to accept the paper roller supplied by Epson. I now have the best of both worlds! An option that I heartily endorse is the acquisition of a printer stand. The stand keeps the printer sheets neatly stored and reduces the amount of damaged paper.

The Epson is reasonably quiet in operation compared to other printers and there is no need for a sound enclosure.

unlike the 2022 or Daisy Wheel 11. An annoying hum drones from the printer at idle" ... but that may be audible to me because I do most of my printing after my children are asleep and the house is quiet.

A further nice feature is that the ribbon and print head are both easily and cheaply replaced. Ribbons are available in Toronto for around $12.00, and replacement heads for $35.00. The repair frequence seems to be very low; some Epson's have been in constant use for years without any service.

The new manual is a great improvement over the earlier versions. It is a huge spiral-bound tome, written in a conversational style that is quite appealing. The semi-tutorial style of this manual can lead the new user through all of the features of the printer; the difficulty is that it is written primarily for Apple and TRS-80 users. Most of the examples and codes must be translated to work on the PET. This is not an onerous task, but it is a nuisance. The manual has a two-page summary of the control codes ... but it is "hidden" as appendix B. These pages need to be copied and placed where they can be easily accessed so that one can utilize the printer fully.

One last comment is necessary. Be careful to buy a good interface unit. The PET will not "speak" to the Epson without a translator! I am using the ADA 1600 from Batteries Included and this adds $150.00 to the base price of the printer. Without an interface the Epson cannot translate PETscii.

There is a new version of the Epson that is just coming out - the FX. It will have 160 c.p.s. and a downloadable (programmable) character set. By the time this review is printed, the FX should be available in local stores for about $1100.00.

Re-Inking Printer Ribbons

E. Toussaint

Shelley, W. Australia

I noted with interest J. Bos' article (July, 1983, TORPET. p. 15) on Re-inking Printer Ribbons".

Here is an alternative method which I use with our Commodore Tractor Printer 8023P:

1. Set a workshop drill press to ultra-low speed.

2. Lightly clasp the advance knob of the printer ribbon cassette in the 3-jaw chuck of the drill and raise the drill's working table to just support the printer ribbon cassette.

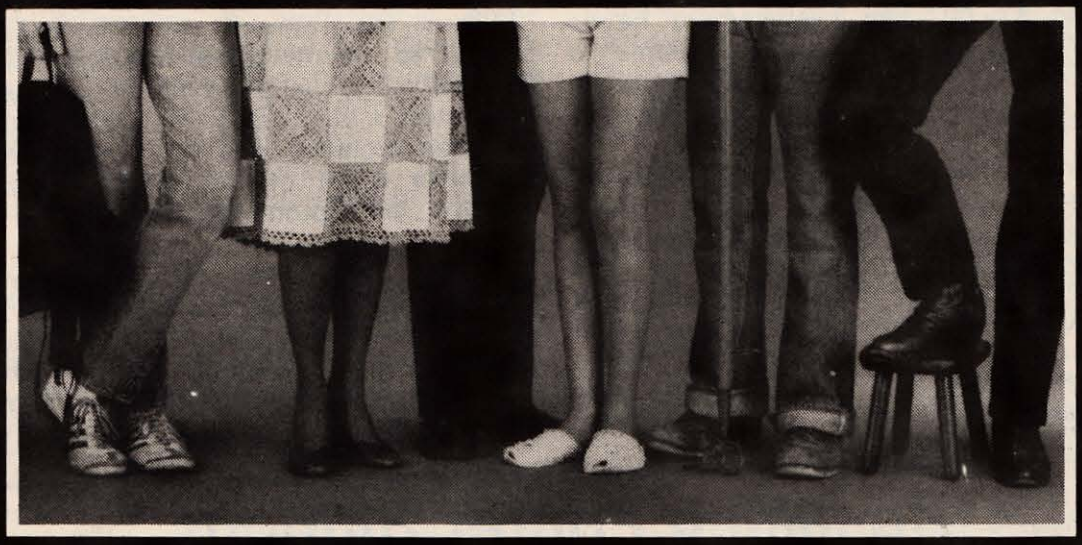
3. As a quick trial, turn on the drill while holding the printer ribbon cassette loosely (i.e. so that it can be easily let go if the ribbon sticks). The ribbon (which forms an "endless loop") should advance slowly and smoothly through the cassette.

4. With a stiff brush, keep the thick black printing paste from a "Gestetner" duplicating machine in contact with the ribbon as it advances around the cassette. Continue this until all the ribbon has been coated with printing paste on both sides.

5. Replace the ribbon cassette in the printer. The first few copies will be a bit messy, but after this the print should be dark and sharp.

Note: If you don't have access to a drill press, the above operation could be done with a hand drill. If this is the case, it then becomes a 2-man operation.

For All Walks of Life



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READ AND DATA WITH CHIPP!

THE "READ" STATEMENT READS DATA WHICH IS STORED IN A DATA LINE IN THE PROGRAM.

DATA IS A WAY TO STORE INFORMATION IN AN ORGANIZED FILE-LIKE FORMATION.

THIS IS HOW IT WORKS: FIRST, YOU READ LIKE THIS:

```
5 READ A
  OR
5 READ A$
```

A WILL READ NUMBERS ONLY, BUT A$ WILL READ ALPHANUMERIC VARIABLES.

SO A COULD EQUAL 27, 114, &, 2 OR 5.78! AND A$ COULD EQUAL "SAM", "CHIPP", "58" OR "ABCI23LMN"!

THE DATA STATEMENT LOOKS LIKE THIS:

```
55 DATA 1,2,3,4
```

AFTER YOU'VE READ THE DATA, YOU CAN DO THINGS WITH IT.

TRY THIS PROGRAM:

```
1 DATA 8,10,4,3,2
5 READ A: IF A=999
    THEN 40
10 PRINT A
20 GO TO 5
30 DATA 23,6,27,999
40 END
```

MIKE RICHARDSON

YOU CAN ALSO READ TWO NUMBERS OR PIECES OF DATA AT ONE TIME:

```
READ A,B
```

IT IS ALSO WISE TO ADD A PIECE OF DUMMY-DATA AS I HAVE DONE. WHEN THE COMPUTER READS THIS, THEN YOU TELL IT TO STOP!

TRY EXPERIMENTING WITH MIXTURES OF STRINGS ($) AND NUMBERS. NEXT TIME WE WILL LOOK AT HOW THE READ AND RESTORE STATEMENTS WORK TOGETHER. SEE YA!

MACHINE LANGUAGE

Machine Language From Square One (Or Zero Page)

by Larry Goldstein Bolton, Ont.

So you've finally gotten over the shock of actually owning a COMPUTER. And you're starting to get pretty good at BASIC programming. The next challenge has to be machine language, but where to start? In fact, machine language programming is not terribly difficult, but the first steps are big ones. After that, you'll be able to design your own routines, understand the listings in magazines, and maybe even be able to comprehend the beginner's machine language columns in COMPUTE!. I hope to present a series of columns to help the reader take those first steps. I'll assume that you understand BASIC programming, but that you have no computer expertise beyond that.

What is Machine Language?

Machine Language is the method by which all commands and data are stored and transferred within your computer. This consists of patterns of electrical voltage which are stored in microscopically small switching circuits. If one of these switches is turned on, it can deliver a voltage when necessary; an off switch delivers no voltage. These switches comprise the memory of your computer. Some of these switches can be turned on and off continually and they are the RAM which stores your programmes and your data. Other switches have been set permanently in manufacture; they comprise the ROM which holds the routines that run the computer. There are tens of thousands of such switches in any of our favourite computers. The following little programme will show the patterns which exist in your computer. It will work with any Commodore, but the colour machines should be set for good contrast between the background and the printed characters.

```
10 A$=CHR$(207)+CHR$(146): B$=CHR$(18) : Z=128

20 FOR I=0 TO 65535: X=PEEK(I)

30 FOR J=1 TO 8: IF(X AND Z) THEN PRINT B$;

40 PRINT A$;: X=X*2

50 NEXTJ, I
```

The lighted (or foreground colour) squares represent switches that are turned on, while the dark (background) squares are off switches. The programme scans the entire potential memory of your machine (largely empty in an unexpanded VIC) and runs a couple of hours so you may want to continue reading while it carries on.

It is the pattern of switches, rather than individual switches, which is important to us. In fact, it is the pattern presented by a group of eight switches that runs the computer. Eight switches, acting as a unit, make up one byte of memory; each individual switch is a bit. So the switching patterns that you see on your screen, taken in groups of eight (or bytes), comprise machine language.

You've never seen machine language listings made up of patterns like this, or even of patterns of "on" and "off" or "5 volts" and "0 volts". Such a system is simply too unwieldy. But if we use the digit "1" to mean an on switch and a "0" to mean off, a miserable machine language byte like "on off on off on off off on" (that's no byte--it's a mouthful) becomes 10101001. This is a definite improvement, but still pretty awkward. What we have now is something that looks like a binary number, a number made up of only the digits "0" and "1". In our usual (decimal) system, we have ten digits to work with, and when we want to count beyond nine we start a second column for multiples of ten, and then a third column for multiples of one

MACHINE LANGUAGE

hundred, and so on, where the value of each column is ten times the value of the one to its right. In the binary system we can count only to one before we need a second column (for twos), and then we need another for fours, and so on with each column having a value of twice the value of the one to its right. If we want to take our pattern of eight and apply it to the binary system, we must figure out the value for the eight columns involved. This will be:

128 64 32 16 8 4 2 1 and 10101001 becomes

1 0 1 0 1 0 0 1 or

1x128 + 0x64 + 1x32 + 0x16 + 1x8 + 0x4 + 0x2 + 1x1 =169

Now that's a nice, neat comprehensible number – to us. The computer would much prefer "on off on off on off off on", but as a special favour to an inferior, the computer allows us to feed it information as decimal numbers, which it then converts to switching patterns and stores and uses. If we want to understand the workings of the computer, it is sometimes useful to work in binary notation which, as you can see, is midway between our familiar decimal notation and the patterns that are important to the machine.

Why Bother?

This is beginning to look like work. Why would anyone want to get involved in machine language, anyway? There are a variety of reasons:

1. So you can come away from TPUG meetings without feeling inferior to the kids.
2. Things happen a lot faster in machine language than in BASIC, especially repetitive routines.
3. Machine language programmes generally make more efficient use of memory space than BASIC routines.

It's up to you to decide whether the first reason is worthwhile; let's look at the second and third.

If your machine is still spewing out coloured squares, you may as well STOP it and enter this little routine: (In line 10, substitute for the stars the appropriate values for your machine from the following table.)

	A	B
PET/CBM 40 col.	32768	33767
80 col.	32768	34767
VIC 20	7680	8186 (unexpanded)
C-64	1024	2023

Note that line 5 is used only for VIC.

```
5 FOR I=38400 TO 38905: POKEI,0: NEXT: REM VIC ONLY
10 A=*****: B=*****:
20 FOR I=0 TO 255
30 FOR J=A TO B: POKE J,I
40 NEXTJ,I
```

This routine is just as mind-numbing as the last one, but it doesn't run nearly as long. You might like to time it. When you're done , get rid of this with a NEW.

Now for comparison, try this one. Again, where you see a letter in the data statements, substitute the appropriate value from the table:

	A	B
PET/CBM 40 col.	127	131
80 col.	127	135
VIC 20	29	31
C-64	3	7

..AND ADD LINE 5 AS IN PREVIOUS PROGRAMME.

```
10 FOR I=830 TO 862: READ X: POKE I,X: NEXT
20 DATA 160, 0, 169, 0, 133, 3, 170, 169
30 DATA A, 133, 5, 169, B, 133, 4, 138
40 DATA 145, 3, 136, 208, 251, 198, 4, 165
50 DATA 4, 197, 5, 208, 242, 232, 208, 235, 96
```

MACHINE LANGUAGE

Carefully check your typing, and make sure that you have the right values in line 30 for A and B. Now run it. How's that? The best yet, right? What has happened is that you have changed the patterns in memory locations 830 to 862. These patterns, if acted upon, will cause something to show up. To tell the machine to go to memory location 830 and follow the machine language instructions from there on, you type SYS 830 and press RETURN. That's better. Still a mindless routine, but fast.

To understand the difference in speed, we must realize that a BASIC programme is read by the computer one command at a time, this command is translated into machine language and is then executed. The the next command, and the next, and so on. This all happens very quickly by most standards, but the command "POKE J,I" in line 30 of the BASIC programme is read, translated, and executed over a quarter of a million times (for a 40 column machine), and you saw how the time added up. The machine language routine does essentially the same job as the BASIC, but the reading and translating are not necessary, and the time saving is obvious. As far as memory is concerned the machine language takes up only thirty-three bytes, whereas the BASIC needs over 45. That's why machine language programming is worth the bother. By the way, the BASIC programme we used to get the patterns into memory is called a BASIC loader.

Once the machine language is safely in place, the loader is no longer needed; you can get rid of the loader with a NEW command, and still use the SYS 830 until your brain rots. The BASIC loader is one of a few ways of dealing with machine language. Each method has certain advantages and disadvantages over the others.

Where Did Those Numbers Come From?

I was afraid I'd ask that question. The machine language programmer has a few dozen instructions to use on the machine. These are different from BASIC commands, although some of them do similar jobs. After writing a programme using these instructions, you have to look up the numbers (patterns) for each one and fill in your data statements. This wouldn't be too bad for our little letter flasher, but you can imagine that a programme of any size would be almost impossibly tedious to write by this method. Since computers are supposed to make life easier, it seems logical to let the machine do some of the job itself, and look up the numbers for us. (This doesn't happen every time the programme is run, as for BASIC, but just once when the programme is first written.) Such programmes, called ASSEMBLERS, are readily available for various prices, each one working a bit differently and offering different aids and shortcuts. By far the best buys are the Supermons and Tinymons and Vicmons etc. available for the usual price from TPUG. They don't do a lot of the fancy things that the expensive ones can, but they are great for starting out, and you may never need anything fancier. If you don't have one of these in your library of club programmes already, please buy one. We'll be counting on it in future installments.

As a final frivolous fling, let's redo the first memory scan programme in machine language. Here's the BASIC loader (the same for all machines):

```
10  FOR I=830 TO 873: READ X:POKE I,X: NEXT

100 DATA 169, 0, 133, 3, 133, 4, 168, 177

110 DATA 3, 72, 162, 8, 104, 10, 72, 144

120 DATA 5, 169, 18, 32, 210, 255, 169, 207

130 DATA 32, 210, 255, 169, 146, 32, 210, 255

140 DATA 202, 208, 233, 104, 200, 208, 224, 230

150 DATA 4, 208, 220, 96
```

After checking your typing, RUN this loader programme, and enter SYS 830. It will run in the time it takes to drink a leisurely cup of coffee. The repeating vertical lines indicate empty memory space, so C-64 owners especially will get plenty of that.

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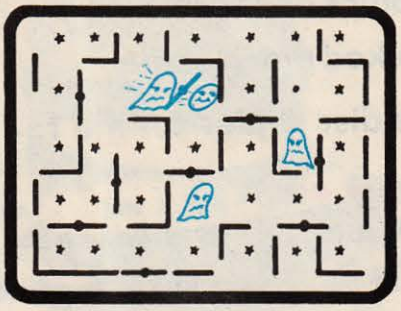

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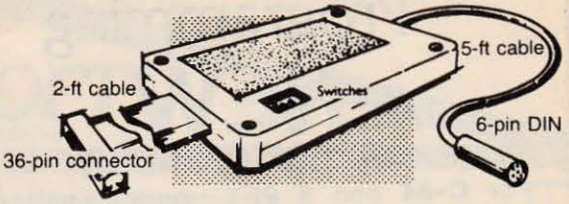

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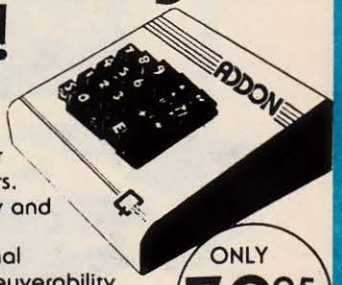

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DISK DRIVES

DETECTING DISK FORMAT

by Elizabeth Deal **Malvern, PA.**

1541 and 4040 floppies are not write-compatible. A floppy formatted on a 4040 and subsequently written on by the 1541 experiences a slow self destruction. The initial signs of trouble are LED and stepper-motor hiccups. This is shortly followed by DISK ID MISMATCH errors, often accompanied by silly track and sector numbers. Finally, the floppy can be read no more.

The same is probably true the other way around, though I haven't tried it, one set of troubles is enough.

A superficial look at the floppies does not reveal on which drive such a floppy was formatted, both have a "2A" sequence in the directory name.

Jim Butterfield says (I think) that the synch marks attached to each sector are different. The recipe for reading the synch marks includes a good bit of magic potion, a white fuzzy kitten on the roof, and a tornado in West Chester, PA ... all at the same time. So here is the easier way:

The 1541 formats differently from a 4040. The 4040 fills the entire disk with zeros, 1541 formats differently from a 4040. The 4040 fills the entire disk with zeros, 1541 fills it with ones, and, sets all next track pointers" to 75. This explains why several disk messages invariably report ILLEGAL TRACK AND SECTOR 75, etc., and an unfinished directory in "newing" has all file names AAAA with 256 blocks each.

Relying on this last bit of information we can detect on which drive the disk was formatted, provided that the floppy is not full.

```
340 REM------------------------------
350 Z$=CHR$(0)
360 DV=8:D=0:REM DEVICE, DRIVE
370 T=29:S=4:REM TRACK,SEC
380 OPEN15,DV,15:OPEN1,DV,3,"#"
390 GOSUB450:IFETHENSTOP
400 PRINT#15,"U1"3;D;T;S
410 GOSUB450:IFETHENSTOP
420 FORJ=0TO7:GET#1,I$
430 PRINTASC(I$+Z$);:NEXTJ
440 CLOSE1:CLOSE15:END
450 INPUT#15,E,E$:PRINTE;E$:RETURN
460 REM------------------------------
```

```
4040 RETURNS  0 0 0 0 0 0 0 0
1541 RETURNS 75 1 1 1 1 1 1 1
```

If you get results other than a chain of zeros or ones, you are not usng an empty sector, so change T and S in a program until you do get a set of either ones or zeros. If you can't get any such clean chain, then somebody has been fooling with the disk, and you're on your own.

My routine will also NOT detect a disk formatted on the 4040 but then changed to look like a 1541, for this you'll have to go after the synch marks, but it is an unlikely event to happen.

In any case, it is just not safe to write on a disk that you did not format, so take all the necessary precautions, whatever the results of the above routine.

Be careful with purchased software, sometimes a sticker says "1541". A sticker may not be relevant. Anybody can print any kind of a sticker they wish. What's inside is what counts, especially if the program writes on the disk, as is the case with high scores in games, to cite just one example.

80 COLUMN WORD PROCESSING FOR VIC

by Michael Ross Toronto, Ont.

I bought a VIC because I had a wide variety of needs involved in my work as an artist, my family business and my small business. Cost was a factor and yet I have a fair investment tied up in this little machine, in software and magazines as well as hardware.

Since purchasing the initial system last year, I have been looking for products and reliable reviews for these same products. With pressing needs, I have made purchases on chance (impulses my friends say) and still find reviews lacking. Perhaps my findings will be of some advantage to fellow members.

Let's begin with hardware. This article is being composed on a VIC with 80 columns, courtesy of a DATA 20 16K/Video Pak. The software is the complementary "WORD MANAGER" 8k+ version and is being viewed on a ZENITH DATA MONITOR with Green phosphor screen.

The Data 20 16k/Video Pak does everything it has claimed to do to date. It fits in the expander port and comes with its own power supply. The board is a little awkward to place into the expansion slot but only requires a little care and is not difficult by any means. Upon installing and powering up VIC one gets a reading of 19967 bytes free. On occasion, one gets 15888 but one can easily reset by flicking the on-off switch to get the maximum memory available. This is great for programs requiring 16k or more memory which seems to be an essential minimum configuration for programs that really do something. The real treat comes when entering the appropriate SYS command that configures VIC for the industry standard 40 or 80 by 24 display. This is essential if you are using your computer for word processing on a regular basis. It shows you the page as you are writing and makes such chores much easier to complete with confidence.

There are differences for programming of which one should be aware. The Video Pak will only support 40 characters per program line in 40 column mode, 80 characters in 80 column mode. VIC will support 88 characters per program line in spite of the fact that its standard configuration is only 22 columns. The Video Pak only supports black and white display which means it will work fine with green or amber phosphor monitors but will display black and white on colour monitors and televisions. So you can't run 40/80 programs which are in colour but I can't think of too many programs in this display which run in colour. Here are some other differences and features of the Video Pak by Data 20.

- Switch to Lower case-VIC uses CBM key Video Pak uses F1 for shift F2 for unshift.

- Video Pak supports erase to end of line through F3 key

- Supports erase to end of screen by using F4

- Supports Screen Dump -Press F6 key -RS232 Port must already be open using device 127, can use CRT mode to do this as well

- Supports Terminal Mode F8 key-used with a Printer interface (I assume they mean theirs)

- Cursor always on

- Allows Putting cursor control characters in Print or InPut mode only when first entering line VIC allows putting cursor control characters in on subsequent edits this

function is toggled through the use of the Insert/Delete key

- VIC will return previous value of a variable when given a null response to an InPut statement where the VideoPak will return null string for string variable and 0 for a numeric variable.

These are some of the features and trade-offs involved in the use of the Data20 VideoPak. I personally feel that I have received my money's worth, especially considering the free word processor, which is included with the package.

I will follow with a run down of some of the other word processors I have purchased and used to date. Let me say that I think this is definitely the best word processor I have used. It is also the easiest one to use as it is fully function key selectable. It has its limitations but is user friendly which means it's very simple to write without taking a six month course and pouring through manuals thrice as thick as the computer. As well, it is fully supported with the 80 columns and for Disc/Tape and VIC or Serial as well as RS232 Printers. It includes a tape that sticks down on top of VIC to show all the functions and the appropriate keys all of which are preceded with the F1 key to alert the program that a function is being selected. The two things I like most about this is the ability to see the page formatted before my eyes and the mail merge program which allows one to create mailers which merge with the document and includes a salutation line which saves the bother of addressing the letter and typing 'Dear Dagweed, So & So', all the time. The mail merge will also store and print 75 labels for envelopes but will not sort though it will suppress lines and select labels for printing. I do a lot of writing and am very pleased with this package overall. I hope those of you who have bought one will bear me out.

I bought mine at CompuCentre in the Hudson's Bay Centre and found the cost there to be as much or more than $100.00 cheaper than most other stores handling this same product. A word of warning; according to my dealer, there has been some trouble with defective equipment but every dealer I know of has been more than willing to replace if it is obviously the manufacturer's fault. My dealer tested mine when it wouldn't work on 80 columns and then replaced it with a new one which we tested to be sure before sending me home with it. I certainly appreciated his patience and service and am more than happy with the product. So don't let it scare you if you have been thinking about this product. I would give it 5 stars if it supported colour but as it is easily a 4(4 1/2)?)star product and I am not easy to please.

I have four other word processors so I feel that considering the research I have done to date that I can honestly state the above with regards to 'Word Manager'. If you have been wondering about other word processors, here is a review of some products you may be wondering about.

Word processor 5.23 is available from Software House in Willowdale and is a product from Intelligent Software. This is essentially a line editor and features include the ability to run on any Commodore computer. This program has a simply but well bound document which is easy, though at times trying, to read and understand. It is the second easiest word processor I have tried and learned to use on the VIC and eventually gave it as a present to my friend who just bought a C-64. It has limited page format settings, but is menu driven and commands are quite simple to accomplish. The results are usually visible immediately. It will work with the 80 column board and will set the margins at either 76 or 74 on the right and 0-10-15 from the left. It does do a few funny things in this mode like dropping from the line at column 40 when hitting the space bar. The text in display mode displays 22 columns no more which I do not understand. This is my choice for worse flaw in the program as it is important to understand the visual display of the page before sending it to the printer. This is a good package for the price and if you are looking for a quick easy to learn and use word processor for short documents and papers, this could be the right one for you to begin word processing.

VIC

Word processor requires a minimum of 8k for use on the VIC and is priced at about $39.95 in Canada.

If you have a completely unexpanded VIC you might try Heswriter which is a ROM cartridge word processor which will fit your expander port. This program supports 121 lines of text and will make use of all VIC's peripheral system. It can take care of most of the basic word processing functions and has a nice feature for VIC's 22 columns to prevent word wrap around. I found it a little difficult to understand exactly how to set all the margin and header formats. The formatting and other editing commands are accessed through control characters within the text. I do not like this personally, not just for the visual display on the screen, but also, because I have often found these characters showing within the text when it is finally printed. This is a nuisance and I still haven't figured out why it does this to the printed text.

This program is still a bit pricey in Canada, though I see many U.S. dealers selling it for under $25.00. It does work on unexpanded VIC and is mostly a simple to use program but my personal opinion, for what it's worth, is to pass this one by as I think there are probably better programs for less money. I do not know if HES is planning an improved version for VIC of this program. It works, but not well enough for me to recommend. I took the loss. I hope this saves you the trouble.

May I say in closing, that I have enjoyed the brief period of time I have been a member of TPUG and hope this article will be of use to fellow members considering the purchase of any of these products. These are only one man's opinion and I have discovered these points the hard way by buying them and trying them out. I hope it will save you some time and trouble. Perhaps I will meet you at a future meeting. I am a very gregarious sort.

Until then, I remain yours in personal computing.

Mr. Dracula

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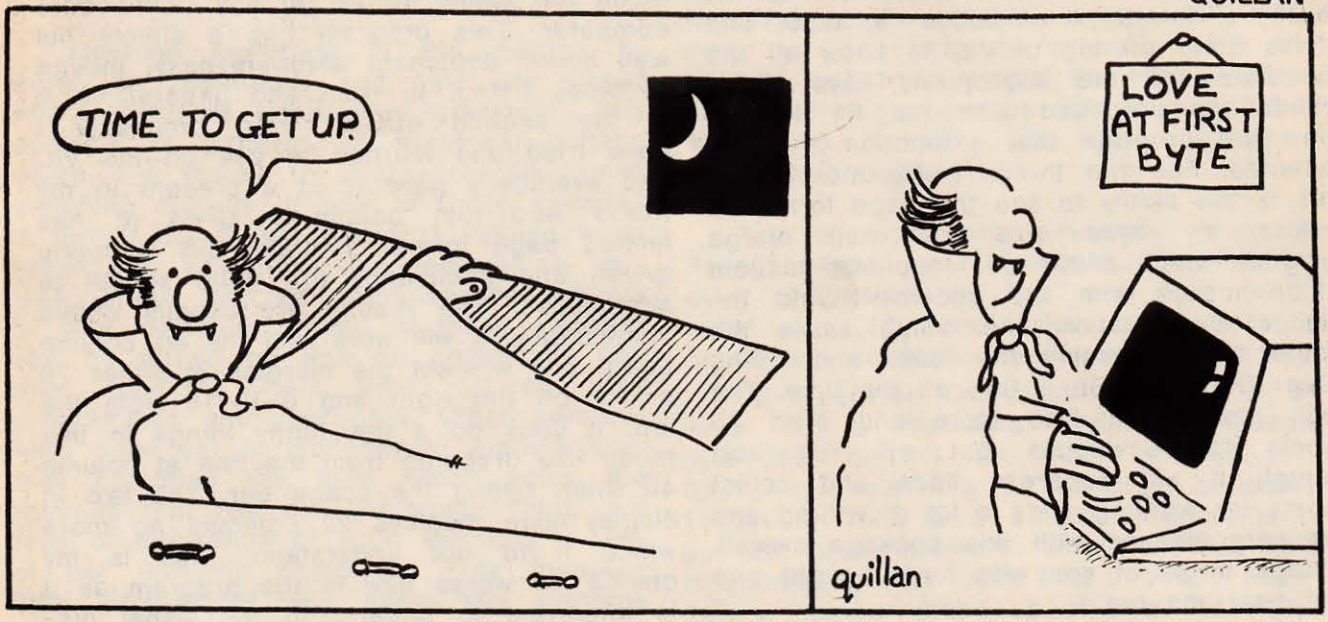

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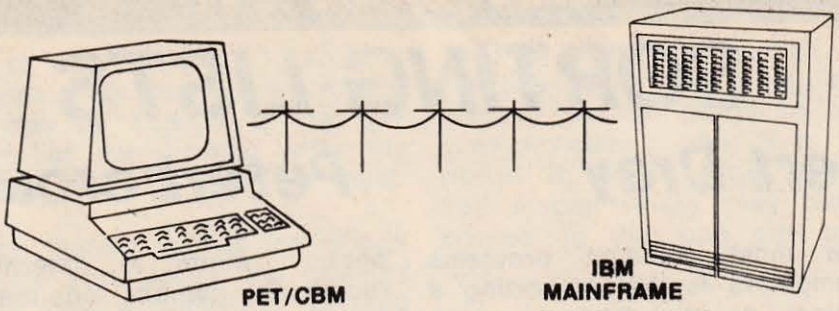

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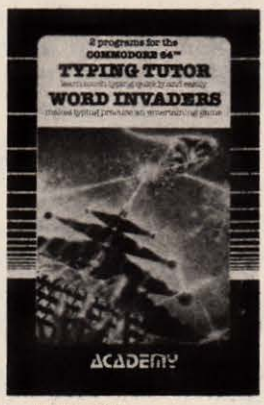

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BUSINESS

SORTING LISTS

by Robert Dray Peterborough, Ont.

One of the most common problems presented to computers is that of sorting a list into numerical or alphabetical order. There are many techniques for doing this, and some languages and large computers simply have a command SORT, or something similar, that will sort the list. On the PET and other microcomputers, we must write a procedure that will perform the sort for us.

The basis of the numerical sort is the line: IF A >B THEN.... A simple comparision is made between two numbers, and a decision is made depending on the result. With alpha data the problem is a little more complex. Since alpha data is stored as an ASCII code in most computers, and the numerical values of the ASCII code just happen to increase as you go from A to Z, why not use the numeric technique on the ASCII code?. This in fact is what is done, and the computer will determine that the letter "C" >"A", etc. If you are comparing words, the computer will check the ASCII code for each of the letters in turn, and the first place where there is a difference, will determine the ranking of the words. "COW" would be placed before "COWS".

Items to be sorted are usually in an array, and one of the simplest sorting algorithms is a "LINEAR SORT", so-called because I haven't found another name for it. (or even reference to it). In this sort, a second array is set up with the same number of elements as the array to be sorted. The algorithm goes as follows:

Either a lower limit is set, or a pass is made to determine the lowest item in the array, and this is stored as "LOW". A search is now made to determine the highest value in the array, and that value is placed in the first position in the second array. The item in the first array that was transferred, is now flagged or replaced by LOW-1, (ie it is now the lowest). A second pass it made to determine the highest remaining number on the list, and it is transferred to the second position on the second array. This value is flagged or made equal to LOW - 1 and the process is repeated until the entire first array has been transferred to the second array in sorted order.

This sort is probably one of the least efficient, since each pass through the array determines the position of only one item. It would be more efficient if each pass through the array moved more than one item closer to the final location, and even better if the items were not compared again, once they had been placed in their final positions.

One sort that is more efficient than the LINEAR sort, is the BUBBLE sort. This sort starts at one end of the array and compares the first two items. If they are out of order, they are swapped. Next the second and third items are compared. One pass through the list will put many items a bit closer to the final order, and at least one item will end up in the correct final position. Depending on the way you are sorting, the largest or the smallest item will end up in the first position. This entire procedure is then repeated until a pass through the array is made in which there are no swaps made. The chart below shows a list on the left which was sorted in 5 passes. Each column from left to right represents one pass through the array moving from bottom to top. Each pass swaps the items if the upper item, of a pair, is smaller than the lower item.

4	7	7	7	7
7	4	6	6	6
1	6	4	5	5
3	1	5	4	4
5	3	1	3	3
2	5	3	1	2
6	2	2	2	1

BUSINESS

The first pass moved the 6 up to one below the 7, which meant that they were in order, and then it compared the 4 & the 7 and swapped them. On the second pass, the 5 moved up to just below the 6 then the 6 & 4 were swapped. Each pass moves the larger items toward the top, as if they were bubbling up through the array. Thus the name BUBBLE SORT.

This sort could be improved if the process stopped once the array was sorted, rather than making one pass for each item on the list. Another improvement would be to flag the position of the last swap on any given pass, and then on the next pass it wouldn't be necessary to compare items beyond that point. If the 7 and the 1 were swapped in the final sorted list, and this new list were to be sorted, the 7 would go to the top in one pass, but the 1 would be very slow coming down. Each pass would lift one item above the 1, and so to move it to the bottom would require 6 passes. This points out one major consideration for the bubble sort. If the list is almost sorted, and a few items are added to the bottom of the list, this sort may be either very fast or very slow depending on where those items are and are going. You should always add the data to the end of the list from which you start the sorting pass, so that you can bubble the new items to their position. Another possibility is to make one pass from the bottom of the list bubbling the small items to the top, and then the next pass would go from the top and bubble the large items to the bottom of the list. Using this method, one double pass would move both the 7 and the 1 into their final locations. With this DOUBLE BUBBLE SORT you could also add the flags to record the position of the final swap going in each direction.

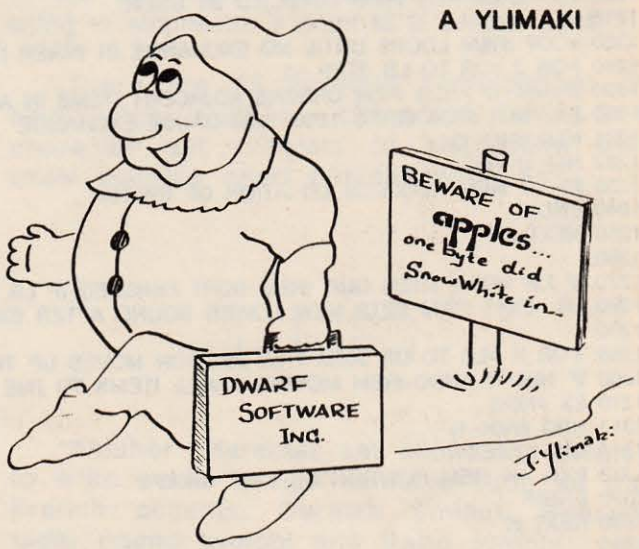
With the LINEAR sort, the number of comparisons is N↑2, where N is the number of items in the array. This is true since you make one pass for each item in the array and each pass compares each item with the next, (actually it's slightly less than N↑2). The BUBBLE SORT can be very efficient if the list is partially sorted, but for a totally random list, the number of comparisons is usually about N ↑ 2/2. Another sort, called the QUICKSORT, has about N*LOG(N) comparisons. When dealing with 1000 items, this is the difference between 3,000 and 1,000,000 comparisons.

The QUICKSORT takes the main list and does a rough sort first. If you were sorting a list of papers into alphabetical order, you would likely sort into 2 or 3 large groups first (A-G, H-R, S-Z), these piles would in turn be sorted into smaller groups. (eg A-B, C-E, F-G) Finally the groups would be sorted into the final order using the kinds of techniques used in the BUBBLE sort. The last step is to put all of the small sorted piles together. This is the technique used by the QUICKSORT; break the pile into smaller groups and eventually use the bubble technique to sort them. In this way the N 2 factor in the bubble sort is not such a problem, since the numbers of items that are being sorted by this method is fairly small.

For large scale sorts, you should write the sorting routine in machine language for maximum speed.

Bubble sort on pg. 58

A YLIMAKI



I/O, I/O, It's home from work I go.

Bubble Sort

```
1000 PROC BUBBLE-SORT
1001:
1060 REM VARIABLE LIST
1070 REM UB =UPPER BOUND (# OF ITEMS IN LIST)
1080 REM LB =LOWER LIMIT OF UNSORTED ITEMS
1090 REM EX =TEMPORARY STORAGE DURING SWITCH
1100 REM FX =SUBSCRIPT OF LAST ITEM SWITCHED
1110 REM J =INCREMENT COUNTER
1120 REM N() =ARRAY BEING SORTED
1130:
1200 LB =2
1210:
1220 LOOP :REM LOOPS UNTIL NO EXCHANGE IN INNER LOOP
1210 FOR J =UB TO LB STEP -1
1220 IF N(J-1) >N(J) :REM CHECKS ADJACENT ITEMS IN ARRAY
1230 EX =N(J) :REM LINES 1230-1232 CAUSE EXCHANGE
1231 N(J) =N(J-1)
1232 N(J-1) =EX
1235 FX =J :REM RECORDS LOCATION OF SWITCH
1240 ENDIF
1250 NEXT J
1260:
1270 IF LB =FX+1 THEN QUIT :REM SORT FINISHED IF LB DOESN'T CHANGE
1280 LB =FX+1 :REM SETS NEW LOWER BOUND AFTER EXCHANGE
1290 ENDLOOP
1295:
1300 ENDPROC
```

Double Bubble Sort

```
1000 PROC DOUBLE-BUBBLE-SORT
1001:
1060 REM VARIABLE LIST
1070 REM UB =UPPER BOUND (# OF ITEMS IN LIST)
1080 REM LB =LOWER LIMIT OF UNSORTED ITEMS
1090 REM EX =TEMPORARY STORAGE DURING SWITCH
1100 REM FX =POSITION OF LAST SWAP GOING DOWN LIST
1105 REM FX% =POSITION OF LAST SWAP GOING UP LIST
1110 REM J =INCREMENT COUNTER GOING DOWN LIST
1115 REM K =INCREMENT COUNTER GOING UP LIST
1120 REM N() =ARRAY BEING SORTED
1130:
1200 LB =2 UB =??? :REM SUPPLIED BY USER
1210:
1220 LOOP :REM LOOPS UNTIL NO EXCHANGE IN INNER LOOP
1210 FOR J =UB TO LB STEP -1
1220 IF N(J-1) >N(J) :REM CHECKS ADJACENT ITEMS IN ARRAY
1230 EX =N(J) :REM LINES 1230-1232 CAUSE EXCHANGE
1231 N(J) =N(J-1)
1232 N(J-1) =EX
1235 FX =J :REM RECORDS LOCATION OF SWITCH
1240 ENDIF
1250 NEXT J
1260:
1270 IF LB =FX+1 THEN QUIT :REM SORT FINISHED IF LB DOESN'T CHANGE
1280 LB =FX+1 :REM SETS NEW LOWER BOUND AFTER EXCHANGE
1290:
1295: FOR K =LB TO UB :REM THIS SECTION MOVES UP THE LIST,
1300 IF N(K-1) >N(K) :REM MOVING SMALL ITEMS TO THE TOP.
1310 EX =N(K)
1311 N(K) =N(K-1)
1312 N(K-1) =EX
1313 FX% =K :REM POSITION OF LAST SWAP
1320 ENDIF
1330 NEXT K
1335:
1340 UB =FX% :REM SETS NEW UPPER BOUND
1350 ENDLOOP
1355:
1360 ENDPROC
```


BUSSter

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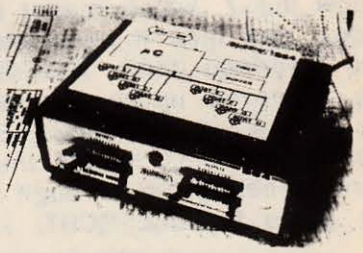

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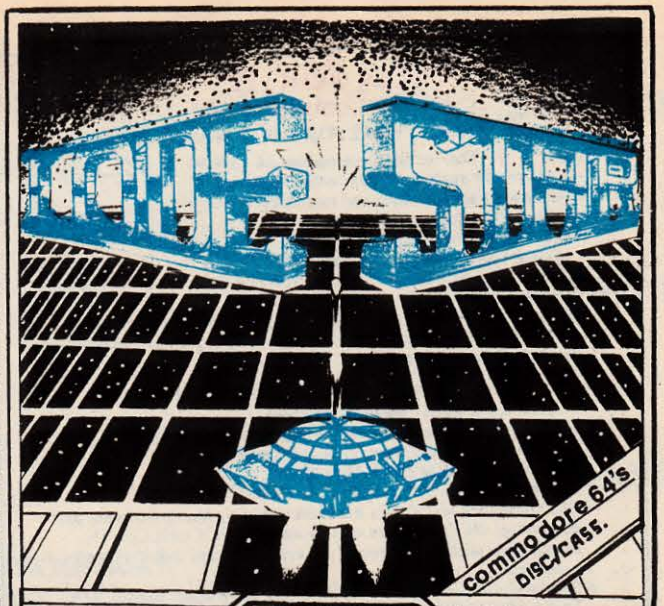

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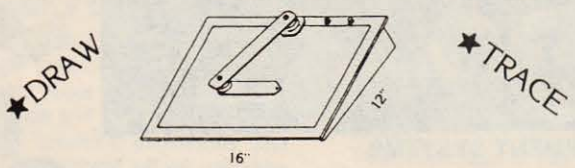

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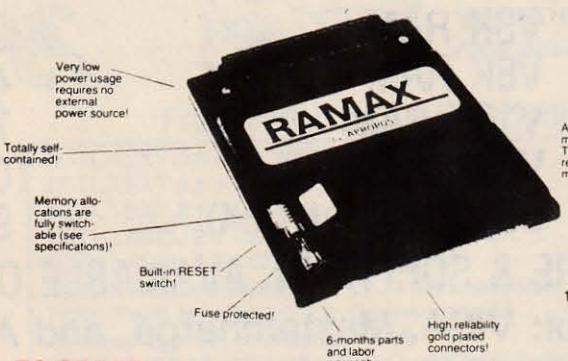

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B-SERIES

The New Business Computer

by Gord Campbell — Toronto, Ont.

Memory Layout in the 'B' Series

The new 'B' series machines are available with either 256K or 128K, and there are promises of memory expansion up to 960K. The processor chip is very much like the 6502 used in earlier Commodore computers, which means that addressing is oriented to up to 64K of memory. Management of the extra memory is handled in a simple and effective manner.

Memory is organized as up to 16 'banks' of 64K each, numbered from 0 to 15. Bank 15 is used by the system for:
ROM
Devices (i/o chips)
Video RAM
System RAM (2K)

On the 256K machine, the other banks are:
1 - for BASIC program text
2 - for arrays
3 - for simple variables
(32K reserved for DOS)
4 - for strings

The 128K machine uses bank 2 for all variables, and does not reserve memory for DOS, since it will not be available with built-in drives.

Pure BASIC programs don't have to worry about memory banks. They can be up to 64K in size, with lots of variables. If only one array is used in a program, it may be dimensioned up to:
32,249 for integer variables
12,899 for floating point numbers
16,124 for strings

Strings are stored with a 3-byte backward pointer for fast garbage-collect.

The content of the 20 programmable keys is stored in 512 bytes of bank 3. Note that all the possible simple variables take up less than 20K of memory.

The old message 'out of memory' has been subdivided into:
'out of stack' (too many gosubs/for-nexts)
'out of text'
'out of array space'
'out of memory' (strings)
(Yes, I have seen all of these.)

The function FRE(n) returns the available memory in bank 'n'. FRE(0) returns a zero.

Machine-language programs have to be very concerned about memory banks. There is very little free RAM in bank 15, so machine-language programs should run out of one of the other banks. My preference is bank 1, which means that 64K is available for BASIC and machine-language. However, the start of BASIC defaults to location 3, and machine-language is rather limited without page zero and a stack. Thus a 'boot' program is required, which:
- POKE's the start of BASIC
- BLOAD's the transfer-of-execution utility
- BLOAD's my machine-language code
- DLOAD's the main BASIC program

The BASIC program may then say:
BANK1:SYSnnnnn
to invoke the machine code.

Storage location 0 is the 'execution register'. As soon as you store a value there, the processor gets its instructions from the indicated bank. Location 1 is the 'indirect register', which controls the bank used by two instructions for their data. These instructions are:
LDA (pointer),Y
STA (pointer),Y

The 'transfer-of-execution' utility referred to above, allows machine-language to invoke ROM routines without worrying about exactly how execution is switched to bank 15 and back again. It also allows for interrupt processing when machine-language is executing in a RAM bank. The routine

requires exclusive use of one byte of page zero, but all the rest of it (253 bytes) is available for your programs.

Memory in bank 15 is allocated as follows:

$2-$03FF - system RAM
$0400-$07FF - DOS buffers
$0800-$0FFF - external buffer RAM?
$1000-$1FFF - DOS ROM?
$2000-$7FFF - cartridge
$8000-$BFFF - BASIC ROM
$C000-$CFFF - unused
$D000-$D7FF - screen RAM
$D800-$DFFF - 8 i/o chips
$E000-$FFFF - kernal ROM

Summary

The way the expanded memory has been implemented in the 'B' series makes it easily available to BASIC programs, while also allowing machine-language to use the memory with a little care.

Farquharson Features...

by Al Farquharson

I Have More RAM Than You Do or other stories

Confusing. 256K whatsit. 64K thatsit. The maximum memory that any 8-bit computer can talk to is 64K. With built-in smarts, the memory can be juggled to expand the memory in a machine to much more memory space or RAM. We can totally clear the memory space in the Commodore C-64 so that 64K is present. And it will do absolutely nothing but sit there; keys won't work. I mean NOTHING. Most micros have certain information built in by means of ROMs. (Remember, this is Read Only Memory). When turned on, the computer reads information from ROM and places it in RAM. When this happens, your available memory for programming or loaded-in programs becomes smaller. Then why do a stupid thing like that?

Reason: Computers need programs for themselves so that they can do what you want them to do. These are built in ROM and are read into memory to give the darned thing some BRAINS! Usually a LANGUAGE such as BASIC is generally used. Room is provided in this manner to handle inside housekeeping and do smart things in math such as what is 12 to the 14th power, or add two monstrous numbers, or balance my checking account. The usable RAM for you and me is NOT the big number usually quoted. Actually a 32K PET and 48K Apple are close in what is left to work with. I have never filled a 32K PET with <u>any</u> BASIC program....my longest was 16K and took four months to write. With some form of permanent outside memory such as a Floppy Disc or Cassette Tape you can extend the size of a program anyway. I mean permanent in the sense it doesn't go away when the computer is turned off. Programs are usually stored externally on one of these two devices.

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Conclusion

SOFTWARE DESCRIPTION

Although a complete listing of the current software will not be given here (a crude attempt at a software flow chart is included, however), I will try to give enough detail to permit an experienced programmer to construct an equivalent (or better yet, improved) version. The main program loop is exceptionally simple since it just sits in a tight loop scanning the function keys looking for PLAY, RECORD, FAST FWD, or REWIND for either recorder #1 or #2. The function keys and legends were programmed to have a toggling action, so that when, for example, RECORD is depressed for the first time, the legend is reverse field highlighted to indicate that it is active, and the next depression stops the action and restores the legend to normal video (that's why a STOP key isn't needed). All musical events are initiated by interrupts which can come from three separate sources: from the keyboard at any time and from either or both recorders if they are in PLAY mode. A 6522 timer is used as a 'master reference' clock from which is derived all the timing data to be saved (which also insures that all events are 'meshed' in proper time sequence).

On receipt of an interrupt, the system first determines the source of the interrupt. If it is from the keyboard, the four-byte event is 'handshaked' out and a data taken signal is sent. If the interrupt is from 'tape', the event data is taken from memory (including the time for the next tape event). Event data is then 'queued' into a 5x256 byte FIFO RAM buffer (the fifth byte keeps track of the interrupt source) and the queue input pointer is advanced. On return from interrupt, the program notices that the queue input pointer has advanced, and takes the following steps (can be re-interrupted during this phase): The data is taken from the queue and if it is a depression event, finds an available SID voice (a 24 byte 'availability' table is maintained), installs the ADSR parameters (the sustain amplitude is taken from the event velocity) associated with the event source (each can have its own parameter set) into the SID voice, installs the appropriate 16 bit frequency (a 12-tone equal temperament scale was used), sets the appropriate byte to indicate 'not available', and then initiates the attack. If the event was a release event, the appropriate SID voice is put into release mode, and the voice is made available. If the system can not find an available voice, the most recent one is over-written; this allows sustained chords to have highest priority since they most likely have been held the longest. With 24 voices, it is essentially impossible for a ten-fingered keyboard artist to get into this situation. (With sound-on-sound, there is a potential problem, but try and figure out which of the 24 sounding voices has been killed!!). In any case, the system will not 'crash' even if you lay your arm down on the keyboard.

If the event was a switch or potentiometer change, just the appropriate parameter table is overwritten. If RECORD on either or both recorders was active, the event data is stashed into one or both recorder buffers (in the present system each has 40K bytes of 'tape' available).

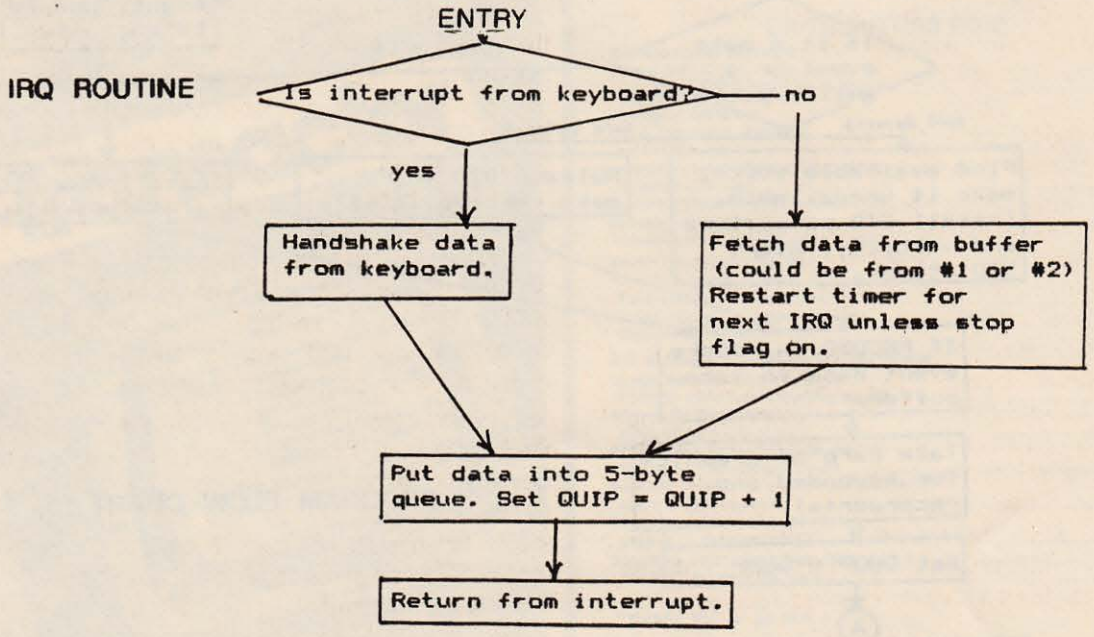
Next, a graphic depiction of the event is displayed. note identity and velocity is displayed as a vertical line (length proportional to velocity) above the corresponding key on the pictorial representation of the keyboard. Potentiometer settings are displayed in a similar way. Switch settings just get an '*' symbol above the appropriate spot. If the event is from or is being recorded to one or both 'tape recorders', the appropriate counter is advanced, and 'tape' remaining is updated.

Finally, the queue output pointer is incremented, and the program jumps back to the function key scanning loop. Overall speed is such that even with furious attempts to 'overpower' the system, I have not been able to make the system lose its 'real time' feel. REWIND and FAST FWD functions were purposely slowed down (really, only pointers are altered) to maintain the 'tape recorder' illusion. 'Stop' events ($FF in the event ID field) are used to separate segments, so multiple recordings are possible on the same 'tape'. Continuous sound-on-sound is implemented by the following procedure:

1. Activate RECORD on #1
2. Play keyboard live (the most difficult step!!)
3. Press RECORD on #1 to stop, REWIND #1, REWIND #2
4. Activate RECORD on #2, PLAY on #1
5. Accompany yourself on the keyboard
6. Press RECORD on #2 to stop, REWIND #1, REWIND #2
7. Activate RECORD on #1, PLAY on #2
8. Go to step 2

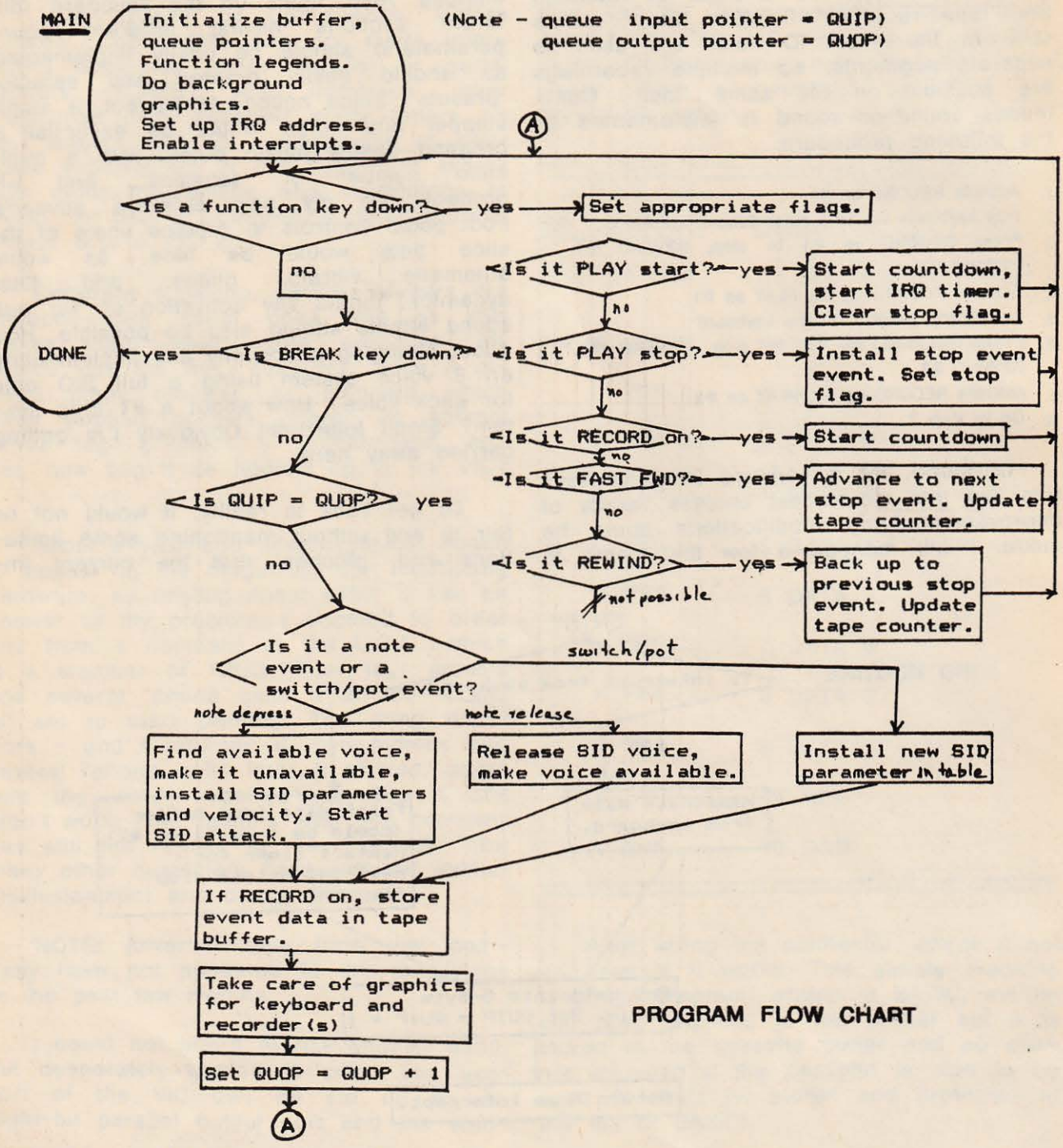
Obviously, for a software intensive system like this, an almost endless variety of improvements and modifications could be made. I will mention a few that come to mind (but I don't promise to implement them!). One very simple modification would allow a variety of temperaments (the specific set of frequencies used in the scale), to be selected, including scales with other than 12 tones. A special event I.D. for 'repeat the previous section n times' would be a substantial aid in live performances. Also, splits on the keyboard (different sections having different sound parameters) should be easily implemented, as should easily created and selected 'presets'. Since nobody is perfect, a single stepper and editor would be essential to creating quality music output with a minimum number of 'sessions', and will probably be my next software advance. Foot pedal controls to replace some of the slide pots would be nice, as would automatic vibrato, glides, and filter dynamics. Single key activation of 'far out' sound effects should also be possible. How about changing philosophy and implementing an 8 voice system using a full SID chip for each voice? How about a 61 chip system? **Stop!! Interrupt!!** Obviously I'm getting carried away here.

To get back to reality, it would not be fair to end without mentioning some limitations and 'glitches' that the current im-



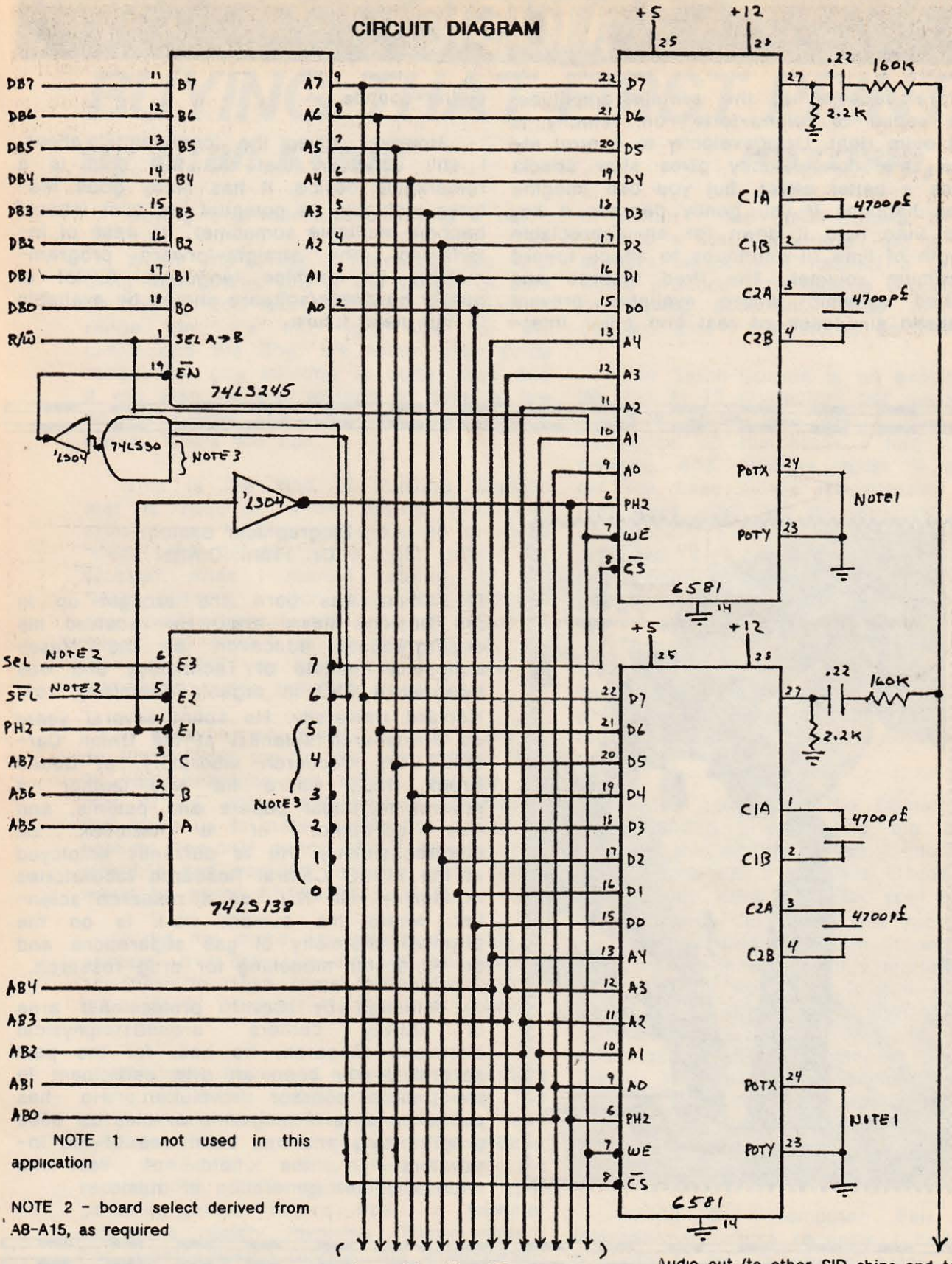
plementation of the SID chip has. Changing the overall volume and installing the filter and filter mode causes a distinct 'click' at the audio output, thus preventing these features from being used dynamically. On release, a faint but definitely audible 'ghost' of the note persists (from on-chip crosstalk?) which can only be defeated by installing zeroes in the frequency register or starting a new attack. The above flaws are compounded in a multiple-chip system, and prevent the current system from having a professional quality sound. Also, since the attack phase must go to maximum volume

Continued on pg. 70



PROGRAM FLOW CHART

CIRCUIT DIAGRAM



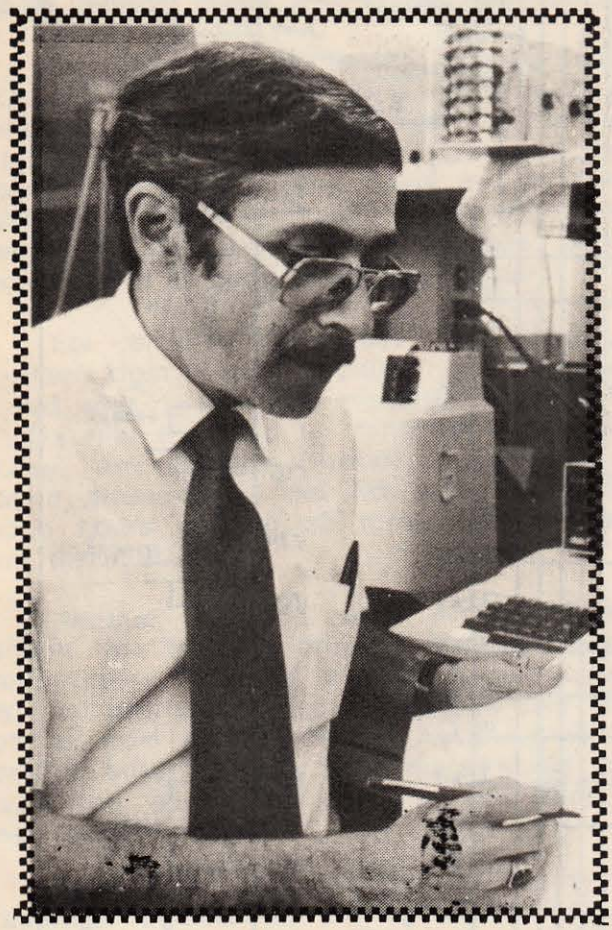
NOTE 1 - not used in this application

NOTE 2 - board select derived from A8-A15, as required

NOTE 3 - to chip selects of other SID chips and to74LS30

before decaying to the sustain amplitude, the sense of 'piano-forte' on velocity is not quite right. Using velocity to control attack rate (low velocity gives slow attack) gives a better effect, but you can imagine what happens if you gently depress a key and then hold it down for an appreciable length of time (it continues to attack toward maximum volume). The fixed timbres and limited dynamic timbre available prevent realistic simulation of real and other interesting sounds.

However, given the 'complaints' above, I still conclude that the SID chip is a remarkable device. It has many good features including its potential low cost (should become available sometime), its ease of interfacing, and straight-forward programmability in machine language. A lot of quality hardware/software should be available in the near future.



Biographical Sketch
Dr. Frank Covitz

Dr. Covitz was born and brought up in the Boston, Mass. area. He received his undergraduate education at the Massachusetts Institute of Technology and was awarded a PhD in organic chemistry from Harvard University. He spent several years as a research scientist at the Union Carbide Corp. research laboratory, at Bound Brook, N.J., where he was author of several technical papers and patents, and was co-author of a textbook on electrochemistry. He is currently employed at the AIRCO Central Research laboratories in Murray Hill, N.J., as a research scientist, where his current work is on the physical chemistry of gas separations and on molecular modelling for drug research.

Although Dr. Covitz' professional area of activity centers around physical chemistry research, he has, for the past several years, been an avid participant in the microprocessor revolution. He has published several magazine articles on 6502 programming and has been one of the innovators in the field of real-time microcomputer generation of music.

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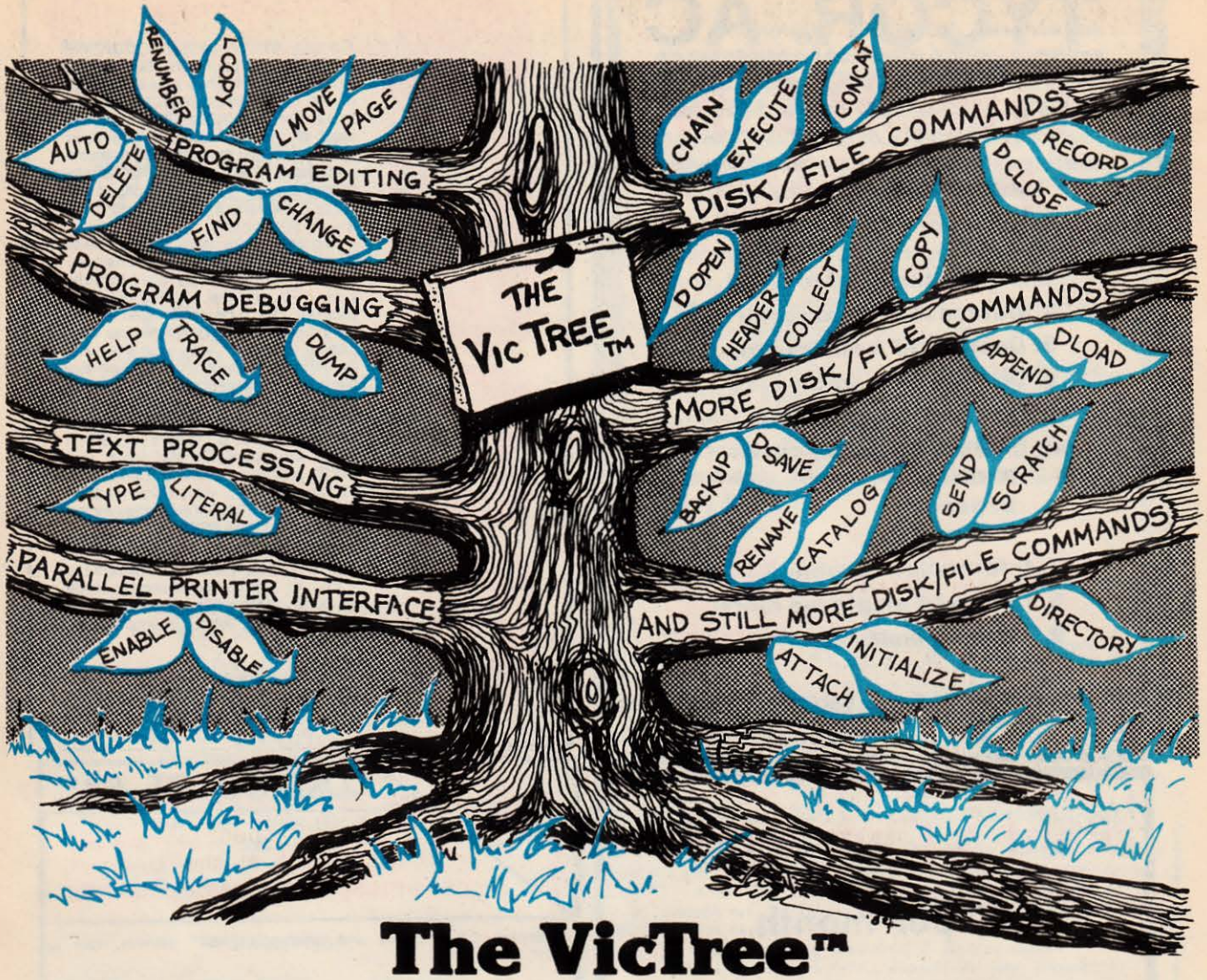

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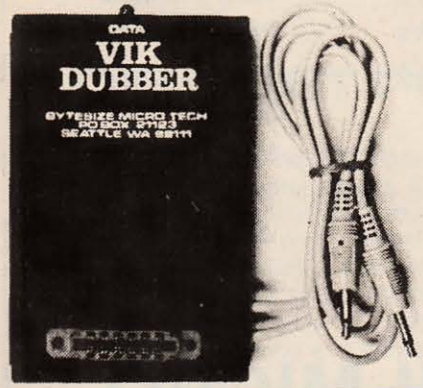

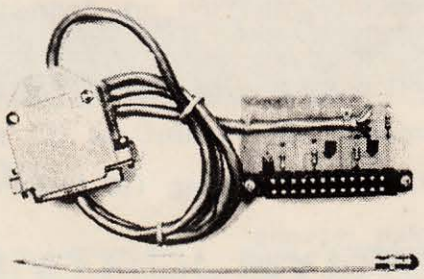

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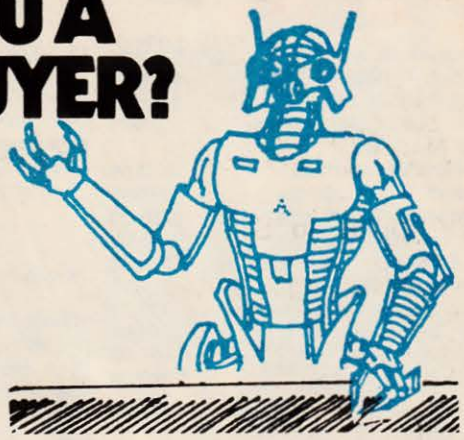

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PRINTERS

I LOVE GEMINI-10!!!

by Mayland Harriman Port Arthur, Texas

(With Apologies to Lucille Ball)

Two years ago I could not justify the purchase of a printer to go with my CBM 2001 computer. One day I jumped in with both big (size 15) feet and bought the lowest-priced printer that I could find. This was just under $300.00 U.S. without the interface. This printer did a fine job but had only two sizes of type and did not print graphics or cute things like that. It was bi-directional and did a good job for me until I heavy handedly "repaired it " burning the print head out at the same time. The print head now sells for $90.00 U.S.

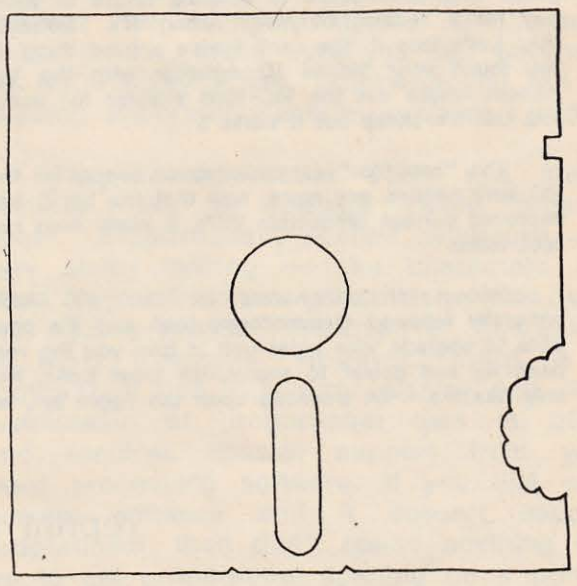
Now I have bought a "dream machine printer, the GEMINI-10 made by Star Micronics, Inc.

With 88 type faces and styles I am absolutely in printer heaven! The GEMINI-10 seems to be quality-built by Star, a company with a record of manufacturing precision parts for more than thirty years. They give the purchaser a 90-day warranty on the print head and ribbon, and 180 days on the rest of the printer. The only difference between the GEMINI-10 and the GEMINI-15 is the size of paper that can be be handled. Both are serial, impact Dot Matrix printers with 9 wire user-replaceable printheads. Printing speed is 100 cps in 10 cpi size, bi-directional logic seeking. One real joy is the 2.3K buffer which can be expanded to 4K.

There are character sets and special features galore with the ability to handle from single sheet to fanfold paper and a tractor feed that takes 5 seconds to install or remove.

The "GEMINI USERS MANUAL" is superior to anything I have bought in years. This is a heavily-wired, spiral-bound book, 6x8 inches with 213 pages of CLEARLY and PRECISELY printed instructions, information, tips and examples. This useful book is written for the first-time printer owner and doesn't assume the buyer has prior knowledge of a printer. The smartest thing and the most helpful thing Star Micronics has done is to furnish us with a toll-free TECH SUPPORT number with knowledgeable, patient men ready to listen to your troubles and help get the snag unsnagged and printer printing. The 800-number is open all the west coast work day.

Some people have written that the GEMINI-10 is a mirror copy of the Epson MX-80 and this may be so but all I can say is that this is one fine printer backed by an excellent warranty, a toll-free help number, a very fine manual and all for a nice low price.



HARDWARE HACKER

by Hank Mroczkowski Houston, Texas

Did you buy a fifth on the third for the Fourth? No? Maybe on the second for the Fourth because the third fell on a Sunday. Right! (Please don't think I encourage drinking...I just like that play on words.) Besides muddling the mind, drinking's been a considerable factor in more than half of all highway accidents. In any case, I hope that everyone has had a safe summer, so far. We can't afford to lose any dedicated hackers...some publications have been either ignoring us or predicting our demise for the past four years. In Mark Twain's words, the...reports of my death are greatly exaggerated."

How about you Canadians...do you have a fourth of July? Sure, it follows the third, just like in any other country (hi hi!). Sorry, just checking to see if you're listening. As neighbors, you're the best. And I'm happy and very proud to be a part of the best...THE TORPET, your independent Commodore users' magazine.

Half the summer's left (or gone?) and it's time to inventory things done and things to do. Some of the projects described in this column have been commercialized and are successful, while others haven't quite made the grade. Modems, for example are about to go a bit lower in price. The VIC modem is being discounted for less than $60 U.S.! I would guess that Commodore is cleaning house to make way for a redesigned model using TI's TMS99532 chip. Let's face it. You can't ignore a good thing! (If you found your 'phone incompatible with the VIC modem, check out the VIC-1605 adaptor for under $10. U.S. It's cheap but it works !)

The "breadbox" expander/power supply for the VIC isn't needed any more, now that the big C has improved current production VIC's. It really does run cool, folks!

Prices for peripherals for the VIC have generally followed **Commodore's** lead and it's possible to upgrade your older unit to give you the real flexibility and power to accomplish most tasks. Not only has the C-64 trounced upon the Apple but, so has the VIC-20. The **Data-20** video module (a circuit card which gives 40 or 80 column format), selling for $80 to $100 U.S. includes a very powerful word processor...that's HALF of the price for which most word processors sell. (Caution, there are a few gotchas)

Speaking of peripherals...**Computer Care's** Arcwelder I is just about to be introduced to the public. This is a printed circuit card which will be plugged into the user port of the VIC and works in conjunction with Micromon. It uses an external wall transformer to supply the programming voltages. What is it? It's a UV-EPROM programmer, that's ultraviolet-erasable programmable read only memory...whew!

Arcwelder I will handle any single supply (no negative voltage) EPROM. For example, it can program the 2716, 2516, 2732, 2532, 2764 and 2564. With minor modification, it'll even program the 2732A. (The programming voltage, Vpp has to be lowered to +21 volts and isn't recommended unless you have a lot of 2732A's) This little gem even has the extended addressing to program 16K byte EPROMs as they become available to the hobbyists.

The complete package will include the PC card, the power supply, a copy of Micromon on cassette, circuit documentation and instructions. A stripped down, "minimum parts" semi-kit will also be sold for the experienced hacker. Please note: the kit isn't recommended for those who aren't sure which end of the soldering iron to pick up...in other words, it won't have Heathkit instructions for assembly. We had to keep the price down somehow!

Currently, we're waiting for several shipments of parts. Meanwhile we're "beta testing" the prototypes and writing the documentation. When it's released, the Arcwelder I will be available through **Foxfire Systems, Inc.**, P. O. Box 507, Deer Park, Texas 77536, (713)473-6723 by mail order or through **Computer Care**, (713)438-5178, locally.

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PROGRAMMING

MAKING GOTO GOFAST

(and other madness)

by David Williams Toronto, Ont.

The June, 1983, issue of TORPET contained an article of mine in which I discussed the consequences of a curious little approximation in Commodore's BASIC interpreter. When instructions such as GOTO or GOSUB are interpreted, the computer often unnecessarily goes back to the very beginning of the program to search for the destination line. This is because, when the numbers of the destination and current lines are compared, they are first expressed in hexadecimal notation, then only the high-bytes are examined to see if the destination line is later than the current one in the program. If this is found to be the case, the interpreter searches forward from the current line to find the destination one. Otherwise it goes back to the beginning of the program and searches forward from there. Since only the high-bytes are examined, it frequently happens that the computer goes back to the start of a program to find a line which is actually later in the program than the current one. It therefore wastes a lot of time searching through the earlier part of the program. For this reason, the execution of reasonably long BASIC programs can usually be speeded up by renumbering them in increments of at least 256, so that all the line numbers have different high-bytes.

Incidentally, since THE TORPET published a brief article, More On Line Speed Fallacy' by George Culbertson in the September 1983 issue which claimed to refute what I have just said, I suppose I should explain why the program it contained failed to run faster when numbered with widely-spaced line numbers. Quite simply, the program contained only one "forward" GOTO (i.e. to a later line in the program), and this was from only the third line of the program. The amount of time which was wasted by going back to the beginning of the program when this was executed was therefore extremely small, and was overwhelmed by the delays caused by converting larger line numbers into hexadecimal notation. In practice, of course, it is rare for GOTOs to start from virtually the beginning of a program. I tried appending Mr. Culbertson's little routine to the end of another program which was about 50 lines long. It then ran considerably faster with widely-spaced line numbers than with low numbers.

Using widely-spaced line numbers, however, is not a very satisfactory solution to the delays caused by the line-comparison approximation. Increasing the line numbers adds new delays, and also makes the program longer, so that it occupies more memory space. At least one program which I frequently use simply will not fit into the memory of a 32K PET unless it is numbered with low line numbers. Also, since line numbers greater than 63999 are not allowed in BASIC, it is impossible to renumber programs with more than 250 lines in such a way as to make all the line numbers have different high-bytes. A far more satisfactory way of eliminating unnecessary GOTO delays is to tackle the problem at source, by rewriting the relevant few bytes of the BASIC interpreter so that it examines both the high- and low-bytes of the line numbers. This is quite easily done by anyone who has access to an EPROM programmer and who is willing and able to remove a ROM from his computer and replace it with another. The difficulty of this task depends on whether the BASIC ROMs are soldered in place or are in sockets. If they are socketed, the replacement is very easy. If they are soldered, I would advise you not to try it unless you are a real expert with a soldering iron. Some PETs have socketed ROMs, others soldered. Only by opening your machine and taking a look can you be sure which type yours is.

I should emphasize here that everything in the remainder of this article applies ONLY to PET/CBM computers with BASIC 4.0. I am sure that similar changes can be made to older PETs and to other Commodore computers, but I have not tried them on machines other than the 4.0 PET. On other machines, the memory locations to be changed will certainly NOT be the same as those stated here. If you try to make these changes on any other machine, I suggest you closely examine memory maps of your computer, and that you carefully disassemble and make sure you understand the code you intend to change before doing anything.

In the execution of GOTO, GOSUB, etc., the first thing which the computer does is to convert the number of the destination line into hexadecimal notation. This number is placed in zero-page locations $11 and $12 in the normal order, low-byte first. The number of the current BASIC line is always kept in locations $36 and $37. The GOTO interpreter then performs the following little piece of code to compare the numbers, starting at location $B836:

```
B836 LDA $37
B838 CMP $12
B83A BCS $B847
```

Thus only the high-bytes of the line numbers are compared. If the current line's high-byte is greater than or equal to that of the destination line, the carry flag is set by the comparison and the branch is taken. This transfers execution to a routine which starts the search for the new line at the beginning of the program. Otherwise the branch is not taken and the subsequent coding starts the search for the new line starting from the line immediately following the current one.

It would be nice if we could simply replace the piece of coding above with something like:

```
LDA $36
CMP $11
LDA $37
SBC $12
BCS $B847
```

This has the effect of comparing both pairs of bytes and of setting or clearing the carry flag according to the exact comparison of the line numbers. However, there is one obvious problem. This new coding is four bytes longer than the original, so it will not fit into the same space in the ROM. A "patch" is therefore needed. Three of the first four bytes of the original coding can be changed to contain a JSR instruction, with a NOP filling the fourth byte. The JSR sends execution to somewhere in ROM where we can find space to put a little subroutine consisting of our new coding with an RTS in place of the BCS instruction.

There is, in fact, plenty of room in the BASIC 4.0 ROMs to hold some extra coding. When it was decided to add an extra ROM to the interpreter to hold the 4.0 disk instructions, there was actually rather less than four kilobytes of new code which had to be accommodated. There are thefore several hundred bytes of unused space in the ROMs, mainly at the end of the $D000 ROM. It would therefore be perfectly possible to put a JSR at $B836 which would call a subroutine to be written in the $D000 ROM. However, this would require two new ROMs to be burned and installed instead of only one. I therefore decided to find some way of squeezing the subroutine into the $B000 ROM, even though this is already packed tight with code, apparently with no free space.

An opportunity to do this arises from the fact that the $B000 ROM contains a few error messages, such as "redo from start" which appears when a non-numeric input is given to an INPUT statement which requires a number. I decided to shorten this message to the single word "redo", and to use the eleven bytes formerly occupied by the last two words for the new subroutine. In fact, this leaves two whole bytes unused! The modified coding therefore looks like this:

```
$B836 JSR $BD0E
$B839 NOP
```

and the subroutine:

```
$BD0E LDA $36
$BD10 CMP $11
$BD12 LDA $37
$BD14 SBC $12
$BD16 RTS
```

It is also necessary to change two other bytes in order to properly terminate the shortened error message. The "o" in "redo" is at location $BD0B. A carriage return ($0D) should be placed in $BD0C so that the cursor will move down to the next line after the message is printed. Location $BD0D must contain a zero. The routine which prints error messages quits when it finds a zero, and we want it to quit before it tries to print out our new subroutine as a continuation of the error message!

As seen on the simple PET monitor, the modified bytes look like this:

```
.: B836 20 0E BD EA B0 0B 98 38
```

and:

```
.: BD0C 0D 00 A5 36 C5 11 A5 37
.: BD14 E5 12 60 00 00 D0 04 A0
```

And that's all there is to it!

In order to burn the ROM, you should first copy the contents of the existing $B000 ROM into RAM, say from $5000 to $5FFF. Then use the monitor to make the changes to the RAM copy as shown above. Then use your EPROM burner to copy the RAM version into an 8-K EPROM. Finally, replace the existing $B000 ROM (that's the one next to the $A000 ROM, which is one of the two initially-empty sockets which are available for custom ROMs) with your new EPROM. Now you should have a PET which will run BASIC programs significantly faster than before.

But wait! There is another little change which you might like to make to the $B000 ROM while you are at it, even though it has absolutely nothing to do with the GOTO coding. We all know, and have been occasionally annoyed by, the fact that the PET drops out of a program if a null input is made in response to an INPUT statement. In other words, if you press the "return" key without typing anything onto the screen in response to an INPUT, the program quits and you find yourself with the "ready" message and a flashing cursor. Of course you can get back in by typing "cont", but many novice users don't know that and find themselves wasting a lot of time because of a trivial mistake.

Actually the exit to direct mode is deliberately programmed into the PET. It doesn't just happen by accident. At location $BBF2, which is in the INPUT routine, is the instruction JMP $B7D8, which takes the machine to the END routine, and thereby out of the BASIC program.

I have changed this JMP instruction to JMP $BB6A. This is the start of the routine which prints "redo" (the old "redo from start") on the screen, then goes back and performs the INPUT routine again. Thus accidentally pressing the "return" key simply results in the computer asking for another input from the user.

To make this change, just change locations $BBF3 and $BBF4 to contain $6A and $BB respectively. This can obviously be done very quickly on your RAM copy of the $B000 ROM before you burn the EPROM.

I can't find one decent recipe in this microprocessor cookbook.

WORLD OF COMMODORE

First Canadian all-Commodore show to be held in December in Toronto

Commodore computer users will have a unique opportunity to examine and purchase products designed for use on their computers at a show being held at the International Centre on Toronto's Airport strip December 8 to 11. The World of Commodore is being presented by Commodore to commemorate their 25th anniversary. Part of the show will be a special exhibit documenting Commodore's 25-year history, and previewing some of their plans for the future, including their newest product offerings.

Participating with Commodore will be over 70 exhibitors from Canada, the United States, Great Britain and Europe. Hundreds of brands of educational, business, professional, games and personal use software and peripherals approved by Commodore for use on their computers will be on display. Many of these products will be shown for the first time in Canada at World of Commodore. Attendees will be able to purchase products at very attractive prices.

These products include a wide range of business software designed for legal, medical, accounting, word processing (in both English and French), database applications, dozens of new games, educational programs and other software intended for home use, peripherals such as 80-column cards for the VIC 20 and C-64 and a product designed to put a photographic image onto computer storage medium, books on computing, diskettes, plus the complete line of Commodore computers, printers, modems, software and other products, including some which will be introduced at The World of Commodore.

At press time a complete list of exhibitors was not available, but a partial list of exhibitors includes:

Aardvark Action Software--an American games software manufacturer.

B.M.B. Compuscience--a Canadian supplier, author of "The Manager" database program.

Batteries Included/Delphi Systems--a Toronto-based firm, author of "The Paper Clip" word processor, "The Delphi Oracle" database program, and supplier of I.E.E.E., 80-column and other cards for the C-64.

Beacon Software and **Capital Computer Systems**--two Canadian manufacturers of business software for medical, legal, accounting and other applications.

Comm Data Computer House--a U.S. manufacturer.

Dynatech Microsoftware--a U.S. firm, manufacturer of Code Writer, a program generator.

French Silk Smooth Software--an American company, supplier of "Develop 64" and "Develop 20," development systems for the C-64 and VIC 20 computers.

Holt Rinehart and Winston--publishers of several computing books.

Jini Micro Systems Inc.--a U.S.-based manufacturer of a series of powerful and flexible series of database programs for the complete Commodore line.

King Microware Ltd.--the Canadian distributor of Abacus software.

Kobotek Systems--a Canadian supplier of accounting software.

Micro Application--a French firm supplying word processing, database and other French-language applications software.

Micron Technology--a U.S. firm, manufacturer of the Micron Eye, which takes "computer pictures" and stores them on disk.

Microphys Programs Inc.--a U.S. software manufacturer specializing in educational software for the C-64 and B--series computers.

Richvale Telecommunications--a Richmond Hill-based (Canadian) retailer and manufacturer. They make the C4 link, an expansion device for the C-64.

S.I.I.F.--a Quebec-based supplier of French-language software.

Silicom International--the Canadian distributor for British software suppliers Anagram, Precision SW and CSM.

Softwerx Inc.--a Halifax-based supplier, manufacturer of "The Bean Counter."

Surtronics--a supplier of Canadian medical software.

The Computer Source--an American supplier of diskettes.

Visitroniques Ltd.--a Sherbrooke, Quebec-based supplier of French-language word processing, database management and small business accounting packages.

In addition to these suppliers, there will be several dealers exhibiting at the show, displaying and selling their own ranges of products. Some of these include Batteries Included, Comspec, Desktop Computer, Electronics 2001, House of Computers, Scitron, and The Software Shop.

And we can't forget the largest exhibitor of all--Commodore.

Watch future issues for an updated, more complete list. Suffice it to say that if you use a Commodore computer (a reasonable assumption given the fact that you're reading this magazine) or just want to find out more about what the computer revolution is all about, you will want to take in this show--the first all-Commodore show ever held in Canada--at the International Centre on Airport Road, December 8 to 11.

If you want more information about the show, contact the show organizers: Hunter--Nichols Inc., 721 Progress Ave., Scarborough, Ont., M1H 2W7. Phone: (416) 439-4140.

the map

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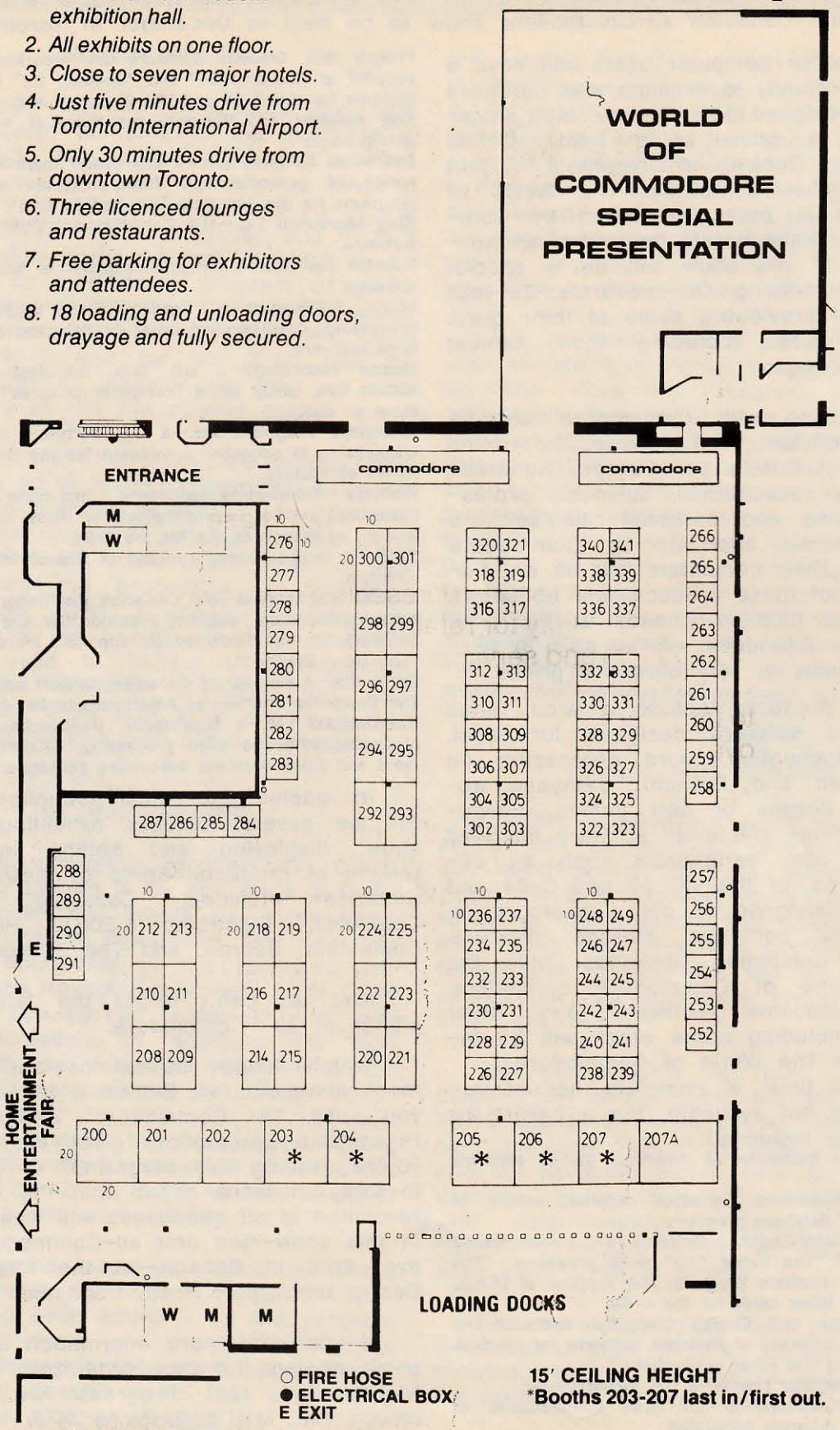

world of commodore

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The World of Commodore is being presented by Commodore to commemorate their 25th anniversary. It is the first all-Commodore show ever held in Canada, and will bring buyers flocking to examine and purchase your products.

World of Commodore represents a tremendous sales opportunity for retailers and distributors of products and services relating to Commodore computers. It is your opportunity to introduce your products and services to over 35,000 interested buyers.

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HELP!

Do you have anything for this column? The three headings are:
(1) Helpful Hints,
(2) Who's Got the Answer? and
(3) "PET" Pals Wanted.
Just send your contributions (including answers to any questions which have appeared) to:

Toronto PET Users Group
Dept. Help
1912A Avenue Rd., Ste. 1
Toronto, Ontario, Canada
M5M 4A1
Please let us know if you wish your full address published.

HELPFUL HINTS

If you shift the Commodore 64's screen to a new location, be sure to disable the RESTORE key. Otherwise, a restore will crash the screen. The problem is that the restore resets locations 56576 and 53272, but it doesn't reset 648. This leaves the screen in limbo. POKE 792,116 : POKE 793,164 avoids this problem by redirecting all restores to the READY routine.

Steven C. Darnold
Alexandra, Otago, New Zealand

I have gotten into the habit of bulk erasing ALL my disks before I Header (New) them, even the new unused ones. I don't use a big bulk eraser, instead I have an old speaker with a huge magnet in the other room. I give a different brand the acid test by running them on the BBS. Drive 0 gets a lot of turning, plus a lot of scratch and save, and save with replace (@). The ones I have used are Maxell, Dysan, Scotch, Verbatim Datalife, & Elephant. Elephant listed last because it caused troubles the soonest (within the first month). I used the Maxell (same 2 disks) for 6 months with no problems whatever before going on to something else.

If you do a lot of save with replace (@), you should also be doing a lot of collecting (verifying), same as with a scratch & save. Done too much, pointers go wacko, a collect every once in a while keeps things straight.

You can use ISOPROPYL-ALCOHOL to clean your keyboard, also read/write heads on the disk. I bought a gallon from a local chemical supply house for $5.75. Get the purest that they have. DON'T use rubbing alcohol or even video tape head cleaner since they have additives that leave a residue behind. Another idea is to not smoke around the computer or even in the same room. the smoke filters down into the keyboard (and disk drives) and the nicotine gums things up. Since I have quit smoking in the computer room, my keyboard hasn't needed cleaning. Before it was every 1 or 2 months between sticky keys. Also, cover the keyboard or computer when not in use.

Tim Tremmel
Racine, Wisconsin

WHO'S GOT THE ANSWER?

I have a CBM 8032, a 2031 single disk drive and 8023P printer. Does anyone know of a good data base (commercial or otherwise) on which I could store relevant data from all my subjects (my area of study is psychology and my data has been collected from interviews and tests) and access it to carry out statistical tests such as Chi Square and ANOVA.

Dorothy Toussaint
20 Beryl Ave.
Shelley, West Australia 6155

Could anyone give me a lead on where to find 2 software disks that would allow me to use a "Soft Box" manufactured by Small Systems Eng. London England. This device is a Z-80 based micro processor that allows CPM programs to be used. It is plugged into the 8032 and the 8032 becomes a "terminal" of the "Soft Box". I have everything except the disks.

Jack Awbrey
Alabaster, Alabama

I wish to be able to use my joystick instead of the specified keys in any existing program. Can I do this? What are the changes involved?

L. Warner
214 St. George St., Apt. 402
Toronto, Ontario M5R 2N8

I am looking for a Commodore 64 computer BASIC program that could be used in the sport of soccer or the game of chess for that matter, that could be used to pair off teams, like in a tournament or a season of games, making sure every team played against each other team at least once. The user would be able to decide the number of teams, ex. 14 soccer teams to play in a tournament or season.

Greg Dietz
Aurora, Colorado

Would you know who sells an "exact" replacement fuse for the VIC 20. I wrote Commodore four months back, but no answer. Evidently the fuse I need is of Japanese make and hard to get. Can the Commodore fuse be bought by mail or is there a Commodore Repair Centre in St. Louis MO?

Bob Hart
Alton, Illinois

I am looking for a geneology program for a Commodore 64. Does anyone have one available or know where I can obtain one?

Richard R. Poitras
21 Nedwied Rd.
W. Willington, CT 06279

(See this issue's want ads -ed.)

HELP! CONTINUED...

I would like a user friendly program for decision tree analysis. One that will easily allow me to change the probabilities associated with possible events and quickly see (for example print) the result of those changes.

I would also like a user friendly program for uploading and downloading. One that will easily allow me to upload ASCII to PDP 11/70 and to an IBM 4341 as well as to download from those computers to either disk or printer.

Alan B. Flaschner
U. of Toledo, C. of Business Administration
2801 W. Bancroft St.
Toledo, Ohio 43606

I am desperately trying to find an already written program for a (hand) palm-analysis. It does not have to be very professional since it will be used in an entertainment capacity. Ideally it would generate about 15 to 20 different readouts of a rather light nature.

I am also very interested in locating a horoscope program that will generate a print-out when a (ddmmyy) (day month year) 6 digit code is keyed into the computer.

Eric Lefebvre
3584 Wiltshire Blvd.
Niagara Falls, Ontario L2J 3E6

I am new to the world of personal computing and am quite lost.

Does anyone know of a U.S.A. income tax program for the C-64 that will keep track of things during the year, prepare monthly, quarterly and year end statements; prepare income tax forms; compare individual totals against that which the I.R.S. considers normal; and do all the other misc. things needed to keep the I.R.S. away from my door?

Can anyone advise me on a good word processing program for my C-64 that will also handle address files, merging said addresses to letters and check spelling (I really need that last part) also a forms generator for filling out pre-printed forms?

Can anyone help me interface the printer part of an old IBM MTST word processor to my VIC 20 and/or C-64?

Robert Dingwall
Huntington Beach, California

If anyone has succeeded in adapting a graphics bit pad (graphics tablet on Apple) to the C-64, please contact

Jack SantaBarbara, Applied Research
2021 Cliff Road
Mississauga, Ontario L5A 3N7

MICROMON

by Bill Yee
Winnipeg, Manitoba

SORRY! These two figures were missing from THE TORPET last month. We thank Mr. Bill Yee of Winnipeg, Manitoba for rushing them to us.

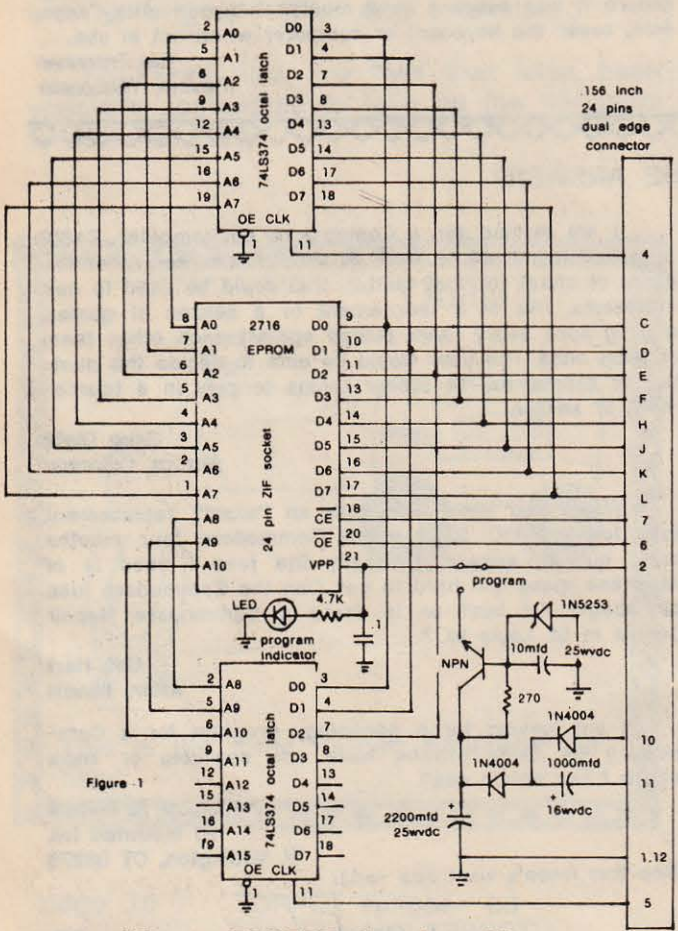


Figure 1

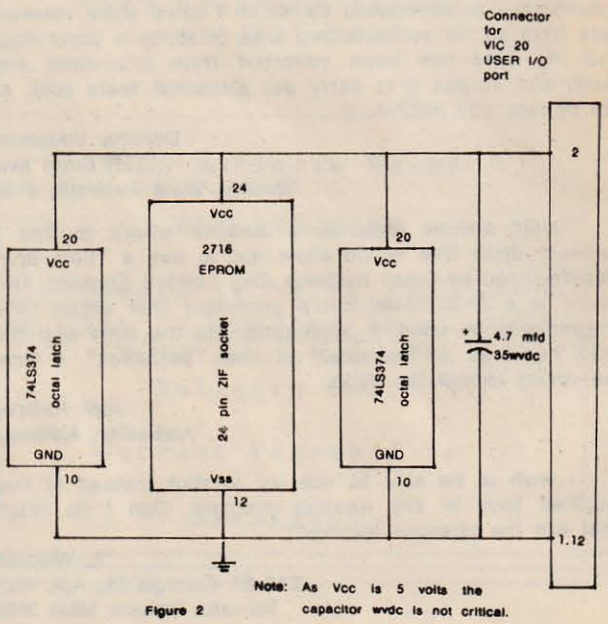


Figure 2

Note: As Vcc is 5 volts the capacitor wvdc is not critical.

CLUB ACTIVITIES

LIBRARY CORNER

Using The PET EMULATOR

by David Bradley

There have been 8 disks released recently for the Commodore 64 that are to be used with the **"PET EMULATOR"**. This means that before the programs will run you must first load the **"PET EMULATOR"** into your 64.

To load the **"PET EMULATOR"** first put your disk in your disk drive and load the directory. **(LOAD"$",8)** After loading the directory type in **LIST** and press **RETURN**. The contents of the disk you have in your disk drive will scroll up the screen. Now type in **LOAD "PET EMULATOR.C",8** and press **RETURN**.

Once disk activity has concluded type in **RUN**. On your monitor you should see a message ending with **EMULATOR ON**. Now, until you reset your computer, you can use the programs on the disk.

If you are using a **"DATASETTE"** then the **PET EMULATOR"** should be the first program on your tape. So just type in **LOAD "PET EMULATOR.C"** and press **RETURN**.

If you decide to convert any of the programs on the **"PET EMULATOR"** disks so that they no longer require the emulator, please send them into the TPUG office.

It would be greatly appreciated by many.

COMMODORE 64 Library Notes

by David Bradley

The **(C)E3** disk will be a real time saver for all of you beginners as it has all of the programs on it from both the **Commodore 64 Programmer's Reference Guide** and the **Commodore 64 User Guide**. Many frustrating hours of debugging unfamiliar programs can be **easily** avoided if this disk is in your **personal library!**

Several of you have submitted **programs** to the library but we still need more! **Remember, one man's** 'junk' is another man's 'treasure'.

On disk/tape (C)TT - April 1983, the program Terminal Doc.C lists in upper case on a 1525E. The modification needed is as follows:

Line 60 should read: "open 4,d,7" not "open 4,d"

Andrew N. Zloty
Winnipeg, Manitoba

VIC Library Notes

by Craig Bonner

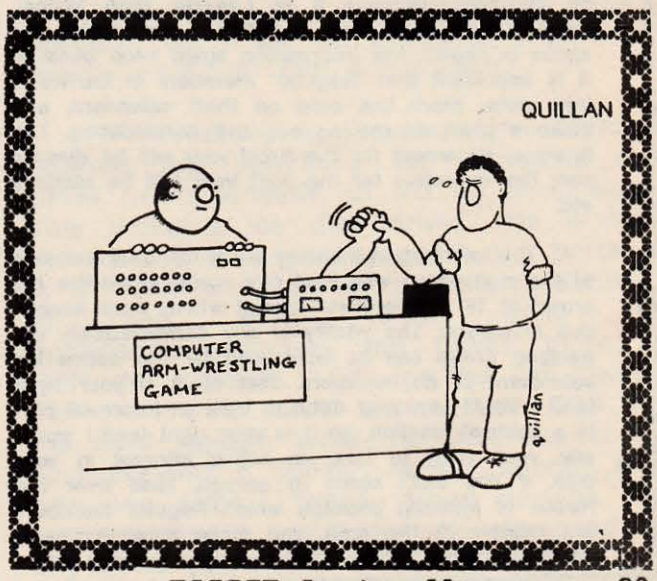
VIC users, for those who don't know me I'm the volunteer VIC librarian. Looking after the library has been a big job. I have had some complaints as to the content of the library but the fact is, I can only put in the programs that I receive from other users.

On the other hand there are some programs that do not work and should be removed. One such program is **'WordPro2'** on the V5 disk/tape. The TPUG office and I have received many calls about it. If you are interested in a word processor for the VIC try **'VIC EDITYPE 8k'** on (V)TU disk/tape. This program works and is well documented in the **July 1983 TORPET**.

I have also received some calls regarding the lack of business programs in the VIC library. I am too busy at the moment to write any myself. Other VIC users and I would appreciate it if someone who did have time could write some or convert some from the PET or C-64 libraries.

The TPUG office and I have also received many calls regarding documentation of the programs in the library. One attempt to remedy this situation is the **LIST-ME** files. Some people have tried to RUN these programs, but it is necessary to **LIST** them because they are only rem statements. LIST-MEs appear as the first program on the disk/tape and give a one-line (80 columns) description of the programs.

Although there have been a few complaints and problems associated with being a librarian, I have enjoyed meeting new people and learning from the programs I have tested. Please keep the programs and documentation coming in!



TPUG's This and That

by Doris Bradley, Assistant Business Manager

Here's a Switch

Joel Meers of Kingston, Ontario writes: I have fallen prey to the great green screen and have sold off my C-64 in favour of a SuperPET.

Monthly Releases

Please note, there were no monthly meetings during July and August. As a result there were no monthly releases for either July or August for any of the libraries.

You will recall the June releases were 'TV'. Rather than continue on through the alphabet, we are starting over again. **The September releases will be T1 i.e. (P)T1, (V)T1, AND (C)T1.** These will be followed in October by T2, and so on.

If you belong to the Disk/Tape of the Month Club, and wish to substitute any other releases for the non-existent summer releases, all you have to do is let us know.

Copy Tree

The library has become so immense that it is impossible to keep roots of the copy tree (especially new ones) up-to-date. As a result, the TPUG executive has decided that no further names will be added to the root of the tree, and that we will cease to publicize information about the tree. There are currently 17 'roots' around the world. Over the next little while I will check with each of them to see if they intend to keep their libraries current, and if they are willing to have their names and addresses provided to interested members. More news later.

Annual General Business Meeting

As mentioned in the Calendar of TPUG Events, the Annual General Business Meeting will take place on Thursday, October 6 at Leaside High School, Bayview & Eglinton Aves. at 7:30 p.m. I am taking the space to repeat the information again here because it is important that 'Regular' members in particular take note, mark the date on their calendars, and make a point of coming out and participating. The financial statement for the fiscal year will be discussed; the executive for the next year will be elected, etc.

The information meeting about the business side of the club which was held this spring drew the big crowd of 16 people (over half of whom were executive members). The vitality of any democratically organized group can be measured by the active involvement of its members. Just as it is your right (and I would say, your duty) to take an informed part in a political election, so it is your right (and I would say, your duty) to take an active interest in your club. If you can't come in person, read over the Notice of Meeting package which Regular members will receive in the mail, and make sure that your views are being represented by using your proxy form.

Library Corner

This issue sees the advent of the **Library Corner**. Here you will find any comments that the librarians wish to make, along with helps in using programs, etc. This month David Bradley explains how to use the PET Emulator, and provides details on using the 1541 Backup program. Craig Bonner provides comments on the VIC 20 library.

P.S. Does anyone have a more interesting name for this column? Garbage Collection was suggested---we welcome your ideas.

List of HAMS

Present plans are to have the list in the next issue, and to provide the name, call, community and province/state for each person.

HELP Column

The HELP column needs help. There are a multitude of questions, but few answers are forthcoming. How about it? With almost 10,000 members there must be some people out there who can provide answers, leads, helpful hints..... Let's hear from you!

Information and August/83 Library List

All of you have received our new information package either as an insert to the August TORPET, or as a separate mailing. In the past, we have had a great deal of trouble with people not knowing whether the listings for the PET library and the Commodore Educational Software require one or two tapes. The new information package spells it out very clearly. So clearly in fact that now people are confused as to how many disks it takes for any one listing, (you can't win, no matter what you do). **One listing requires one disk,** whether it be 4040 or 8050. Next time we'll use the system we're now using for Additions to the Library i.e. (1 disk/tape), (1 disk/2 tapes).

Help for VIC Users

Craig Bonner, the VIC librarian, will be in the TPUG office on Monday evenings from 7:00 to 9:30 p.m. eastern time. He will be answering questions regarding the VIC library which have been received by mail as well as dealing with phone calls.

Commodore Educational Software

The final touches are being put on the disks and catalogues for the upgraded and enlarged series. There will be three disks/tapes which will be special for the C-64. If all goes well, we should have the "new" software by the middle of October. It might be advisable to wait for the new series rather than order now.

PLEASE NOTE! The forthcoming issue of THE TORPET is combined for November/December issue and therefore will be a little later than usual.

ADDITIONS TO TPUG LIBRARY

(Access to library available to TPUG members only)

With the advent of the 96-page TORPET, we now have room to print the 'List-Me' files for the new releases in the TPUG library. 'List-Me's are on all the disks which have been added to the library since March 1983. It is hoped that we will gradually provide 'List-Me' files for previous releases and that eventually we will produce a publication containing them for all the listings in the library.

Ordering Information

Disks

To order club disks by mail, send $10 for each 4040 / 2031 / 1540 / 1541 disk and $12 for each 8050 / 8250 disk (payable in advance). Do not send us diskettes.

Tapes

To order **VIC 20** or **Commodore 64** library tapes, send $6.00 for each tape. Do not send us tapes.

To order **PET/CBM** or **Commodore Educational Software** tapes, check first in the library (see August library listing in August TORPET). Each entry indicates the number of tapes required directly below the title of the listing. Send $6.00 per tape required. Do not send us tapes.

Send all orders to:
TORONTO PET USERS GROUP
1912A Avenue Rd., Ste. 1
Toronto, Ontario, Canada
M5M 4A1

Include:
1. Membership number
2. Return address
3. Computer (disk drive)
4. Payment by cheque or money order

(C)G5 - EMULATOR GAMES 3
(1 disk/tape)

PET EMULATOR.C	Configures your 64 to run most BASIC PET programs.
LIST-ME (C)G5.L	The List-Me for disk (C)G5.
BRAIN STRAIN	Reverse the squares to reach the objective.
PIGS	Move all the pigs to the opposite row.
CRAPS ODDS	Discover the odds of your winning at the crap table.
LETTER 15	Sort the letters.
CONCENTRATION	Find the matching patterns.
FAMOUS PHRASES	Find the famous phrase.
GUESS IT	The computer will guess your number every time!
TIC-TAC-TOE	Play Tic-Tac-Toe on your computer.
JOTTO	Guess the five letter words.
HORSE RACE	Pick your favourite horse then watch the race
ARROW	Get as many points as you can in the allocated time.
POKER	Play Poker with your computer.
DEFLECTION	Deflect the ball so it will hit the targets.
BATTLESHIPS	Play Battleships on your computer.
BREAKOUT	Keep the ball in play and try to breakout!
ROBOT CHASE	Try to escape from the robots.
DAMBUSTERS	Bust the dam before you get shot down!
LABYRINTH	Set the maze parameters then try and find your way out!
BOWLING	Bowl on your computer.
BLACK JACK 1	Play
BLACK JACK 2	Black Jack
BLACK JACK 3	on the computer.
SOLITAIRE	Play Solitaire on your computer.

(C)G6 - EMULATOR GAMES 4
(1 disk/tape)

PET EMULATOR	Configures your 64 to run most BASIC PET programs.
LIST-ME (C)G6.L	The List-Me file for (C)G6.
OTHELLO	Play Othello with your computer!
TOKER	Try and consume the contents of the bong!
KENTUCKY DERBY	Pick a horse and watch the race.
RACETRACK	Pick a horse and watch the race.
CHECKERS 1	Play Checkers
CHECKERS 2	with your computer.
MOTORCYCLE	See how many buses you can jump!
PETALS & ROSE	Can you figure out the puzzle?
CHASE ROBOT	Try and get away from the robots.
SNAKES	Try and outlast your opponent.
TARGET	Hit the target!
GO-MOKU	Play Go-Moku on your computer.
ROULETTE	Play Roulette on your computer.
AWARI	Try and get all the beans!
LIFE WAR	Try and get as many cells as possible.
FLIGHT SIMULATOR	Go on a simulated flight on your computer.
BLACK BOX	Probe the box in search of the balls!
BOMBER	Bomb enemy installations.
PRO FOOTBALL	Play Football on your computer.
SKI	See how far you can make it down the mountain.
PINBALL	Play Pinball on your computer.
DUCKSHOOT	Shoot down as many ducks as you can.

ADDITIONS TO TPUG LIBRARY

(C)G7 - EMULATOR GAMES 5
(one disk/tape)

PET EMULATOR	Configures your 64 to run most BASIC PET programs.
LIST-ME (C)G7.L	The List-Me file for (C)G7.
STOCK	Play the stock market on your computer.
CRAZY 8'S	Play Crazy 8's on your computer.
KILLER BUNNIES	Get away from the killer bunny!
FAWLTY	Look for the body of the murder victim.
CARD SNAP	Play Card Snap against your computer.
DEPTH CHARGE	Destroy the enemy subs before they get you!
CARDS UTILITY	Need cards for a game? Look no further.
GRUNGY TOWERS	Look for the body of the murder victim.
BREAKOUT	Play Breakout on your computer.
DRAW POKER	Play Poker on your computer.
SUBMARINE	Destroy the enemy before they get you.
BILLIARDS	Play Billiards on your computer.
CLUE	Search for clues by questioning potential suspects.
DRAGON MAZE	Try and get through the maze.
GUNNER	Shoot down the enemy!
DICE PIG	Roll the dice but beware of the ace.
OSERO	Capture the enemy's pieces.

(C)G8 - EMULATOR GAMES 6
(one disk/tape)

PET EMULATOR	Configures your 64 to run most BASIC PET programs.
LIST-ME (C)G8.L	The List-Me file for (C)G8
YAHTZEE	Play Yahtzee on your computer.
BOWLING	Bowl on your computer.
BLACK JACK 4	Play Black Jack on your computer.
HORSES	Bet on the horses.
BRIDGE BID TRAIN	Learn to play Bridge with your computer.
SOLITAIRE POKER	Play Poker with yourself on your computer.
WUMPUS	Search for the Wumpus!
SLOTS JACKPOT	Try and beat the one armed bandit.
TREES	Try and keep the trees alive.
KNIGHT TOUR SOL	Watch the knight move around the chess board.
ARTILLERY TRAP	Try and hit the enemy.
CHECKERS 3	Play Checkers on your computer.
BASKETBALL	Play Basketball on your computer.
MUGWUMP	Find the Mugwumps!
SINNERS	Capture the baddies!
GOLF	Play Golf on your computer.

(C)G9 - EMULATOR GAMES 7
(one disk/tape)

PET EMULATOR	Configures your 64 to run most BASIC PET programs.
LIST-ME (C)G9.L	The List-Me for (C)G9.
OHARE'S #1	Search for
OHARE'S #2	treasures
OHARE'S #3	but beware!
WIZARD'S CASTLE	Look through the castle for treasure.
TRIP TO ATLANTIS	Tour Atlantis and pick up treasure as you go.
KING TUT	Search for treasure in and around the grave of Tut.
SORCERER'S CASTLE	Look through the castle for treasure.

(C)X1 - BEST DEMOS 1
(disk only)

LIST-ME (C)X1.L	The List-Me file for (C)X1.
BOOT UK1.C	Great demonstration of the 64's capabilities.
KEY.D	Loaded
SCROL.D	
DEMO FIN.D	by
BOOT2.D	
HUFO.D	"BOOT
MUSIC2.D	
SPRITES.D	UK1.C".
BOOT UK2.C	Another great demonstration of the 64's capabilities.
MUSIC.D	Loaded
LAND.D	by
DEMO.D	"BOOT UK2.C".
BOOT CLYDE.C	Clyde shows you what your 64 can do.
DEMO GUTS1.D	Loaded by "BOOT CLYDE.C".
DEMO C000.D	Loaded by "BOOT CLYDE.C".
DEMO.13.D	Loaded by "BOOT CLYDE.C" and "NUCLEAR DEMO.C".
DEMO.13.D	Loaded by "BOOT CLYDE.C".
NUCLEAR DEMO.C	Learn about the 64 and a nuclear power plant.
C64 CDN DEMO.C	More 64 capabilities are demonstrated.
BOUNCE M/C.D	Loaded by
SPRITE.DATABIN.D	"C64 CDN DEMO.C".
CHRISTMAS.C	Merry Christmas from Commodore Canada.
CHRISTMASMUSIC.D	Loaded
CHRISTMASCODE.D	by
CHRISTMASROOT.D	"CHRISTMAS.C".

(C)X2 - BEST EDITORS 1
(disk only)

LIST-ME (C)X2.L	The List-Me file for (C)X2.
SPRITE BOOT.C	Design your own sprites!
SCROLL.DATA.D	Loaded by
SPRITE EDITOR.D	"SPRITE BOOT.C".
SAMPLE SPRITES.D	Can be loaded by "SPRITE BOOT.C".
SPRITE INSTR.C	Instructions for "SPRITE BOOT.C".
SPRITE MAKER.C	Another Sprite Editor.
SPRITEMAKER.C	Yet another Sprite Editor.
SPREDIT.C	Still another Sprite Editor.
SPED.C	One more Sprite Editor.
CHAR BOOT.C	Design your own character set(s)!
ROTATE.DATA.D	Loaded
STANDARD SET.D	by
CHAR EDITOR.D	"CHAR BOOT.C".
CHAR INSTR.C	Instructions for "CHAR BOOT.C".
CHRED.C	Another Character Editor.
CHAR DISPLAY.C	Display big characters.
1525 CHAR.EDIT.C	Edit the 1525's characters.
CHARGEN PEEK.C	Look at the Character Generator.
CHARACTER GEN.C	Generate your own characters.

ADDITIONS TO TPUG LIBRARY

(C)GA - EMULATOR GAMES 8
(one disk/tape)

PET EMULATOR	Configures your 64 to run most BASIC PET programs.
LIST-ME (C)GA.L	The List-Me for (C)GA.
BLOCKADE	Avoid the robots and fences to escape!
SEABATTLE INST	Instructions for Seabattle.
SEABATTLE	Try and win the battle.
PIRATE ADVENTURE	Search for treasure!
WILL O' WISP	Look through the forest for trinkets.
PET NUC PWR PLNT	Run a nuclear power plant.
BASEBALL 7.4	The Blue Jays take on the Expos.
SUPERTREK/16NR	Look around the galaxy for the enemy.
PINBALL	Play Pinball on your computer.

(V)T1 - SEPTEMBER 83
(one tape/disk)

LIST-ME (V)T1.L	Documentation for this disk/tape.
COMPUTE ART.IN.V	A reference file of "Compute" articles by topic.
NEW ARTFILE8K.V	A blank file program for future articles above.
COMPUTE ARTICL.V	Data for Compute ART.IN.V above.
MONSTER PTL16K.V	Work your way through dungeons to get chest.
ASTEROIDS 16K.V	Conversion of PET program uses the keyboard.
SUB 8K.V	Drop depth charges to destroy submarines.
BIORHYTHM.V	Gives your biorhythm output on a printer.
METRIC.V	Drills you on your knowledge of metric prefixes.
METRIC 8K.V	Same as above with added sound and colour.
MOTION 1.2(3K).V	Prints motion questions & answers on printer.
PC-DEMO1.V	These next 4 programs are from
PC-DEMO2.V	Loren Wright's - Programmable
PC-MULTI-DEMO.V	Character demonstration at the
PC-HALF-DEMO.V	1983 TPUG Conference.
KEYBOARD INTRO.V	Beginner's guide to cursor and screen controls.
TABLE TESTER.V	You set high & low limits for multiplication drills

(C)E3 - MANUAL PRGS 1
(one disk/tape)

LIST-ME (C)E3.L	Documentation for this disk/tape.
REF.PAGE 20.1	The programs on this disk/tape
REF.PAGE 45.1	have been typed in from both the
.	Commodore **64** Programmer's **Reference Guide** and the Commodore **64**
.	**User Guide.** Each file is named
.	so that you can tell which book it
REF.PAGE 123.1	is out of and what page it is on
REF.PAGE 123.2	in that book. Also, if there are
.	two programs on a page you will
.	find that the first program on the
.	page has a '.1' after it and the
USER.PAGE 43.1	second has a '.2' after it.
USER.PAGE 44.1	For example: 'REF.PAGE 20.1'
.	means that this program comes from
.	the Programmer's Reference Guide.
.	It is on page 20 and is the first
USER.PAGE 146.1	program on that page.
USER.PAGE 147.1	

(C)E4 - 6510 OPCODES
(disk only)

LIST-ME (C)E4	Documentation for this disk.
6510 OPCODES.C	
ADC.D	**Mastering 6510 Opcodes**
ADCQ.D	Forward
AND.D	To use this program you will need
ANDQ.D	to have some prior knowledge of
ASL.D	machine language. This program is
ASLQ.D	designed to teach you the Opcodes
BCC.D	of the 6510, and their operations.
BCCQ.D	You will need to know about the
BCS.D	Accumulator, the X & Y registers,
BCCQ.D	the stack, and all the flags. If
BEQ.D	all this completely boggles your
BEQQ.D	mind then we suggest you not con-
.	tinue with the program, as you
.	will become frustrated.
.	Richard Bradley, author
.	
D1.W	WordPro documentation.
D2.W	WordPro documentation.
D3.W	WordPro documentation.
D4.W	WordPro documentation.
D5.W	WordPro documentation.
INST.LIST.D	Sequential file of all the WordPro files.
INST.LIST.PRT.C	Program to print INST.LIST.D.

CLASSIFIED ADS

5 Cents per word, with $1.00 Minimum.
Payment in advance to:
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Horning's Mills, Ont.
Canada L0N 1J0

The TORPET reserves the right to limit ads from businesses placed in the classified column.

WANTED

WANTED, a disk drive to a printer for my "VIC 20". In very good condition and relatively cheap.Lear Warner, (416)927-0730.

CREATIVE PROGRAMMERS! Original VIC 20 and Commodore 64 programs required by new software company. Programs of all kinds may be submitted on tape or 1541 disk with documentation and stamped, self-addressed mailer to: The Cintechs Company, P.O. Box 2220, Station A, London, Ontario N6A 4C3. All submissions will be answered.

WANTED, 4040 Disk Drive. Will pay $900.00. Call Ken, (416)483-5649.

Has anyone seen or heard from Dr. Daley? Has anyone experienced and solved problems with Dr. Daley's Mail List version A.4 or newer? We invite correspondence in an effort to retain the utility of this versatile software. Call collect (201) 658-3133 or write L. K. Shick, Stampsoft, P.O. Box 125, Pluckemin, NJ 07978.(1)

FOR SALE

For Sale: Commodore 8032 Micro Computer 2031 disk drive, Epson MX80 Printer, 80 pin modem with excellent terminal program, tables, data set + Waterloo chip $2500.00. Call Martin, (416)789-2919, after 7:00 p.m. or Suzanne, (416)782-0889, after 9:00 p.m.

STOP THIEF eprom for CBM 8000 series. Your name, address and 'phone number appear when you power on. System only accessible after you type your invisible password (up to nine characters). No soldering required - fits into socketed position. COST: $39.95. Send name, address, 'phone number and password to: INFOSYSTEMS Limited, Box 2001, Sackville, N.B. E0A 3C0.(2)

Canadian distributor for NIBBLES & BITS software - $19.95/tape. Event Horizon's SORCERER'S APPRENTICE - graphics for 64 - $59.95 (CDN). SS/DD diskettes - $30/ten; $250./100 - postpaid. Third party software for CBM computers. TPUG Copy Tree agent. INFOSYSTEMS Limited, Box 2001, Sackville, N.B. E0A 3C0.(2)

MEMORY EXPANDERS FOR VIC 20. 32K switchable - adds 24K to BASIC and 8K for Machine Language, etc. $179.95 CDN each. 16K non-switchable - $99.95 CDN each. Both are finished in a black plastic case, and are guaranteed for 90 days. Ontario residents please add 7 percent P.S.T. Please add $3.50 postage and packaging. (Will come first-class registered mail). COMPACC, 39 Second St. Orangeville, Ontario L9W 2C2.(1)

Commodore 64 games: Radar Rat Race, Visible Solar System cartridges $30. each, Twist cassette $20. All 3 - $70. (416)848-1311

VIC 20: M & M software announces its first in a series of 16K Adventure games. This first role playing adventure, takes you throughout the United States and possibly, other countries. The object of the game is to get from New York, your home town to L. A., with at least $1.00 left from the $10,000 you left home with. You'll be involving yourself with many obstacles from bike gangs to international smugglers. Available on tape and disk. VIC must have a minimum of 16K. Please specify tape or disk. Tape - $15.99 and Disk - $17.99. Ontario residents please add 7 percent sales tax, payable by cheque or money order. Free postage and handling. Send for the ultimate in adventures to: M & M Software, 29 Woody Vineway, Willowdale, Ontario M2J 4H5. If you like Adventures, you're going to love M & M's *ADDED BONUS*. If you order before December 31st., 1983, you will receive as an added bonus, 100 free Bulletin Board Numbers covering North America. *(Additional BBS lists in future issues).

PRINTER Radio Shack model IV (actually a centronics 737 inside) dot matrix compatible with COMMODORE PET. Very reliable. Complete with ada-1600 interface (6 ft. ribbon cable). Handles cut sheet roll and fan fold. Extra paper and ribbons. $600. Also **WORDPRO 3PLUS** for Commodore PET/CBM. Original documentation $200. Call Dave at (416)977-0468 after 6, after October 16th. only please.

"FOR SALE": COMMODORE 8032 microcomputer and 8050 dual disk drive (one megabyte capacity). like new. $2500.00 for the pair. Will not sell separately. Write CS Design Inc. Box 602, Waterloo, Ontario, N2J 4B8."(1)

Attention VIC 20 users: Announcing "PALACE ADVENTURE" for the 13K VIC. This wonderful game will keep you playing for hours upon hours. Send a cassette, self-addressed postage-paid mailer and $4.00 to: Jimmy L. Richardson, Route 1, Box 12A, Elk Creek, VA 24326. You'll be glad you did!(1)

HES MON cartridge for the VIC 20, also 3K expansion for the VIC, $30.00 U.S. each. Will be shipped from Canada, Hans Agostini, 7102 Old English Rd., Lockport, N.Y. 14094, 1-716-433-8355.

ATTENTION PET and COMMODORE 64 owners: Our new line features reasonably priced, TOP-QUALITY programs, including: utility (grading, attendance, others); Statistics series; educational games; drill; and a stock options program. Contact: MELCHER SOFTWARE; P.O. Box 213; Midland, Michigan 48640. (517)631-7607.

Software,
For VIC 20 & C-64, Runway, Torpedo, Tape or Disk. For C-64, Tanks, Tape or Disk. The Mailer, Data-Bites, The Editor, Disk only. Tape $34.00, Disk $36.00 postpaid. Send S.A.S.E. for list and prices on other programs available. Specify VIC 20 or C-64, Tape or Disk. Send check or money order to: E. L. Logiciel, C.P. 1479, Rock Forest, Quebec J0B 2J0.

Games for C-64. NEUTRAL ZONE, best arcade, 3D game: tape or disk. DAVID'S MIDNIGHT MAGIC, hires pinball game: disk only. $43.75 each postpaid. Check or money order to: E. L. Logiciel, 1543 Murier, C.P.1479, Rock Forest, Quebec J0B 2J0.

PEANUT PACK,3 diskettes ELEPHANT MEMORY $12.00 per pack or 3 packs for $30.00 postpaid. Check or money order to: E. L. Logiciel, 1543 Murier, C.P. 1479, Rock Forest, Quebec J0B 2J0.

SOFTWARE 20 percent off the suggested price of most suggested Canadian price lists. No tax except for Quebec residents. Please add $2. per unit for postage. Personal cheques require an additional 2 weeks to normal delays to clear. Super special T&F Space Sentinel for $29.95. Ordex, Box 122 Stn. F, Montreal, Quebec, H3J 2K8.

FOR SALE! PET 8032 and dual drive 8050,plus word processing software and interface for electronic typewriter. Excellent condition and recently serviced. $2,500.00. Barry Lebow (416)224-2662.

STUNTMAN SPELLING - a quality field tested educational game for kids of all ages. Purchase one program and make up to 25 free copies for school or home. Our policy on all products. Stuntman for VIC, or PET - $24.95 to: Synchronizing Education and Games, 668 Sherene Terrace, London, Ontario, Canada N6H 3K1 (7)

VIC STUFF - 16K Memory Expander - $140.00. 3K Super Expander - $75.00. VIC Modem, plus Victerm-1 Terminal program, plus Commodore telephone adaptor - $145.00. Cartridge Game "Radar Ratrace" - $40.00. If interested call (416)886-0062.

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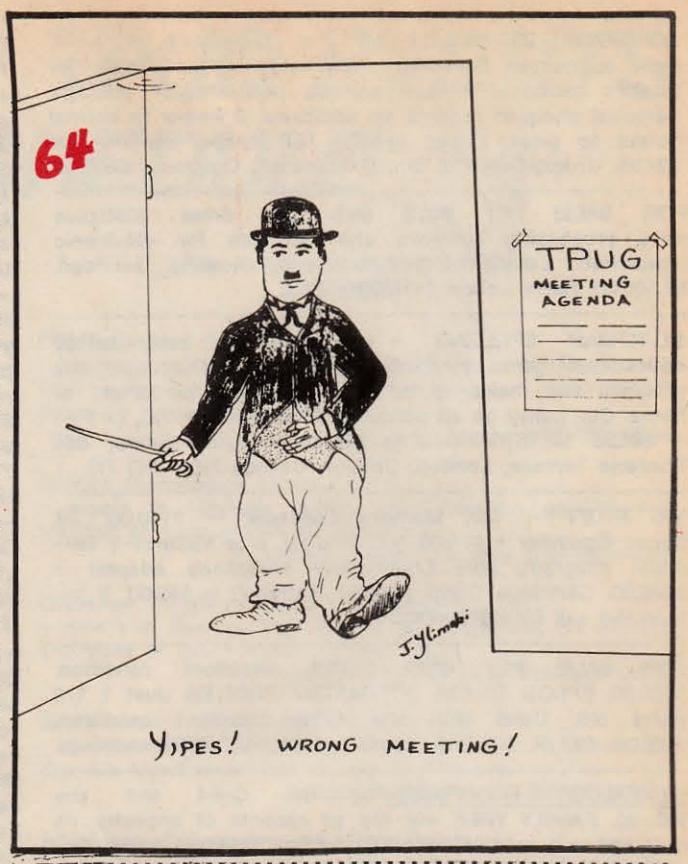

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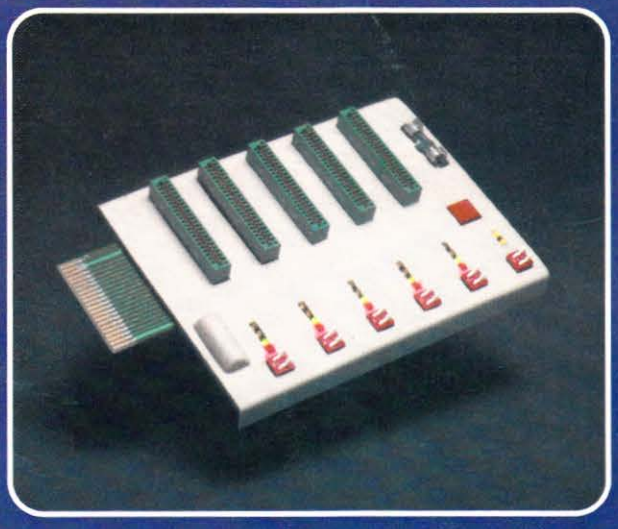

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