



THE PLUS/4: HOW DOES IT RATE?

By LARRY PHILLIPS

Recently, a friend asked if I would accompany him to a local computer outlet to take a look at the new arrival from Commodore, the PLUS/4. He was wondering whether to buy the PLUS/4 or the C64. I had a chance to play with it for about an hour or so, and used that time to explore a few of the new editing features and some graphics commands. Since I couldn't spend too much time in the store, I decided to try to get a unit to test. Gord McOrmond, a local Commodore representative, was kind enough to loan me his machine for about four days.

The CPU itself was all I needed, as the power, disk, and video cables are all interchangeable with those from the C64. Yes, the 1541 will run on the PLUS/4, and Commodore plans to supply a faster drive at a later date. According to at least one memory map I've seen in Commodore magazine, the new drive may be a DMA (Direct Memory Access) device. This could be a very fast drive indeed. The cassette port, expansion port, and the two joystick ports are not compatible with either the C64 or VIC. The cassette Commodore plans to use is, if you can believe it, even slower than the cassette unit used by every other Commodore machine to date. The joystick ports are shielded connectors similar to, but smaller than the DIN plugs used for the serial, video, and power plugs. Before the cynics among you start howling about being forced to buy joysticks from Commodore, let me say that the connectors form a much better RF shield than the old style. This allows a better, or at least more quickly obtained, FCC approval. No doubt there will be a number of adapters available from joystick manufacturers. The one connector left is the user port. As of this writing, I have seen no data on the pinouts, but it should be fairly compatible.

Before we leave the physical description, let's look at the overall appearance. The case is a dark grey, with a pronounced 'wedge' shape. The main keys are an off-white, and the function keys are a medium grey. The function keys themselves are above the main keyboard, from above the '1' to above the '8'. More about the placement later. There is an 'ESCAPE' key, a 'CTRL' key on each side of the

keyboard, and some gimmicky cursor keys shaped like arrows. You read that right, not 'with arrows on them', but 'shaped like arrows'. There are four of them, a boon to anyone used to certain other computers, but a source of annoyance to us 'die hard Commodore users'. The whole unit is about three inches narrower than the C64 or VIC, due to the placement of the function keys. My personal feeling is that this is not the place for them, despite the insistence of many respected manufacturers to place function keys above the main keyboard. I believe that having to reach over the keyboard to press a function key is ergonomically poor.

The internal architecture is more complex than the 64. The PLUS/4 has 64K of RAM and 32K of ROM, with about 60K available to BASIC. This necessitates a more complex memory management scheme, taken care of by the IED chip, which also looks after the screen and sound. There is also a special communications chip called an ACIA (Asynchronous Communications Interface Adapter) for serial communication. The 64 aficionados will be sad to hear that there are no sprites, and that the sound generator is more like the VIC than the 64. There have been some excellent sounds produced by the VIC, but if you're really hooked on synthesized music, stick with the SID chip in the

64. Likewise for shoot-em-up games using sprites. They can still be done, but will be more difficult to program.

Undoubtedly the best feature of the PLUS/4 is the new BASIC. This is 'upward compatible', that is, any program written for the 64 in PURE BASIC will run. Any PEEK, POKE or SYS commands may have to be modified. The BASIC is not 'downward compatible', as a number of additional statements have been provided to make life easier for programmers. It is a positive joy to be able to plot points, lines, circles, and boxes, as well as make sounds from BASIC. These commands are similar to those found in the VIC and 64 SUPER EXPANDER cartridges. The PLUS/4 has five screen modes. They are: text, high resolution, multicolour, and 'split screen' modes to go with the two graphic modes. The colours are also enhanced by eight levels of luminance, producing a wide variety of saturation within each colour (except black, which is not affected by luminance).

The BASIC includes some very nice tools for programming: AUTO line numbering, RENUMBER, insert line, erase to end of line, DELETE line range, Predefined and redefinable function keys, Trace, and a full featured machine language monitor. The General BASIC commands include an IF.. THEN.. ELSE, and two

(continued on page 2)

LET'S GET TOGETHER . . .

Our club's annual general meeting will be held on Wednesday, January 16 at the Emily Carr College of Art and Design at 7:00 p.m. Only paid-up members need bother attending, so it is highly recommended to pay up your membership at the workshop meeting on Tuesday, January 8, especially since the cost of membership may rise after the AGM!

Among the items on the agenda will be the election of a new executive. Those people who are letting their name stand for office at press time include: President -- Jim Bauerle; Vice-President -- Phil Seligman; Secretary -- Al Townsend; Treasurer -- Hu Reijne; Directors -- Guenther Hake, Glenn Hazlewood, Helen Ming, Murray Kopit, Elenor Johnsson, Gary Lee-Nova, Ken Molen, Larry Phillips, Mike Quigley, Nick Shevchenko, Sig Steiner, Marvin Steinway.

Items of business to be voted on include a motion to terminate membership for those who haven't paid

their dues one month after the expiration (presently non-paying members can technically be members for up to a year). It will also be proposed that the out-of-town dues be raised and that the first-time membership fee be slightly higher than the annual renewal (thus providing incentive for people to renew).

Possibly some door prizes will be offered as last year and hopefully there will be some entertainment in the form of a guest speaker or a demonstration.

As you may be aware from phoning the club's recorded message, Jim Butterfield was scheduled to appear on January 22nd. This date has been changed to February 12th (a Tuesday), with final arrangements yet to be confirmed. Call the answer phone or come to the February club meetings for further details.

February meetings scheduled are the Workshop on Tuesday the 5th and Lecture on Wednesday the 20th.

A COMPLETE GUIDE TO MACHINE LANGUAGE PROGRAMMING ON THE PET

By HAROLD BROCHMANN

PROTECTING YOUR MACHINE LANGUAGE PROGRAMS [8-1]

So far we have been placing our ML code in the second cassette buffer, leaving the entire BASIC area free. Many utility programs consist of ML segments which coexist with BASIC.

Frequently in these situations the ML segments are placed higher up in RAM. These higher locations are protected from being changed by BASIC by altering the memory pointers so that the PET doesn't realize it has as much memory as it really does. Altering the memory pointers can be done from either ML or BASIC.

One of several reasons why one would want to place ML in higher memory is that the second cassette buffer isn't big enough to hold very long ML sequences.

In any event, in this section we will place our ML programs at \$1000. This location was chosen so that readers with 8K as well as 16K and 32K PETs will be able to use it. ML sequences placed here would be accessed with SYS 4096.

INDIRECT INDEXED ADDRESSING [8-2]

We are already familiar with indexed indirect addressing. A similar concept, INDIRECT INDEXED addressing was not even mentioned at that time to avoid confusion.

In indexed indirect the address referred to was obtained by reading the address found in two bytes called POINTERS and adding the contents of the Y register to this number to obtain the final address.

In indirect indexed addressing the address of the pointers which contain the address we are looking for is obtained by adding the contents of the X register to the address indirectly referred to!

Suppose \$60 and \$61 contains the address \$8000, then LDA (\$5E,X) will load the contents of \$8000 provided that the X register contained \$02. Note that \$60 is two bytes further on from \$5E.

Indirect indexed addressing also only works for zero page pointers.

Let's try this just to make sure it works:

```
1000 A9 00 LDA #500
1002 85 60 STA $60
1004 A9 80 LDA #800
1006 85 61 STA $61
1008 A2 02 LDX #502
100A A0 05 LDY #505
100C A1 5E LDA ($5E,X)
100E 91 61 STA ($60),Y
1010 60 RTS
```

When this program is assembled at \$1000, exit

MICROMON, place an A in the top left hand corner, and SYS 4096.

The A should be replicated in column 5.

If a list of pointers to various things were stored in zero page we could select the address of an item from the list simply by supplying a base indirect address and placing the appropriate offset in the X register.

In theory this sounds fairly straight forward, but in practise there are a number of problems because most of zero page is used by the PET for its own indirect addressing requirements as well as other needs.

Some of zero page locations cannot be tampered with at all without disastrous results. Other locations can be used temporarily. Machine language

programmers are always on the lookout for "safe" zero page locations.

We have already seen that locations \$5E - \$61 may be used temporarily. All addresses in the range \$5A - \$6F (10 pair) may be used by ML routines which are called from a BASIC program without interfering with the operation of BASIC. These locations form the FLOATING POINT ACCUMULATOR and their contents are altered every time a calculation is performed.

(Ed. Note: In the original manuscript, there follows a passage about the creation of a Space Invaders game in ML. Unfortunately, one of these files is missing from the master disk, so this passage is not included here.)

PLUS/4 - cont. from page 1

completely new 'structures'. These are DO WHILE, and LOOP UNTIL commands. There is an additional input command called GETKEY, that works like a GET, but waits for a keypress, eliminating those 'IF A\$="" THEN...'. If you've ever tried to format a column of numbers so that the decimal points line up, then you'll love the 'PRINT USING' command. You can now do a RESTORE to any line number. Very handy for repetitive reading of data without having to read all the DATA from the beginning again. HAVE trouble converting Hex to decimal? There are functions for conversions between the two. Add all the standard BASIC 4 commands, and you have an extremely powerful machine that is pleasantly free from POKES, PEEKS, and complicated disk commands.

In addition to the BASIC, Commodore has built in an easily accessible word processor, a spreadsheet, business graphing, and a file manager. These programs are fully integrated in that data from the spreadsheet may be transferred to the word processor for editing, for example. You can even split the screen, and have two of the programs showing at one time. The word processor and the spreadsheet are not what you would call 'full featured'. There are better ones on the market, but on the other hand there are many worse. The ones Commodore supplies will certainly be adequate for 99% of home applications. I didn't get a chance to play with the file manager, so I can't report on its usefulness.

On the negative side, the keyboard seems rather 'loose' and the touch is difficult to get used to for anyone accustomed to the VIC or C64. I have already mentioned the lack

of sprites, and I think it's time to say something about why I think they should have been included. Most people, programmers included, seem to think that a 'serious' program has no need of sprites. One of the first programs I wrote for the C64 was a sprite editor (Spreedit). The first sprite I designed was to be used as a cursor. If a cursor can be adapted in shape or colour to match any application, you will automatically improve the appearance of the program. From there, you can easily make the cursor do many things that a normal cursor cannot, smooth moving, change colour or shape, and so on. The same may be said for indicators, pointers, etc. How about special symbols or logos? If you use sprites, there is no need to do a lot of work with character sets. The second reason I feel that they (and good sound) should have been included, is that the software houses would be more inclined to write games for the machine. Face it, the more games there are for a machine, the more are sold. The more sold, the more software is written. A not-so-vicious circle. So much for my marketing sermon.

All in all, the PLUS/4 is a very powerful machine, most suitable for the 'serious' home user who does not want to bother with a lot of confusing commands. I give Commodore a '10' for the idea, and a '6' for execution. If your use of a computer runs to the 'serious' or 'programming' side, there is no machine on the market that offers so much for so little of your hard earned dollars.

Late Flash! The Commodore 16 has the same features as the PLUS/4, but only has 16K of RAM, no user port, and comes without the built in application software. The good news is that it's about \$300 cheaper, and has a VIC/C64 type keyboard.

PIRATING AIDS - A RACKET?

By MIKE QUIGLEY

One of the biggest rackets facing Commodore 64 owners is an ever-increasing number of "disk copy" programs. Every month's issue of major magazines features large ads for utilities with claims like "Backs up virtually all existing disks for Commodore 64 including Copy Protected Software," "The ultimate bit by bit disk duplicator," "No better disk copier at any price," and "Fastest and most advanced copier you can buy."

In reality, these programs are part of a vicious circle highly reminiscent of Biblical "begats". As soon as one method of breaking copy protection is introduced, a new protection system is quickly developed by the software houses, which brings another generation of pirate programs, and on and on. The last year has seen, in many commercial programs, the demise of the familiar errors which cause the 1541 to perform its unpleasant knock-knock noise as a method of disk protection. In their place have come half-tracking (moving the read head to a space between the extant 35 tracks), writing beyond track 35 (up to track 44), varying the number of sectors in a manner inconsistent with normal DOS functions, and the use of fast-load techniques.

Many of the pirate pack programs try to justify their existence by claiming that a person has a right to back up their software, which I agree with. A person should also be able to modify their software to their own purposes, especially if it doesn't meet their expectations.

However, some of these breaking packages are less than subtle about their real intentions. One of them, The Software Protection Handbook, was originally to be called "The Software Pirate's Handbook II". The authors try to justify this name by saying that the word "pirate" in the title was "intended as a light-hearted reference to any copying process, and to inspire a certain tendency [sic] of humankind: the attraction to things mysterious or secret."

What follows are reviews of a representative sample of disk-buster type programs. Not surprisingly, several other companies which I contacted refused to send me their products.

DI-SECTOR. Starpoint Software, Star Route, Bazelle, CA 96034. \$39.95

Di-Sector is a slickly designed program which is relatively easy to use. It comes in the form of a master disk from which you are allowed to make three copies. Each of these is encoded with your name and serial number.

It features a 3-minute copy program, a quick format (around 16 seconds), a public domain-style disk doctor and a machine language monitor with typical commands which additionally allows you to transfer code to and from the 1541's memory.

Di-Sector also contains a bit copier, a file copier (which will read the file names from "invisible" directories) and an error maker/checker. There is a Sector Editor, sort of like a Disk Doctor, which I found confusing because some characters in the sector did not appear on the screen. An "Arts Backup" creates unprotected backups of Electronic Arts disks.

About the only negative feature of Di-Sector is

that you're not allowed to return to the main menu from half of the program's six sub-sections or exit the program without turning off the computer. The company's ads are also in error when they claim that "None of our copy routines ever makes [sic] the drive head 'kick'." Formatting a disk not only kicks the head, but does so several times faster than normal.

Most parts of the program load in very quickly using special DOS techniques, and devices like printers should not be connected to the serial port. (Try disconnecting your printer after booting Di-Sector for some unusual and very harmful noises.)

The manual with Di-Sector is not bad, though there are names referring to various parts of the program which do not tally with the names in the main menu.

Di-Sector will not copy itself, nor will it copy recent programs which contain methods of protection other than errors. As such, its uses may be somewhat limited to legitimate purposes like copying and performing various housekeeping tasks on your own disks, which it does extremely well.

MASTER COPY. Digital Wizardry, 3662B South 15th Street, Milwaukee, WI 53221. \$19.95

This is a home-grown kind of production which claims to be "the most effective, yet still the most inexpensive copy utility ... for ... the 64." This claim is debatable, since virtually everything available in it is available in a public domain equivalent.

The program is divided into 7 sections. One of these is a Disk Doctor which allows you to copy a block from one disk to another. It also allows you to scan back and forth within tracks -- that is, it will jump from sector 1 to 2 to 3 and so on. Another section catalogs a disk, which just means reading the directory. And another copies a disk with a variant on the familiar 4-minute backup program, complete with head knocks at uncalled-for locations. If you want to format a disk, this can be done in 21 seconds. Errors 20, 21, 22, 23, 27, 29 can be located and created.

Probably the least satisfactory part of the program is the one which copies sequential and program files. After you insert the disk you want to copy from, a prompt -- "OUTPUT #" -- appears on screen. There is nothing to tell you, without looking in the manual, that you are supposed to input either D for Disk or T for Tape (the latter an unusual touch) at this point. You can copy a total of about 110 blocks or 27K at a time (some public domain programs allow up to 51K), and once you have copied certain files, you have to scan through those file names in the directory on your subsequent passes through it before copying new ones. You cannot exit from this part of the program to the main menu.

Virtually all these utilities are available for nothing from user group libraries. About the only thing I found interesting about Master Copy was its method of protection which involved numerous errors and "secret passwords". As you might have guessed, you can't copy the disk with itself.

PROGRAM PROTECTION MANUAL FOR THE C-64. C.S.M. Software, P.O. Box 563, Crown Point, IN 46307. \$29.95 plus \$2 shipping.

I like this book, because it seems, unlike most computer literature, to be written by an intelligent person. This is not to say that it's free of grammatical errors or published in a slick format. It outlines methods of defeating various methods of protection and also tackles the ever-changing area of software law (U.S. variety, of course).

The book is written in a clear, concise and easy-to-follow manner. I had little trouble employing some of its methods to change several older commercial programs so their errors would not be detected.

The book comes with a disk of "public domain" software, including the Disk Doctor written by Don Lakei, erstwhile of the Commodore Computer Club! The book's author, one J.N. Simstad, gets himself so entangled in various statements of liability that he describes this disk as "copyrighted". The disk, by the

way, contains various features such as an invisible directory and other little challenges, all of which can be explored with methods described in the book.

Among these public domain programs are an early version of the 4-minute copy program (that sure gets around, doesn't it?) and another to determine if there are any errors on disks, both of which cause the 1541 to do its knock-knock routine, a major cause of drive failure. Is it no coincidence that C.S.M. Software also sells a 1541 disk alignment program for \$39.95?

C.S.M. also sells expansion boards to aid in cracking cartridges and publishes a monthly Program Protection Newsletter for \$35.00 a year, which details in each issue how to break 4 or 5 programs.

Unfortunately, the kind of approach exemplified by this company is all too susceptible to the "vicious circle". Much of its information is already obsolete, though it may be of interest to people planning to protect their own programs. Or perhaps it will just discourage them from even bothering to write any.

SUPER CLONE, also known as THE CLONE MACHINE. Micro-W Distributing Inc., P.O. Box 113, Pompton Plains, N.J. 07444. \$49.95

This program, issued in a revised version in September 1984, was one of the earliest copy utilities. It consists of three major sections.

One of these is a further variant on the 4-minute backup without the head-knocking at the beginning of a transfer. Another is something called Tough Nuts Utility, which allows you to break complicated new methods of protection like those varying the number of sectors per track in a manner inconsistent with DOS. In order to find out about Tough Nuts, however, you have to subscribe to a newsletter from Micro-W devoted to these methods, at an additional cost.

The major part of the program consists of Super Clone and the original Clone Machine, the latter being a slower version of the former. Super Clone does have one good feature -- a bit copier which, like most, takes an eternity, but it copies most normally-created disks, warts (errors) and all.

Other parts of the program leave a lot to be desired. The file copier, for example, lets you choose several files and then proceeds to copy them -- one at a time! Although the program is supposed to be "self-documenting," there are sections which utilize the function keys for various purposes. There are no prompts for these on screen -- you have to look them up in the manual.

The manual itself is not bad, but suffers from a certain kind of disorganization caused by the complexity of the programs themselves. The back of the manual contains several pages devoted to errors which may occur!

Published by The Commodore Computer Club, P.O. Box 91164, West Vancouver, B.C. V7V 3N6. Editor: Mike Quigley (321-8465).

Copyright 1984 by the Commodore Computer Club. Material in this paper may not be reprinted for profit without written permission. Opinions expressed are those of the individual authors, and not necessarily those of The Commodore Computer Club. The name "Commodore" is used with permission of Commodore Business Machines of Canada Ltd.

Club meetings are normally held: *Workshop*: first Tuesday of the month, 7:00 p.m., Thompson Secondary School cafeteria, 1755 E. 55th Ave. (near Victoria Drive); *Lecture*: third Wednesday of the month, 7:00 p.m., Emily Carr College of Art and Design, 1399 Johnston, Granville Island. These dates and locations are subject to change. For up-to-date information on any changes, please call the club's 24-hour answer phone:

PET-3311 (738-3311)

Club Executive: President -- Jim Bauerle; Vice-President -- Sigmond Steiner; Secretary -- Marvin Steinway; Treasurer -- Hu Reijne; Directors -- Robert de Boer, Guenter Hake, Jim Jorgenson, Terry Juuti, Murray Kopit, Mike Quigley, Elmer Koy, Philip Seligman, Nick Shevchenko, Tony Smith, Arthur Tamer, Al Townsend, Jim Wilcox.

SOFTWARE & BOOK REVIEWS

- TASK FORCE -

By JAMES INGLIS

This game turns the player into an admiral who commands a "white" fleet which has to liberate an island held by the "black" fleet.

To load the program you type LOAD*1,8,1 and then press RETURN, which begins a long slow process. The title screen appears and you must hit a key to continue. The playing screen appears and you select a level and a strategy. The load continues. Unfortunately the game starts without you -- your fleet can be seen to be moving and there is no way to control it at this time.

The game is made up of several screens. The global screen shows the entire playing area. Your fleet is visible as well as any of the enemy ships nearby. The status screen shows the number and type of shipping, both allied and enemy. The close-up screens show the shipping in any particular area. They are viewed by placing a square cursor over the area you want to zoom in on and pressing either F3 or F5 depending on the magnification desired.

Movement and control are manipulated through the joystick in port two and the F7 key. Identification of your shipping is done by placing a round cursor over your ship. The screen on the right will tell you the type of ship, its course, speed and damage. If you desire to control a ship you hold down the fire button, which turns the right area of the screen red. You can then change course and speed as well as use the ship's armaments. Firing is done by placing the round cursor over the target and pressing the fire button. You will either be told that the target was hit, missed or out of range. To get back to other screens or to be able to control other shipping you must use the F7 key first to escape the ship you control.

The game is over when you have reached the beach with the necessary number of landing craft (LSTs).

PROBLEMS:

This game is full of problems. I will not go into all of them because there are just too many!

Loading the game is poorly handled. When the instructions for selecting level and strategy are going across the screen, the player cannot select either. This may be fine the first time the game is played but it's infuriating when you already know what to do and have to wait. As mentioned before, there are approximately twenty seconds when you cannot control the fleet during the final loading procedure.

When choosing levels, both two and three do not work properly. Neither gives you any LSTs. (Without LSTs you cannot end the game. The purpose of the game is to land a specific number of these craft.) They also give different amounts of shipping than the side display indicates the player is entitled to receive (e.g. two battleships instead of one). In addition to

these problems, level three does not give you any aircraft carrier. It does give aircraft but without the carrier you do not have access to them. Approximately three to five minutes into the game on these two levels the following message appears: "ALLIED ARMY HAS LANDED ON THE ISLAND." The game then ends and the program begins to reload!

To top this off, the game reload does not work properly. A couple of minutes after going through the same procedure as when the program is originally booted up, the game again claims that the allied army has landed and the game ends. This is the same on all three levels. On level one, you can at least play the first game successfully, but any games on this level that the program has reloaded have the same problem as levels two and three.

The status portion of the program is unreliable. It causes shipping and aircraft to surpass their capabilities (e.g., carriers with the capabilities that their aircraft are supposed to have). It also causes other craft to lose some of their capabilities (battleships with no guns, etc.)

When all enemy shipping is destroyed dots appear on the screen that should not be there. These dots are the same symbols used for enemy shipping. They range anywhere from one to ten craft. They move just as the enemy does. When you use the close up option, the dots disappear.

When there are only one or two enemy craft left as active on the status board they are not displayed on the playing screen.

The cursor will sometimes be removed from player control. It is not possible to get it back on to the playing area. It moves to the very top and bottom of the display. The only way to play the game after this happens is to power down and start over from scratch.

The game will sometimes be taken from player control. The display screens flash on and off and finally stop on the allied/enemy status board. The game locks on this screen. The game must be turned off and reloaded.

I could go on like this for some time, but I think I have gotten the message across. The program is so poor that it isn't worth giving any playing tips. The only tip I can think of is telling you to save your money. My disk was not defective, by the way. The others in the store had the same problems.

The documentation that comes with this game requires mention. It's among the worst that I have seen. The information is scarce and poorly presented. Playing the game is done more through trial and error rather than through the playing sheet. Considering how long it takes this game to load, players should not be expected to have to struggle to find out how to operate it.

On the whole, it is a very slow game considering it's billed as a real time simulation. Compared to other games by SSI and Avalon Hill (especially SSI's Combat Leader), this one just doesn't make the grade.

About the only positive thing you can say about Task Force is that the idea is a fairly good one. If the glitches were eliminated it would at least be

playable. The price is great, but the old adage "You get what you pay for" really applies in this case.

FORMAT -- Disk. PUBLISHER -- Cymbal Software Inc.

PRICE -- \$19.95

RATING -- DOCUMENTATION: F; GRAPHICS: C-,C;

PLAYABILITY: F; INTEREST: D

BEST OF TORPET

By HU REIJNE

In reviewing the Best of The Torpet, published by Copp Clark Pitman Ltd. in mid 1984, I would like to begin with a quote from Bruce Beach, the editor: "We will never be as technical as the Transactor nor as free form as the Midnite Gazette. We will continue to address the new audience of computer users who are wanting to get away from the games-only aspect of their machines and into a beginning understanding of the computer and its capabilities." This book follows this philosophy pretty well. There is enough technical material in the book to help a neophyte get started in programming and understand his machine. None of it is above my head, so the technical level is not too deep but there are enough routines in it that helped me learn a little more about the Commodore products. The articles are a collection taken from the Torpet magazine and have been published previously. Many are 'PET' articles which we old timers (those who owned a computer for more than two years) appreciate. The PET programs generally work on the VIC and the C-64.

One program particularly useful on the PET because of the way it handles input statements is a program that worked on my C-64 with only two changes (semi colons). The program, "friendly Menu" allows you to use the cursor keys to make a menu selection. The item chosen is highlighted, and adds a nice touch to programs using menus.

The introductory section of the book has a number of general interest articles. They cover everything from Commodore's history to Jim Butterfield's famous article on program swapping and sharing. Two sections follow on the C-64 and VIC. It is through articles such as these that I developed my programming skills. The key to getting anything out of this is to study and analyse the programs and wonder why it was done in a certain fashion.

For those a little further into programming that like to dabble with machine language there is a section as well. I tested some of the examples and they all worked the first time. Most of the articles here hint at a point and then leave it to you to resolve how you would use it. Other languages are also covered, Logo, Simon's Basic, and CP/M. Use of CP/M with Commodore products is discussed in some detail and should be read by anyone serious about using this language.

Word-processing is another topic that is touched on. The articles are more of a general nature with only a couple of reviews of specific programs. The 10 pages devoted to it are now somewhat out of date as there are references to \$400 for a VIC and \$170 for a spelling checker. Although I have not followed a career in computer music, the 25 or so pages seem to address that topic in much more detail. Use is made of schematic diagrams and making up a black box to interface your computer's (VIC or C-64) audio to a hi-fi system. That kind of material suits my fancy.

Communications and computers go together like cheese and apple-pie. The Best of Torpet has not left this out. There are eight articles on various areas of communications, half dealing with bulletin boards (have you tried ours yet at 271-1082?). The remainder are reviews of hardware and software. One caution, there is an article on VICModea switching which gets into modifying telephones. If you do this be aware that the phone company may charge you for a repair call if you cause trouble on their lines!

For the educators in the club The Best of Torpet is probably a real deal. You get the largest section devoted to educating our young ones. A listing of the public domain educational programs with a short

(continued on page 6)



COMPUTERMAN!!

SERVICES FOR COMMODORE
USERS:

MAINTENANCE; REPAIRS; MODS.
TO & FOR:

-VIC-20
-C-64
-1540, 41
-MOST PERIPHERALS &
ACCESSORIES

*REASONABLE RATES

*ALL WORK GUARANTEED

1131 WILLIAM (NORTH OF 13th & CLARK)
FOR INFO CALL KEN AT 299 8613

DEBUNKING SOME MYTHS

By LARRY PHILLIPS

Two recent articles by our editor, Mike Guigley, have prompted me to write something about some of the common misconceptions prevalent in the computer milieu. The articles were a review of Aprospan-64 and a program called Mr. Tester. The myths mentioned in these were the old 'don't ground the reset line or your computer will explode' myth, and the idea that a diagnostic program should somehow be able to check for 'less obvious' faults such as power supply problems.

Let's look at the 'reset' myth first. There is a persistent rumor that a resistance of some sort should be placed in the wire from the switch to the reset line to prevent damage to the computer. A look at the schematic tells us that the reset line goes to the input of the 6510, the CIA's, and the VIC II and SID chips. Since these are inputs, no harm can come to them by applying any voltage between ground and +5 volts. The other chip that the reset line goes to is an output. It is not good practice to ground an output of a TTL (Transistor/Transistor Logic) device, UNLESS that device happens to have an OPEN COLLECTOR output. For those not familiar with electronics, a normal TTL chip has two transistors connected between ground and +5 volts, with the output taken from the connection in the middle. If this middle point is grounded, and if the chip is trying to pull the output high (toward +5), then an excessive amount of current will be drawn by the upper transistor. However, an open collector device has no transistor on the upper side, and must depend on some external component to pull the output high. In the C64, the chip whose output is connected to the reset line is a 7406, an open collector inverter. The external component required to pull the output high is a 1.000 ohm resistor. If we ground the reset line directly, any current will flow through the resistor, and not through the 7406. There is absolutely no danger of trying your computer. (unless, of course, you miss the pin and ground something you shouldn't). I would be willing to demonstrate this by applying a ground to the reset pin of my own 64 for the duration of a workshop meeting if there are enough doubters. One down, one to go.

In his review of Mr. Lester, Mike was quite right when he stated that a program like this is no substitute for the investigations of a good technician. Without actually saying that I am a good technician, I will say that I have been technicianing since 1963, and doing same to computers since 1966. In my experience, a good diagnostic program is not only a rarity, but will not find any of the 'non-obvious' problems such as power supply faults. The reason for this is that if the power supply is marginal, there is no way for the program to check it. You may as well ask it to tell you what colour your eyes are. On the other hand, your power supply could be completely non functional, in which case, you'll have


to load it into someone else's computer if you want to run it. The best diagnostic is an ordinary program. If you want to check out the sound chip, load up a song. If it sounds good, your SID chip is OK, and you can enjoy the song besides. This holds true for any other part of your system, whether it be joysticks, video, ram, rom, or whatever. If it works, it's good. What if it doesn't work, you ask? Well a lot of faults will cause the computer to go bye-bye altogether, causing you to suspect that it might not be just one of the switches in the joystick. Ah, now comes the tricky bit, and it's the place where a diagnostic program really shines, if it's intelligently written. This is the dreaded 'intermittent non fatal failure'. Often, these cannot be pinpointed by observation of a program in action, because the symptoms cause a state that could be arrived at in any number

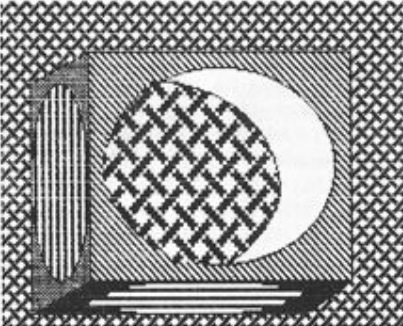
of ways. The diagnostic program, starting at the most fundamental checks, and using as little of the machine as possible, will test part of the machine. When that part is proven, it will then begin to widen the range of its testing. A good diagnostic, while it's doing this, will keep you informed of what it's doing at all times, so that if a failure occurs, you will at least know what it was checking if the failure causes a total wipeout.

Again, Mike was right in saying that there are programs in the public domain that do just as good a job as Mr. Tester. There are also people in the club willing to give advice, if not physical help.

There are a number of other myths floating around that probably should be commented on, and if I hear enough feedback, I'll be glad to explode a few more.

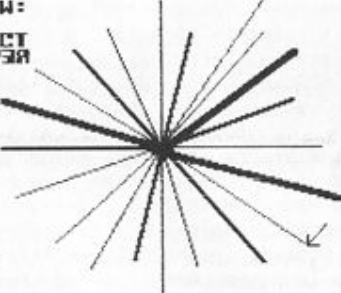
Flexidraw™





CIRCLES, BOXES AND ELLIPSES,
512 DIFFERENT FILL PATTERNS

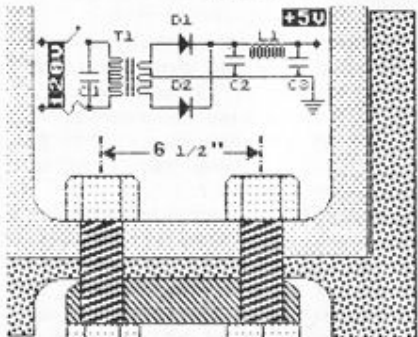
With FLEXIDRAW:
You can REFLECT
MIRROR ROTATE
or ROTATE
ROTATE
ROTATE
ROTATE
Draw Smooth:
or on a grid:





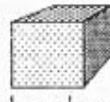
RUBBER BANDING, RAYS AND 3
DIFFERENT LINE WIDTHS:

The Flexidraw drawing system for the Commodore 64 is here!

With any C64, most dot-matrix printers and Flexidraw you can produce fabulous graphics with a lightpen and very little time and effort. Flexidraw has all the features of most drawing systems, and even some borrowed from expensive CAD systems. It comes with 8 character sets (in two sizes) and four symbol libraries, and you can create your own. 'Grid' mode guarantees that your lines are straight, and 'filter' mode helps you draw smooth curves. The lightpen supplied with Flexidraw is of industrial quality and is guaranteed for two years. If you want to produce professional quality hardcopy graphics with your C64, you have to take a closer look. Just contact **DIADIC RESOURCES AT 263-1661.**



TECHNICAL ILLUSTRATIONS WITH
SYMBOL LIBRARIES TO PASTE IN

FREEHAND LINE DRAWING AND
FINE OR COARSE AIRBRUSHING

C64 IS A COMMODORE TRADEMARK

ANOTHER VIEW OF PIRACY

By JIM BUTTERFIELD

Copyright (c) 1984 Jim Butterfield. Permission to reprint is hereby granted, provided this notice is included in the reprinted material.

In September of last year I was chatting with the author of the program FBACKUP, sometimes called Fast Backup, sometimes the Four-Minute Backup. Everybody must have a copy by now. In contrast to the single disk backup program that comes with the 1541 and which takes a half hour or more to perform a disk backup, FBACKUP does the job in four minutes, sometimes less.

This celebrated program was written for commercial distribution by Thomas Tempelmann, a student who lives in Oidenburg, West Germany. It has been for sale in Europe for some time now. There were problems lining up a U.S. distributor, and so the program has never been offered for sale in the U.S.A. or Canada.

Thomas told me his total sales on the program -- world wide -- amount to seventy copies. I suspect there are at least ten thousand copies in North America alone. If all Thomas' sales had been to North America (and as far as is known, none of them were), that would mean that over 99% of the copies in circulation were not purchased.

Seventy copies. If you have a copy of FBACKUP, how do you feel about that? Would it be better if you didn't know the author's name? Would it be better if you thought maybe he has sold a million copies, so he won't miss your royalty?

Seventy copies. Listen, you can't be blamed, right? It wasn't even for sale in North America. So how else could you get a copy except from a friend? And it's a really fantastic program that everyone needs, right?

We seem to be entering a new era where pirates are proud of their work. Bootleg copies are signed by the pirates who broke the protection. There's now a regularly published newsletter which deals with how to make "unprotected backup" disks. The newsletter names commercial software

```
*****
* COST PLUS 10% *
*
* Every Sunday on specially *
* selected items. *
*
* Personal Shopping Only!! *
*
* *-----* *
* ! 1541 SERVICE SPECIAL! ! *
* ! * * * *
* ! * Re-alignment ! *
* ! * Adjust speed ! *
* ! * Clean head ! *
* ! * Check Read/Write ! *
* ! $49.98 ! *
* *-----* *
*
* Commodore software for *
* -- sale or rent -- *
*
* NU-TEK *
* COMPUTERS *
* 5881 Victoria Dr. *
* at 43rd Ave. *
* 321-5223 *
* *****
* OPEN SUNDAY 11AM - 6 PM*****
```

packages, details the protection schemes they use, and gives precise procedures to remove the protection.

Tempelmann's story might have a happy ending. He told me he hopes to sell FBACKUP rights to Commodore for general distribution. So he might -- possibly -- eventually receive respectable compensation for his work. But it won't be from the sale of seventy copies.

How do you think such an experience would affect Thomas Tempelmann's attitude towards developing new software? Well, he is not the type of person to let small setbacks like this slow him down. Six months ago, he wrote a fast disk program that will load software at remarkable speed. About the time it was completed, he was visited by a young person to whom he showed the system. During the demonstration, Thomas was called away to the phone. The kid stole a copy, and there are hundreds of copies around West Germany now. Thomas

doesn't think he'll ever put his fast program on the market now.

His current project has something to do with reading sequential files from other computer disks -- perhaps Apple, Atari, and/or IBM PC. But he doesn't talk much about it, and he doesn't show his new system to anyone. I get the impression that he's learned not to trust people. I wonder why?

Maybe you hope to write software some day soon. And maybe you plan to work hard, learn efficient coding, get some good insights into machines and people, and put together a program that will be universally admired. It will be useful; it will be elegant; it will be efficient; it will be easy and convenient; and it will do something that hasn't been done before.

And maybe you'll get it all together, and your program will be a sensation. Everybody will admire it, everybody will want it -- more, everybody will need it.

And maybe you'll sell 70 copies.

REVIEWS -- continued from p. 4

description divided by subject are all in here. Some of these disks are in our own PET library.

Finally there are the BEST programs to conclude the Best of Torpet. These are directory listings of the ten best disks with public domain programs. Then one of the more valuable articles has a description of the BEST programs so you can browse through the book to find a program you want to try. The last few pages have memory maps.

After reading through the book I will certainly agree with Bruce Beach that the material is not intended for the highly technical. I think that the beginner and casual user of a Commodore product can gain some insight into his machine. If you have all the back issues of Torpet than you don't need this book. If you are like me and have only the odd one then it may be worth your while. I have seen quite a price range, from \$19.95 at the Pacific Coast Computer Fair to a high of \$29.95. Compared to other computer books if you get at the lower end of the price range it is a good deal, if you have to pay the top price for it, you should consider it carefully.

— ZAXXON —

By JAMES INGLIS

When I think of the name "Zaxxon," the playability and graphics of the arcade original come to mind. This can be one of the setbacks of a home computer version of an arcade megahit. Expectations of the gamer to such translations are often high. The result of this is that the gamer can end up bitterly disappointed with his purchase. This most certainly isn't a problem with Zaxxon. There has been very little detail or playability lost in translating the game for the 04.

I found the game to be relatively trouble free. A minor bother is the fact that the high score can't be saved to disk.

As far as quirks go the only one that I came across was the fact that the first wall encountered in the first fortress sequence is not solid. Flying the shuttle at ground level allows the player to fly through the wall with being destroyed. I can't say the same for the other walls I crashed into (purely for research, you understand).

I do not have any complaints to make against the game. However, I am not totally happy with what Synapse chose to add to the disk. They have put in a commercial for their games. My complaint isn't the fact that a game costing over \$30 shouldn't have such advertising. My complaint is that there is no way to break out of their commercial once it has found its way into the unsuspecting 04. The system must be shut down and the entire loading process started again.

Certainly there is a selection screen. This screen allows you to choose between the game and the ad. This is not the point. The point is that the game takes long enough to load without this unnecessary delay. If Synapse must include advertising they should put it on the back or enclose a demo disk. I for one would thank them.

The 3-D effects of the game are excellent. The scrolling of the screen is well done with none of the shakiness that I have seen in some other games. The graphics are crisp and easily recognizable. The shuttle responds well to joystick manipulation. All of this combined with the playability of this game make Zaxxon worthy of praise. I would recommend this game as an addition to your software library.

FORMAT -- Disk and Tape. AUTHOR -- (64 version) Peter Adams. PUBLISHER -- Synapse. PRICE -- \$34-44
 RATING -- DOCUMENTATION: C+; GRAPHICS: B+; PLAYABILITY: B; INTEREST: C+.

CREATIVE WRITER

By MIKE QUIGLEY

Although a bit high-priced, Creative Writer is an easy-to-use word processor well suited to computer and word processing novices.

Unfortunately, this program has a couple of serious problems. The first is that when using it, my printer (a Gemini 10 with Cardco A interface) will not put spaces between paragraphs in the text, nor will it do double-, triple- or any other multiple of spacing, despite the fact that the program's preview screen shows the document as it should be printed correctly. After experimenting with a wide variety of inputs and printer dipswitch settings, I wrote to the manufacturer, pointing out that I had never had this problem with several other word processors, including Speedscript, Write Now! and Quick Brown Fox.

A second problem relates to the disk's anti-copy protection, in the form of an error on track 2. My copy of the disk also had an error on track 3, which was unfortunate, since four of the program's help files happen to begin on that track!

Some time after I wrote complaining about these two problems, I received a new disk from the manufacturer, with a letter claiming "The problems you discovered are caused by a disk duplication error. I am sending you a new ... disk with the error corrected." The new disk had exactly the same faults as the old one.

In light of these problems, about the only recommendation I can make for Creative Writer is "try it before you buy it."

(Creative Writer, Creative Software, 230 East Caribbean Drive, Sunnyvale, CA 94089, \$49.95)

HOW TO EXTRACT 5 VOLTS FOR YOUR CARDCO INTERFACE FROM YOUR PRINTER

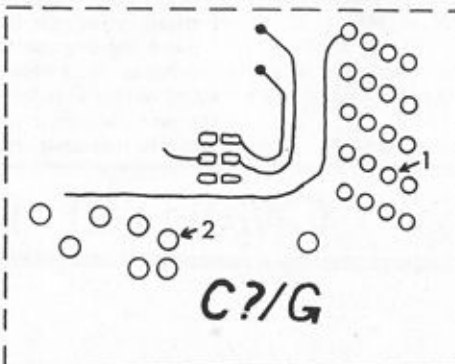
By BRUCE DUNN

All printer interfaces need a supply of +5 volts in order to work. Cardco interfaces get this power from the cassette port of a Commodore 64. The serial bus cord from the interface, which normally is plugged into the back of your disk drive, also sprouts a thin wire with a small connector on it which has to be plugged into the cassette port. This works fine, but gives an extra wire to plug in and because Cardco makes the power supply wire so short, it severely restricts where you can place the disk drive. It also means that Cardco interfaces cannot be used with the SX64 Executive computer, as it does not have a cassette port. Microworld interfaces on the other hand get their 5 volt power from the printer. The Centronics "standard" for parallel printer interfaces calls for the printer to supply +5 volts on pin 18 of the connector. This is picked up by Microworld interfaces through the ribbon cable between the interface and the Centronics parallel port on the printer. This works well as long as the printer does indeed supply 5 volts to pin 18.

To avoid the hassle of the cassette port connection when using Cardco interfaces, it is possible easily to modify Cardco interfaces so they draw their power from the printer. This simply involves soldering a jumper between two existing connections on the circuit board of the interface. The procedure outlined below was performed on a Cardco +6 interface purchased in January 1984. Other Cardco interfaces may differ in the exact locations of where the jumper needs to be placed, but the principle would be the same. *NOTE: The author of this article and the editor of the newsletter take no responsibility for equipment damage resulting from attempts to perform the described modification. It is recommended that this modification be performed only by someone with some electronic experience. If you don't own a fine-pointed soldering iron and a multimeter, get someone else to do it.*

1) Make sure that your printer does indeed supply +5 volts on pin 18 of the Centronics connector. Locate pin 18 on the printer; on most connectors the plastic

is stamped with numbers to indicate the locations of pins 1 and 18, and 19 and 36. With the widest part of the connector to the top, looking into the printer connector, pin 18 should be at the top left. Turn the printer on, and use a multimeter to check for the presence of +5 volts on pin 18, relative to the chassis ground of the printer. Almost all printers supply +5 volts to this pin. However, Mannesmann Tally, Admate, and other square pin printers do not supply +5 volts to this pin. If you are really keen on getting a Mannesmann Tally or Admate to work with a modified Cardco interface, you will have to rewire the printer so that pin 18 of the printer is supplied with +5 volts from the printer power supply. Conti



Electronics knows how to do this for Mannesmann Tally printers, and quite likely could do it for others.

2) Open the interface, and examine the back of the circuit board. The diagram shows one corner of the circuit board of the interface that I have modified. If your circuit board looks like this, then you are in luck. The connection marked 1 is attached on the other side of the board to the wire in the ribbon cable attached to pin 18 of the Cardco side of the Centronics connector. The connection marked 2 is attached on the other side of the board to the entry point for +5 volts coming from the wire to the cassette port. The needed modification is to solder a

jumper between these two connections to allow the +5 volts from pin 18 access to the circuitry in the interface. BEFORE GETTING OUT YOUR SOLDERING IRON, READ STEP 3.

3) Make absolutely sure that you have located the correct connections by checking them with a multimeter. If your circuit board does not resemble the one in the diagram, you will have to search out the correct connections using the multimeter. Set up your multimeter for measuring resistance, and check the resistance between connection 1 and pin 18 of the Cardco Centronics connector. These should be attached through a wire in the ribbon cable, and you should have less than 1 ohm resistance between them. Next, check the resistance between connection 2 and the termination of the cassette power supply wire at the cassette port connector. These should be connected, and you should have less than 1 ohm resistance between them. As an additional check that you have the right connection, look on the top side of the circuit board. Connection 2 should lead to the + leg of a small electrolytic capacitor soldered to the board. Warning: do not attempt to use the color of the interface wires to trace the connection of the cassette port wire to the interface circuit board. The cassette port end of the power supply wire may be a different color than the end soldered to the interface circuit board.

4) Having located and checked connections 1 and 2 or their equivalent, solder an insulated jumper between them. Put the interface back together and set it up with the printer and computer. For testing, leave the cassette port connector dangling where it cannot touch anything that would short out the interface power. Try out the printer to ensure that the interface can indeed operate with printer power. If the setup works, cut off the cassette port wire about 1 inch from the Cardco serial bus connector and tape the stub of the wire to the serial bus cord. Save the cassette port connector - if you ever need to reverse the modification you can splice the wire and connector back to the stub on the serial bus connector, and remove the jumper inside the interface.

THE COMPUTING CYNIC

By MARK JACQUES

Something which truly distresses me is the wretched state of grammar today. Nowhere is this more evident than in computer manuals.

Having suffered with the VIC-20 manual and programmer's guide which contained numerous errors, technical and otherwise, I was pleased when I purchased my 64 to notice that its manual seemed to be prepared in a less haphazard manner. That is, until my eyes fell on paragraph three of the Introduction (page vii!!!), which tells me "...the SPRITE EDITOR let's you animate as many as 8 different picture levels at one time."

Even more disturbing is the discovery of such errors in word processing programs. The manual for CircaScript, a word processor for the 64, says "Each word to be underlined should have it's own set of two flags with a space in between." And the help screens in Write Now! for the 64 tell me that its Special Characters "...show in reverses on the screen..." and that the Commodore-K combination "waits for keyboard input at print

time and inserts the entered text into the printed document."

It's no wonder that a popular feature of many of today's word processors seems to be a "spelling checker", which usually ups the price by quite a bit. I have an old-fashioned "spelling checker" -- my "dictionary."

One of the things you should never, never do is write with a 1541 to a disk which was formatted on a 4040. There are some rumours that you shouldn't even write to a disk done with a 1541 containing ROMS which are slightly different than your own! One way to make such disks compatible with your own drive is to run the 4-minute copy program, insert the disk in question, and keep hitting return until the backup is complete. What you are doing is reformatting the entire disk over itself. This is not a procedure recommended for people with weak hearts -- but it works! Need I add that this is strictly a "do it at your own risk" proposition to avoid any lawsuits or bomb threats...

Why can't game designers be of one mind about which 64 joystick port to use? A nice feature of the VIC 20 is that there's just a single port to begin with. The only solution with the 64 is to buy two sticks.

It is possible to make programs which can use both ports, like Pitstop II, but not many companies seem to have caught on to this fact. There are many two-player games for the 64 in which the players have to pass one joystick back and forth between turns!

R.A. MICRO SERVICING MICRO COMPUTER REPAIRS

Randy Atkinson

TELEPHONE
(604) 876-4611

12 EAST 4th
VANCOUVER, B.C.
V5T 1E8

AFFORDABLE SERVICING FOR
ALL COMMODORE PRODUCTS

OPEN 9 AM-6 PM MONDAY TO
SATURDAY

ALL WORK GUARANTEED

COMMODORE DISK DRIVES

By JOEL ELLIS REA

(Reprinted with permission from Loadstar
-- Copyright 1984)

First there was the Commodore 2001 Personal Electronic Transactor (PET). It was one of the first personal computers on the market. It had a whopping 4K of RAM, an 8K BASIC in ROM, and a Kernal to control input/output and other system operations. It used Commodore BASIC Version 1. There were no disk drives then, but provisions were made in the form of an IEEE-488 General Purpose Interface Bus. It also had the funniest little keyboard you ever saw!

Commodore then invented the 2040 Dual Floppy Disk Drive. It was an industry first. Instead of requiring the main computer to control every tiny detail of disk drive operation, not to mention loading a (large) Disk Operating System (DOS) into the computer's RAM in order to use the drive; it was an intelligent drive, with its own computer system inside, and its own DOS in ROM! By simply PRINTING commands to its command channel, BASIC users could SCRATCH, RENAME, and COPY files, and DUPLICATE an entire disk without any further help from the computer. Only problem was, they could not SAVE or LOAD programs, or use data files.

The problem was in BASIC V1. It didn't know about the timing involved with actually transferring data back and forth between the computer's RAM and the disk drive's computer. So, Commodore created Upgrade BASIC (now known as BASIC V2), and put it into a new PET, called the 2008. It had 8K of RAM, a REAL keyboard (unlike other companies, Commodore NEVER tried a rinky-dink keyboard again!), and it could use the disk drive!

But the 2040 drive had its faults as well. It couldn't handle random access files (one of the most important advantages of a disk drive over a tape drive!) without a LOT of effort on the user's part, it couldn't trap errors correctly, it required the user to OPEN15,8,15,"I":CLOSE15 every time the user wanted to change disks, and it couldn't seem to center the disks properly.

So about the time Commodore came out with their 3008 PET computer (with BASIC V3, with very minor differences from V2), they came out with the 3040 Dual Disk Drive. This had DOS V1.2 in it, which corrected the problems with error trapping. But they didn't fix such else. Also, people were getting tired of having to type OPEN15,8,15, "R0:newfilename=oldfilename":CLOSE15 to rename a file, when their Apple-owning buddies could do the same with the command RENAME oldfilename,newfilename.

Almost immediately thereafter, the Commodore 4016 PET came out. It had 16K for starters (expandable to 32K), and BASIC V4. This version of BASIC had nice disk commands like CATALOG, SCRATCH, DLOAD, DSAVE, BACKUP, COPY, etc. These commands simply translated themselves into the old commands the disk drive understood. So COPY D0, "oldfile" TO D1,"newfile" got sent to the disk as the good old "C1:newfile:=oldfile" stuff.

Along with the PET 4016 came the 4040 Disk Drive. It had it all! Besides fixing the hardware problems, it had DOS V2.1, which supported RELATIVE FILES! (What other people called random files, but

they used a different terminology so as not to confuse the old disk drive owners who were doing it the H-A-R-D way!) The new DOS also performed an automatic "I" command every time it detected a disk with a different ID, so that the user didn't have to unless he had two or more disks with the same ID (the two characters that appear after the disk name in a directory listing). It also used a slightly different disk format from the 2040's and 3040's, so that a disk made on a 2040 would have to have its files copied to a 4040 disk drive.

Later, Commodore came out with the Commodore Business Machine (CBM) 8032. It had BASIC V4, 32K of RAM, a 12-inch 80-column monitor (the old machines had smaller 40-column screens), and a more business-like keyboard. Indeed, it was a business machine!

A business machine needs a business

disk drive. So Commodore presented the 8050 disk drive. It used a double density format that got over twice as much data on each disk. It also could tell if a disk drive door had been opened, and automatically did an "I" command when the door was shut again, so that the user NEVER needed to do that, no matter WHAT his disk ID's.

Later came the 8052 double-sided drive, and the D9060 and D9090 hard disk units that could store 2, 5, and 7.5 Megabytes (1 Meg = 1024 K!) of data!

Then came the VIC-20. Commodore made many advances on this one! Low price! Graphics! Low price! Color! Low Price! 3-channel sound! Low Price! RS-232! Low Price! 8 user-programmable function keys! Low Price! A cartridge slot for games! Not to mention a low price! Even though they were producing a computer to compete with home video games, they learned their

lesson on the PET 2001 and gave the VIC a REAL KEYBOARD!

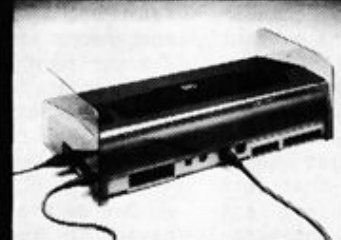
But for the sake of low price, Commodore took several MAJOR steps backwards. Only 5K of RAM, 22-column screen. Back to BASIC V2. And worst of all, they scrapped the wonderful IEEE-488 bus that could shove all 8 bits of a byte down the wires at once, and replaced it with a "serial bus" that had to spool those bits out one at a time.

Commodore then produced the 1540 Single Floppy Disk Drive. It was basically a one-drive, serial bus version of the 4040. It had less RAM, so that fewer files could be open at any one time. It used the new half-high disk drive units. Instead of two microprocessors (one for the drives and one for the interface), it had one processor controlling the single drive and the interface. (CONTINUED IN NEXT ISSUE)

VIC-20 C-64 COMPUTER PROTECTION

KEYBOARD COVER & TRAY

- FEATURES OF COMPUTER KEYBOARD COVER**
- For use on both Commodore 64 and Vic-20 keyboards
 - Easy to install & remove
 - No disturbance to your computer connections
 - No need to turn off your system when installing or removing



- A. USE AS A COVER**
- Protects against dust, dirt & liquid spill
 - Prevents accidental program loss by inadvertent key activation when operator absent
 - Protects keyboard from accidental impact damage
 - Complements your computer system

- B. USE AS A SOFTWARE TRAY & ORGANIZER**
- Holds your computer software neatly in view & accessible
 - Holds your programming notes & reference items in place
 - Holds floppy disks, manuals & other files in convenient & memory positions to save untidiness & clutter

TO ORDER: SEE YOUR DEALER OR CALL



JALCO INDUSTRIES INC.

#9 - 2900 Smith Street, Richmond, B.C. V6X 2Z6 Canada
Tel: (604) 273-2262