

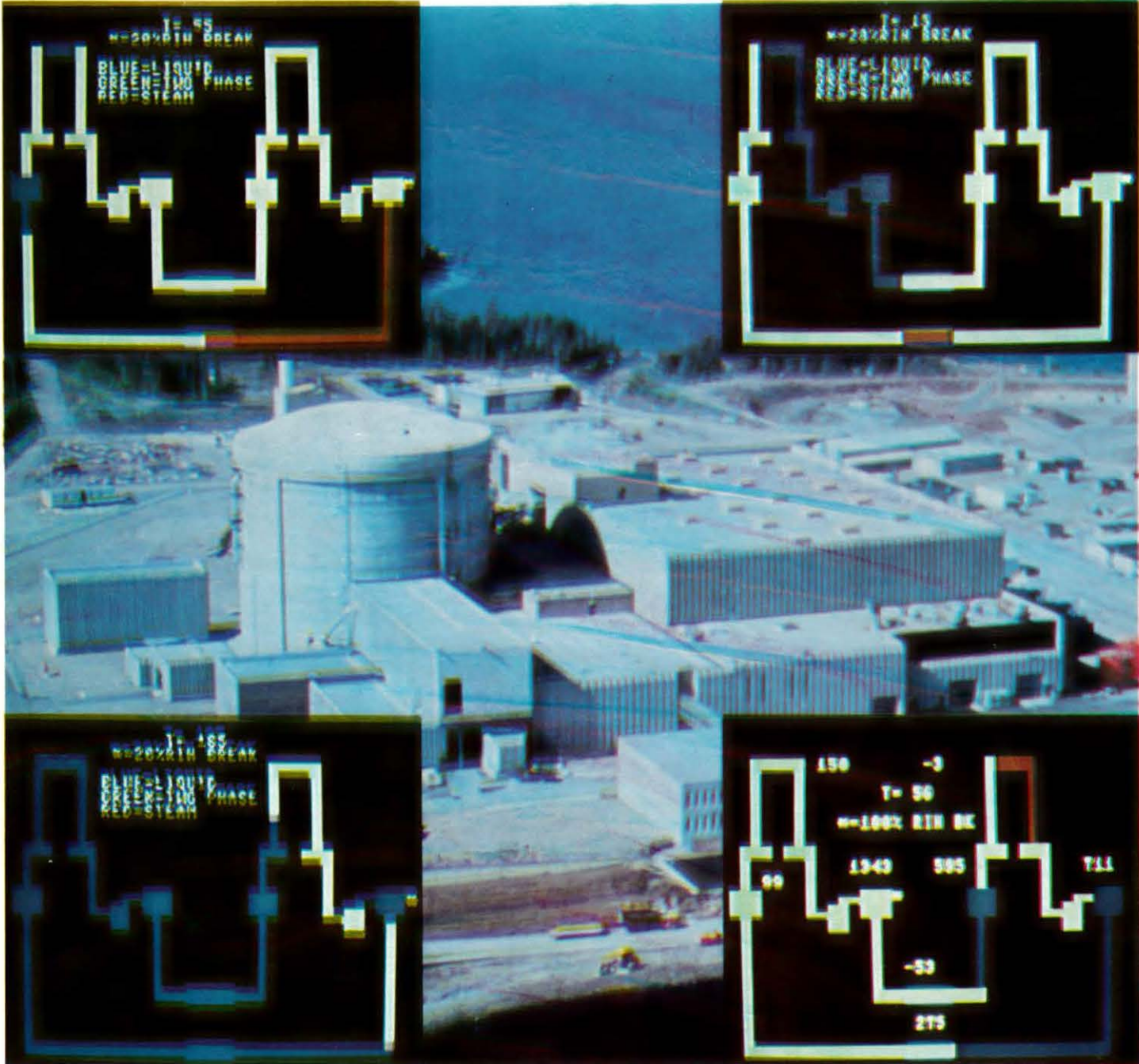
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School/Summer Edition

No. 28 JUNE-AUG. 1984

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EDITED BY
BRUCE BEACH



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320
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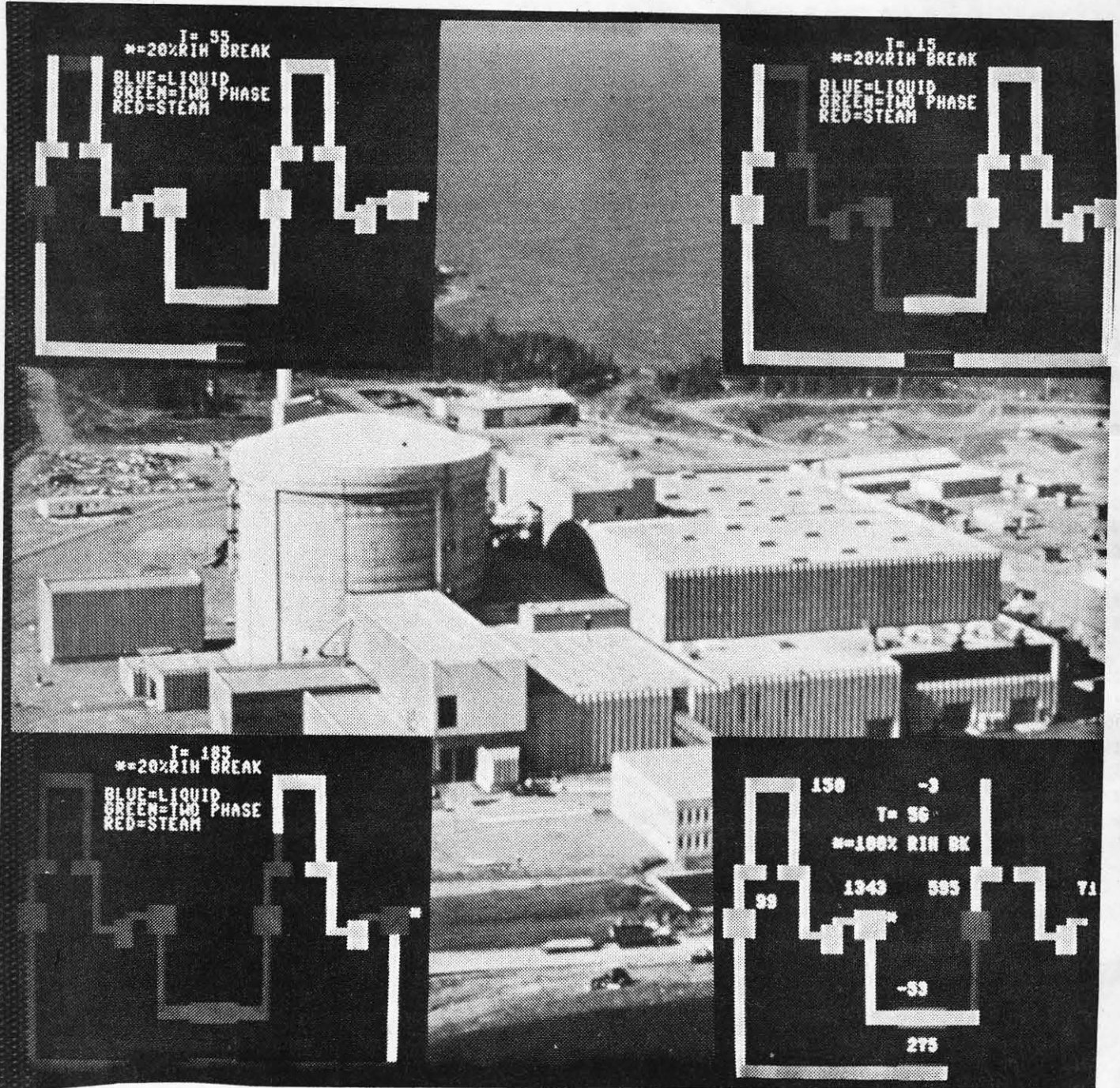
TORPET June-August 84

page 1

THE CANDU REACTOR and THE C-64

PATRICK G. HAWLEY

REXDALE ON



COVER STORY

In this article I describe how a simple program and a Commodore 64 can provide valuable assistance in analysing nuclear power reactors.

INTRODUCTION

A CANDU nuclear power reactor is a beautiful thing. Innovative design and engineering have made Canada's reactor the best performing reactor in the world.

Safety standards in the nuclear industry are among the highest. Studies and analyses are constantly being made to make sure that even in the event of highly unlikely system failures no harm will come to the public or to the people working at the reactor site.

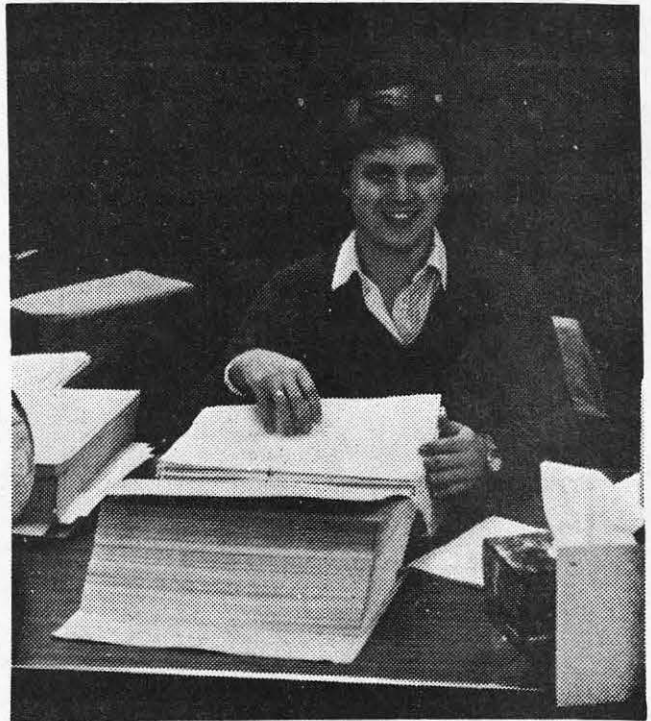
I work at Atomic Energy of Canada Limited. I, and the people I work with, simulate hypothetical accidents in CANDU nuclear power plants. This is how we demonstrate the effectiveness of the safety systems designed into the plant.

To do these analyses I run large computer programs on a large computer (Control Data Corporation Cyber 170 Series, Model 175). Not surprisingly, the output from these programs can be quite thick. The information contained within the output must be examined, understood and then put into a form so that it can be easily presented to and understood by other people.

Standard plots with time along the X axis, of course are a great help. There is no better way of showing such items as fuel temperature, fluid pressure and so on. Still, from these plots it's hard to get a feel for the overall picture of what's happening. As a result, analysts have taken to drawing simple pictures of the reactor, producing "snapshots" for given times. These pictures have proven to be a great aid in understanding and presenting results. The only problem is that making them is time-consuming and tedious.

This is where the Commodore 64 helps out. It was easy to write a

program that displays the picture of the reactor on the monitor and then, if required, print the picture on a page. With a modem all the required data can be downloaded from the large computer after the simulation program has been run. The whole process becomes automatic. Now instead of wading through eight inches of output the analyst can start off by scanning through "snapshots" of the accident on the computer monitor. Given enough data, and letting the program run continuously, it's almost like watching a movie. Important times can be noted, and the program run again, this time getting hard copies. Great fun.



Patrick Hawley and a large printout that the described C-64 program helps replace.

CANDU Reactors

Before going further let me briefly describe how a CANDU power reactor works. It's really quite simple. Basically all a reactor does is boil water to make steam -- sort of like a kettle. From that steam, a turbine can generate electricity.

Figure 1 shows a simple diagram of a

COVER STORY

CANDU nuclear reactor. Coolant (heavy water) is pumped around a continuous loop made of pipes. The coolant transfers heat from the fuel (uranium oxide) to the steam generators. The region of the reactor which contains the fuel is called the core. In the steam generators the coolant gives up its heat by making water boil to produce steam. The steam is then used to drive a turbine which drives the generator to produce electricity.

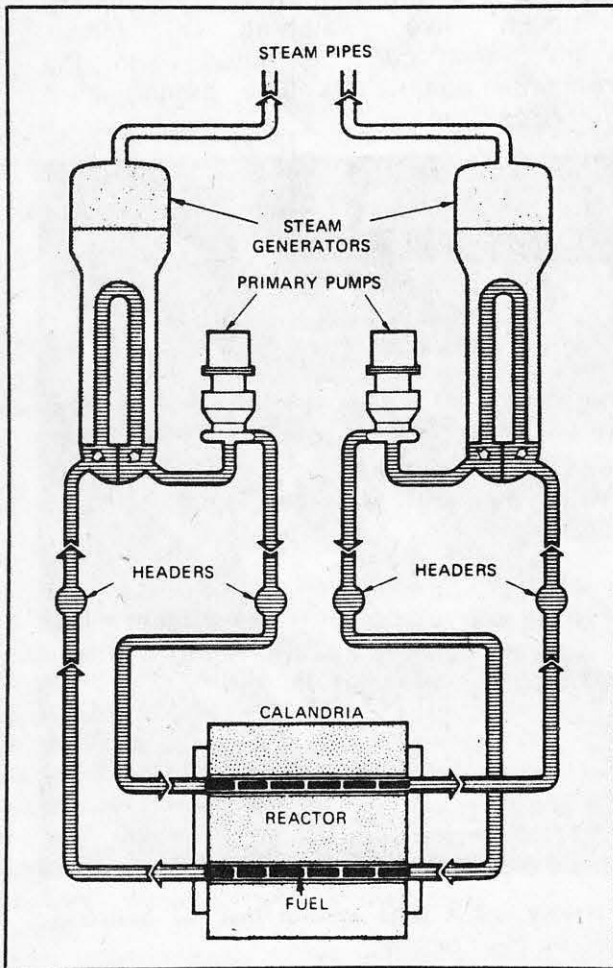






Figure 1

-  LIGHT WATER STEAM
-  LIGHT WATER CONDENSATE
-  HEAVY WATER COOLANT
-  HEAVY WATER MODERATOR

The loop which contains the coolant is called the primary heat transport loop. A common hypothetical accident involves a break somewhere in this loop. This is the type of accident that I simulate.

REACTOR ACCIDENT SIMULATIONS

In the event of a break the reactor trips (trips means power is turned off). The coolant escapes out the break so cold water (called emergency core coolant or ECC for short) is injected into the primary heat transport loop. By simulating the accident on the large computer we can predict all the important parameters concerning the reactor during the break. These parameters include fuel temperature, coolant pressure, time of ECC injection, flows etc. A large part of my job is to take the computer output, understand it, and put together a package of text, plots and figures so that other people can easily understand it as well.

COMMODORE 64 DISPLAY

It is important that the fuel doesn't get too hot in the event of an accident. Therefore a fundamental objective of the analysis is to determine if at any time coolant is not flowing over the fuel and how effective the ECC system is in maintaining a water supply to the core. Thus, at any given time, we want to know where the coolant is and where the ECC water is going. To do this, analysts draw pictures which show the primary heat transport loop.

The picture of the loop is filled in solid to show a liquid region, slashed to show a region of steam/water mixture and blank for a steam region. ECC flows (ECC is injected into each header) and the flows through the core and steam generators are noted so that the finished picture gives a good general idea of the conditions at that given time. Figure 2 shows a hand-drawn picture of a primary heat transport loop showing the conditions at 62 s in time for a complete break in one of the reactor core inlet

COVER STORY

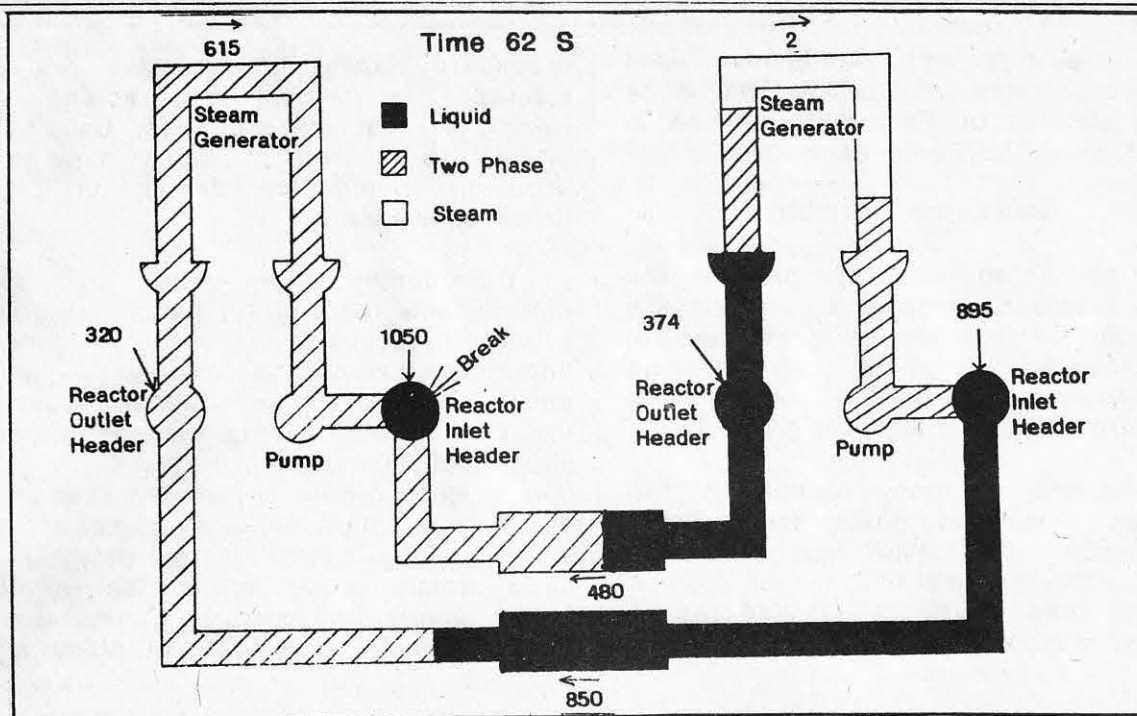


Figure 2: 100% Reactor Inlet Header Break Void and Flow Map

pipes. A number of these pictures are usually contained within a report to help explain the results of a particular break analysis.

Using the graphics available on the Commodore 64 keyboard, it was easy to put all this information into a video display as shown on the cover of this month's TORPET. In these pictures the colour blue represents regions of liquid, green a steam water mixture (two-phase) and red regions of steam.

One of the advantages of using a micro computer is that, since it is all automated, many pictures can be made and displayed. Low-resolution graphics are all that's required to produce these displays. Thus, even a program written in BASIC can display new pictures fast enough (approx. 3/s) so that a cartoon-like effect is created. Three of the pictures on the cover show the story of a break that was simulated to occur in a reactor core inlet pipe (if you're wondering, RIH stands for reactor inlet header and a 20% RIH break is a break that is equal in flow area to 20% of the flow area of a reactor in-

let header). At first the primary heat transport loop partially empties and steam forms. Then, after ECC is injected, the steam is "pushed" out the break and the system refills.

There is one other picture on the cover from the Commodore 64 display. This one is showing the results from a complete reactor core inlet pipe break at time 56 s. The display is in the stop/start mode so ECC, steam generator and core flows are also displayed (the numbers would be changing too fast to be readable in the continuous display mode). Positive ECC flow is nominally taken to be into the primary heat transport loop and positive flow within the loop is nominally taken to be in the clockwise direction.

The display alone is a valuable tool for analysts. Between the display and standard plots, diving into the actual computer output is minimized to the times when very detailed information is required. There are other boons as well. The computer is portable enough that it can be

COVER STORY

taken to meetings and the display used during presentations. Slides can be made by taking pictures of the monitor screen at a cost of about 50 cents each.

HARDCOPY ROUTINE

The next step was to provide the ability to create hardcopies with reports. It takes about 30 minutes to draw one of these pictures by hand so if the Commodore could do it appreciable savings could be realized in report preparation.

I wrote the hardcopy routine as two subroutines. The first draws the primary heat transport loop outline plus prints the flows etc. The second fills in the outline with either solid for liquid, slashed for liquid/steam mixture (two phase) or blank for steam.

The outline routine was a straightforward printing of lines (graphics characters) on the page. It was drawn to be a replication of the screen display only enlarged by a factor of two. The filling-in routine is basically a screen dump expanded to fill the outline. The results using a Commodore 1526 printer are shown in Figure 3. It takes about three minutes for the computer to draw one of these pictures but, once set up, the computer can be left to work on its own. There's really no need but the printing

procedure could be speeded up considerably by writing the screen dump routine in machine language. Usually, between five to ten of these pictures are used in aiding the description of one break simulation.

Considering that there are sixteen colours and many graphics characters that I haven't yet used (or made) a lot more information could be displayed. For example I could colour code the outline of the core region in the monitor display to show fuel temperature regimes. In fact, I find I must refrain myself from adding so much that the pictures become "overloaded". The desire is to produce pictures which show certain features of a break clearly and simply. I think that the Commodore 64 is capable of doing a very nice job.

So there you go. For about \$1600. Atomic Energy of Canada analysts have found a valuable analysis/drafting aid in the Commodore 64 computer. And it wasn't the complexity of the program; it was just the idea. Imagine that.

Note: While this program will be used at Atomic Energy of Canada Limited, it, and this article, were written by the author as a private citizen. Therefore, any views expressed in this article are those of the author and not necessarily those of AECL.

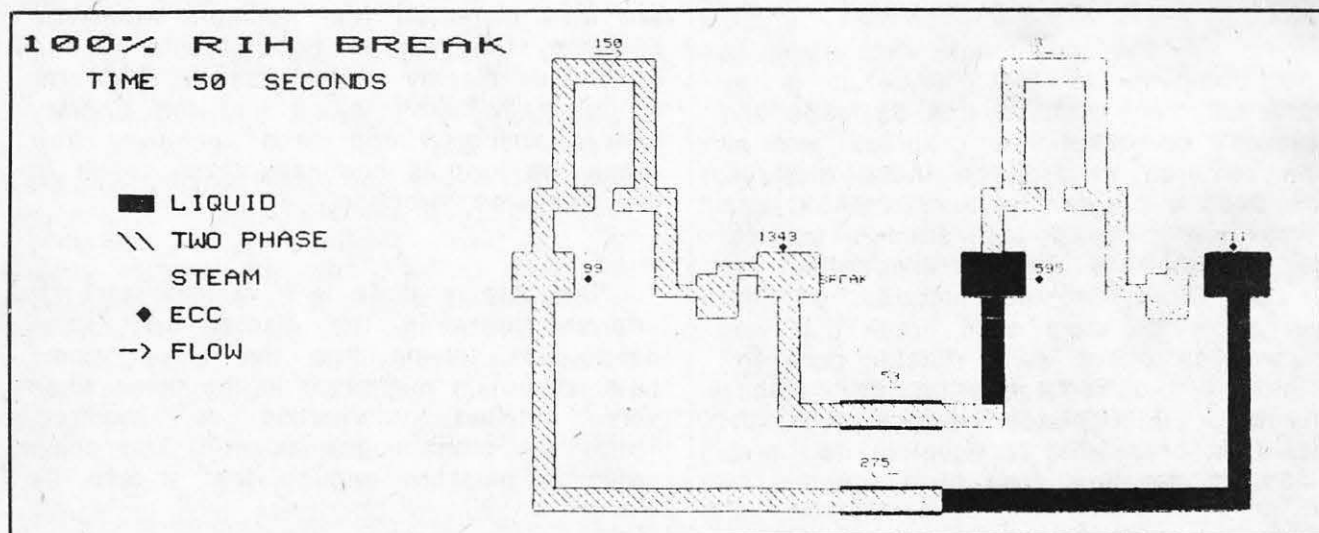


Figure 3

THE SUMMER 1984 CONSUMER ELECTRONIC SHOW IN CHICAGO

The June 1984 CES was giant and exciting as usual. Show attendance was expected to be in excess of 90,000. In order to make our printing deadline I was only able to be at the show for the first two days.

For those of you who do not know, the Consumer Electronics Show takes place twice a year. In the winter it is in Las Vegas and in the Summer (June) it is in Chicago. The show is not open to the public but is attended by department-store buyers, distributors and dealers from all over the world. It is here that manufacturers from all over the world demonstrate the wares that they currently have available and that they will have available in the next six months.

In other words what I was seeing there were the new products that will be on the store shelves for next Christmas. Since there were over 1,200 manufacturers demonstrating their products it would have taken over 20 hours to see the show if one had spent just one minute at each booth.

Fortunately, the show is divided into areas. The micro-computer area occupies the three floors of one whole building with some exhibits spilling over elsewhere. There were of course many interesting new things to see, some of only a few of which we can report in this issue because of time limitations, and others which we will tell you about in future issues.

There were many new things shown at the show other than computers and computer software. For example the pocket-book size flat screen portable color T.V. by Citizen Electronics, and a portable radio the size of a 9-volt battery. The new VCR cameras are quite exciting as are the new video disk players. I could go on and on

but this is a computer magazine and we really must limit ourselves to computers.

The computer exhibits were once again the most interesting at the show and once again showed greater expansion than any other area. However, there has been considerable shakeout in the home computer industry.

TI (Texas Instruments) had a big booth for other products but their home computer is of course gone. Although TIMEX has dropped Sinclair, Sinclair was showing their new QL which stands for Quantum Leap. They may be planning to challenge Commodore for the low end market. If they provide us with enough additional information we will pass it on to you in future issues.

Coleco once again had a giant booth for the ADAM. They insist they are going to stay in the market. The company feels it has received a bad press. Once again, given sufficient information we will try to give you an accurate report as to what is happening with them.

Atari, as usual, had a mind boggling exhibit. The words are not used lightly as you will be able to tell from another article in this issue which is dedicated to one of their exhibits.

The only astounding thing that we could see about the Commodore exhibit was that they have changed the name of the 264 to the PLUS 4. Everything that we said about that machine in the last issue still stands.

This show was not exhibited at by Radio Shack, IBM or Apple. The latter two attend another show called COMDEX which is on at the same time. But without their participation (and they seldom show at CES) the computer exhibits

CES CHICAGO



Attendance was expected to exceed 90,000 persons by the fourth day of the show. We could only stay the

first couple of days because of press deadlines, but two days were exhausting enough.

still showed more growth than any other area.

One can also tell there is a lot of shakeout taking place among soft-ware

manufacturers. There will undoubtedly be many firms disappear from this market in the future. We won't name names at this time but watch out for changes.



One of the six large display floors at the 1984 Summer CES show in Chicago. There were also overflow

displays into many large hotels. The micro-computers had one large building to themselves.

KEYPORT

A New Input Device Shown At CES

Proto-types were being shown at the CES show in June for a device called Keyport. This new device is supposed to be available next fall for the Commodore, Apple, and I.B.M. computers.

Similar in appearance to the large Koala pad types of devices this unit may have many practical applications. It will of course permit very young users who cannot type to interface with different programs by means of illustrated overlays but many adult users may find it very useful also.

Programs like word processors and spread-sheets will be available for use without one having to learn to use a command language. By simply pointing to the function desired on the large pad one will be able to control the program in the manner that they wish. This will be even simpler than using a "cat" or "mouse".

Keyport is a product of Polytel Computer Products Corporation in Sunnyvale, California. When the devices become actually available we will report further on them if we can get hold of one before the next issue.



Keyport- shown here with a graphing program is proposed for use with spreadsheets, other business programs and also for primary school applications.

Garbyte

by DAN SLOAN



NEW MUSICAL KEYBOARD

INEXPENSIVE MUSICAL PROGRAM SHOWN AT CES

I could hardly believe my eyes. It looked like a music program I could actually understand. We have had many music articles and have reported on many such programs before. But understand them? Never. I have to admit I am a klutz when it comes to music. But, I have always hoped. And now, I think there is hope.

You have to remember that many of the things that we see at CES are prototypes and are not on the market yet. This is true also of The Melodian which will be available for the Commodore 64 in the fall at a cost of about \$200 from Melodian, Inc. in N.Y., N.Y.

We expect to get one of the first production units released and we plan to have a very experienced music reviewer write a full length article for us. If every parent is like myself in that I have been looking for a program and a device that will make music fun to learn then perhaps we have found it.



Harry B. Mendell, President, Melodian, Inc. with his invention, The Melodian Keyboard which was shown at the CES.

THE ELECTRONIC UNIVERSITY

A GRAND IDEA INTRODUCED AT CES

At the Winter CES in Las Vegas we saw something that appealed to us as a very novel and practical idea. It is called The Electronic University. We were most pleased to find them again at the Summer CES in June and in a much expanded form.

Briefly, the way the system works is that you enroll for courses which you study at home. Tests, practices, and examinations are entered into your home computer and are transmitted to your professor by telecommunications. You receive his comments and evaluations by the same

means. Even an on-line conference with your professor may be arranged at mutually acceptable times.

There are accredited universities that will give you credit for courses completed through the system. Much further enhancement and expansion appears to be under way. We feel this service has such potential to be very valuable to many of our readers that we will do a further complete article on it in some future issue.

The Electronic University is available from TeleLearning Systems, Inc. in San Francisco, CA.

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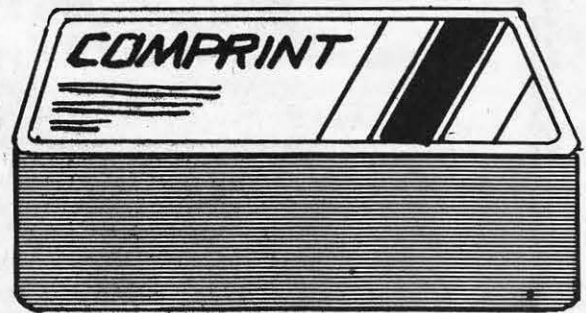
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The *COMPRINT* interface

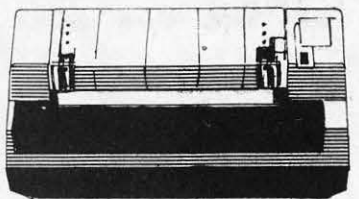
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The **COMPRINT** interface was designed to allow the use of any parallel printer conforming to the "Centronics" standard with either the VIC-20* or the C-64* computers from Commodore*.

The standard Commodore printers (such as the VIC printer) use a method of data encoding called "PETSCII". The **COMPRINT** interface performs a PETSCII to ASCII conversion so that most software will perform

as originally intended, and the final output will be in understandable English. This process requires a very intelligent interface and for this task we chose the 8039 micro-processor. We think you will agree that it performs the assigned function admirably. The ability to use a printer with many more functions than the standard Commodore printer will expand your computing horizons dramatically.



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Ed Mansfield

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I had to see it to believe it. In fact I had to try it to believe it. That meant pressing my way through a crowd, waving my press badge, and standing in line for a turn. In a show that had many fascinating items this was truly one of the crowd gatherers.

How does the device work? Atari will not tell you. In fact, now get this, they won't even tell you how to work it! They say they can't. Not because they wouldn't like to tell, they just don't know how to tell.

So, how does one learn to use it? You just put the band around your head and try. Some people catch on right away. The demonstrator says he has seen some people take as much as twenty minutes. It took me about ten.

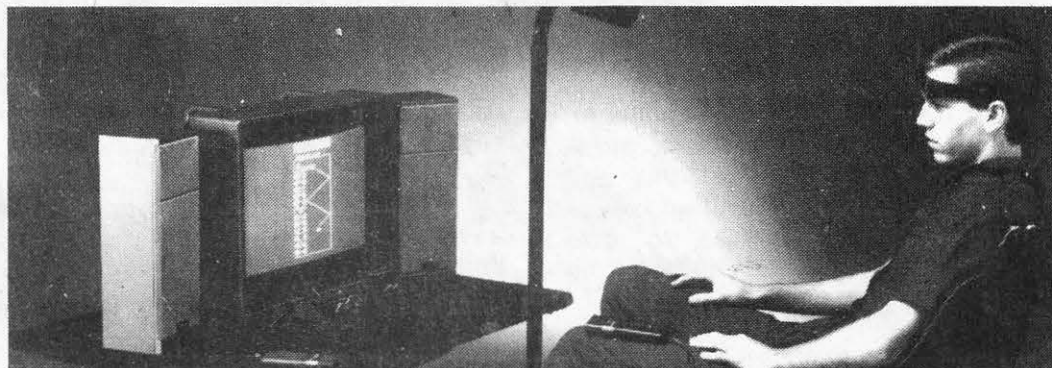
For me it had something to do with how I held my teeth. No kidding. It was a movement so slight that no one could possibly tell what I was doing. Other people think it is a matter of how they shift their eyes or furl their forehead. It appears to be different from person to person. For you it might be how you wiggle your ears.

Anyway, eventually you find you can make the paddle for breakout move left or right slowly or rapidly as you may desire. The demonstrator says it is a matter of increasing or decreasing your tension. Increased tension makes the paddle move to the right. Decreased tension makes it move to the left.

At the demonstration there were three different games. More will undoubtedly be developed and it is possible to write your own programs to work with the device. This could be super for paraplegics.

I have heard of other companies with similar devices. Behavioral Engineering in Santa Cruz California is about to release for the Commodore, Apple and Atari a game controller called MindReach that works similarly to a lie detector. They are reported to have six games available for their device. It is expected that the Behavioral Engineering device will be introduced for about \$75 and the Atari one for \$150.

These new devices are undoubtedly but the tip of the iceberg as to what we will see in the future. In a later issue we will try to do an article or two on bio-feedback, the technique involved here. I at one time had a government grant to study the subject and I must say I am fascinated with the possibilities.



Mind Link. A new device from ATARI shown at the summer CES that allows one to control the computer with their mind.

MICRO ILLUSTRATOR USES INEXPENSIVE LIGHT-PEN

Darrin McGugan
Shelburne, ON

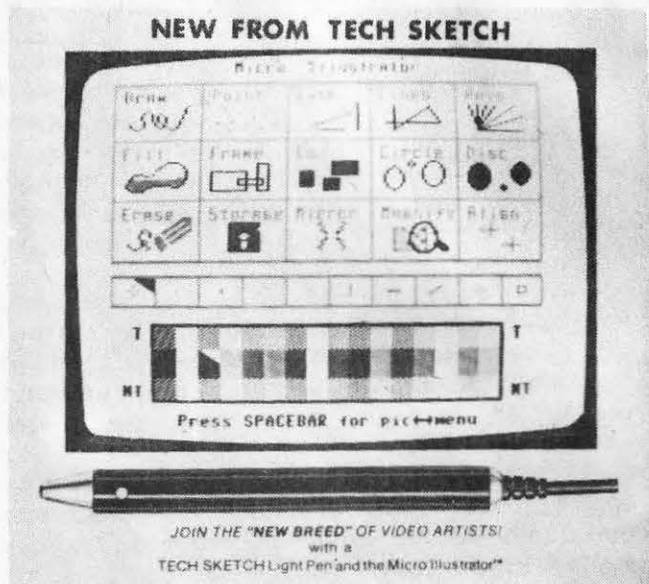
One of the exciting new products that our editor brought back for the Commodore-64 and the Atari from the June 1984 CES show was a light-pen package that included a program called the Micro Illustrator.

Micro Illustrator allows you to draw hi-resolution pictures and then lets you save these beautiful pictures for later enjoyment. This package from Tech Sketch Inc. comes complete with a LP-10S light pen, a diskette and documentation.

To use this program on the Commodore 64 I just loaded it in and plugged the light pen into port #1. The documentation is sufficient except for the fact that the instructions say to LOAD**8 which doesn't work. To load this program you must actually LOAD**8.1. Once it is loaded you may hit any key, or the button on the lightpen, and the main menu will appear.

The main menu consists of three sections (commands, brush types and color sets). Touching the lightpen on the screen, or close to it, allows you to move the cursor anywhere on the screen. Move the cursor onto the command of your choice and then press the button to make your command selection (such as draw, fill, frame, erase, etc.). Next position the cursor to your brush selection (single, double, or triple density) and again press the button. The default colour of the pen will be in orange but can be changed to any of the other fifteen colours to give multiple colours and overlay shadings to your drawing.

Now that you have selected your command, brush type and colour hit the space bar to go into the drawing mode. To escape the drawing mode hit the space



The Tech Sketch light-pen and The Micro Illustrator program that were introduced at the June 1984 CES show will be available in Canada from TC Data Inc.

bar or move the cursor off the screen and hit its button. Using various combinations of commands, brushes and colors you can draw any hi-resolution drawing that you can conjure up.

Here are some of the commands available.

DRAW - Use the lightpen to draw freehand on the screen with whatever brush and colour you have selected. Hold down the button to draw and release the button to move without drawing.

POINT - This allows you to point anywhere on the screen with any of the different brushes or colours. Just position the cursor and press the button and it will appear.

LINE - Allows you to draw straight lines on the screen. Put the cursor on the starting point of your line and hit the but-

ton. Next move the cursor to the end position of your line and push the button again.

FILL - This command fills in an entire area with the colour of your choice. Put the cursor in the area you wish filled and press the button. This will fill the area with the new colour until it finds a different colour boundary. **NOTE:** If you should change your mind partway though a fill just hit any key and the fill will be cancelled.

FRAME - This lets you make frames or boxes on the screen. Just place cursor at the starting point of your frame and hit the button; then move to the boundaries of your frame and hit the button again. A frame of the chosen colour and brush type will be drawn.

CIRCLE - Allows you to draw a circle of any radius anywhere on the screen. Place the cursor on the desired center point and press the button. Now move the cursor to the outer limits of the circle and press again. A circle of selected colour will be drawn.

ERASE - This allows you to erase either the whole picture or the last thing drawn. When the menu with these two choices appears then move to the desired selection and press the button. The erase will be done and you will be returned to the drawing.

MIRROR - This allows any drawing that is done to be copied in all four corners on the screen. To use this first go to main menu and turn the command on. Don't forget to turn the command off when you are finished with it. It can be used with any of the drawing commands.

MAGNIFY - This allows you to get a blow-up of parts of the screen and then modify any of the pixels. Just go to main menu and turn this command on; then return to drawing and you will have a blow-up of the area surrounding the last cursor position you were at.

STORAGE - To use this feature first be

sure you already have a diskette available in the disk drive, then select the command **STORAGE**. You may choose from a list any of these functions: load a picture, save a picture, display index, go to main menu, delete picture, binary save, or format the diskette. When loading a picture make sure that your previous picture is saved because the one that is loaded will replace the drawing you have. You may use the lightpen or the function keys to make these decisions.

ALIGN - This command, which is not described in the manual, allows you to align the cursor to the light pen. You will be shown a vertical line; just point the light pen directly at this line (not the cursor, the lightpen). You will also be shown a horizontal line; do the same for this line.

In my opinion this is a program that makes good use of the lightpen. It is much easier to use than similar programs that I have used with a joystick. The lightpen allows much better control than the joystick. When using some of the commands the cursor is somewhat slower than the lightpen itself but this does not matter much.

Another review which I read, (printed in *Family Computing*) gave a more favourable performance rating to the **McPEN** light-pen manufactured by Madison Computer. Our editor tells me that the Madison device did have "less bounce", but the overall performance and the ability to do **KOALA** types of functions at the less than \$50 U.S. price made this by far the most attractive package that he saw at the show.

Anyone can be a success at computer games. To win in **FROGGER** takes **TOADAL** concentration, while at **HANGMAN** you should try to get only the good news, not the bad noose. To win at **WAVY NAVY**, let your computer generate those 30-foot waves on its own for a while. It is easier than to beat a C-sick ty four.

Ylimaki

BAR CODE READER A Novel Way to Input Programs

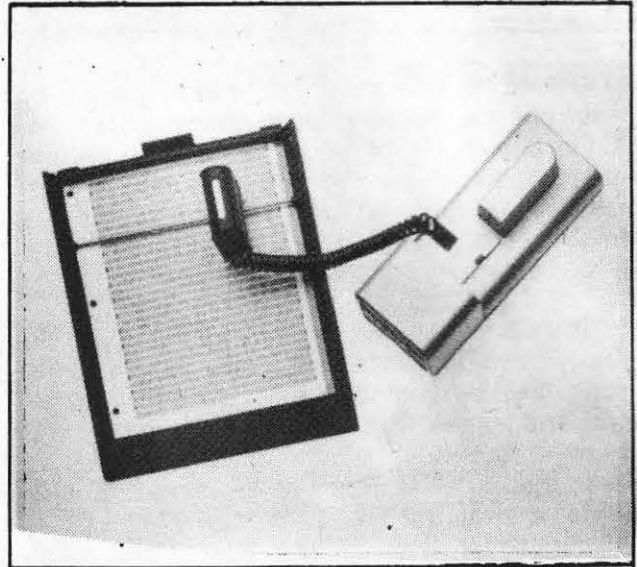
At the winter CES in Las Vegas we purchased a curious little instrument (for around \$90 U.S.) that allows one to read in programs printed in bar codes much like you see on all the products you now buy at the grocery store.

The device took some practice to learn to use (about two hours on our part) but once one got the hang of it they could load error free programs into their computer from the printed page.

When you consider how long it takes to learn to type and, even if you know how to type, how long it takes to correct the typos to get a bug-free program into your computer it seemed like a good investment of time.

We were most happy to find at the summer CES that the product had further been considerably improved. We have always thought it to have the best styled and engineered molded case we have ever seen. As we get more experience with the product we will tell you more about it.

The device we own is OSCAR I but OSCAR II is now available from Databar Corporation in Eden Prairie, Minnesota.



Oscar II- A bar code reader used for inputting computer programs.

Garbyte

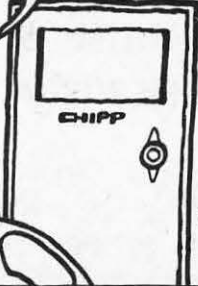
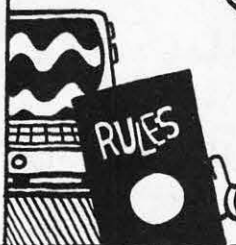
by DAN SLOAN



FOR NEXT #3 Loops WITH: CHIPP!

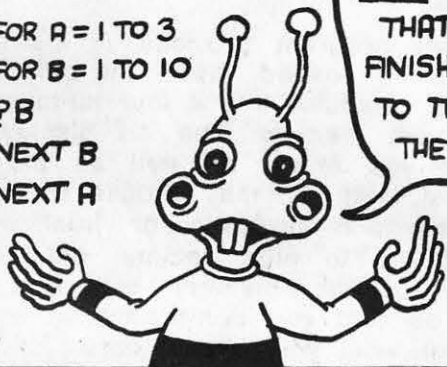
THIS LESSON IS ABOUT THE "RULES" OF "LOOPING" WITH YOUR COMPUTER!

DID YOU REALIZE THAT YOU COULD PLACE ONE LOOP WITHIN ANOTHER?



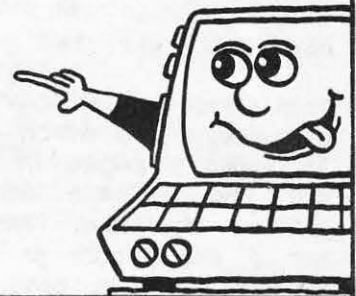
IT'S QUITE INTERESTING. TRY THIS PROGRAM:

```
5 FOR A=1 TO 3
6 FOR B=1 TO 10
7 ?B
8 NEXT B
9 NEXT A
```



NOTICE THAT THE FOR AND NEXT LINES ARE SET UP SO THAT THE INSIDE LOOP IS FINISHED BEFORE YOU GET TO THE NEXT VALUE OF THE OUTSIDE LOOP.

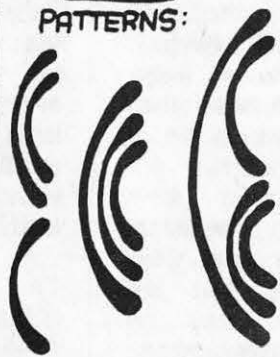
WE CAN REPRESENT A LOOP WITH THIS SYMBOL:



THE PREVIOUS PROGRAM THEREFORE WOULD HAVE A LOOP PATTERN LIKE THIS:



THESE ARE EXAMPLES OF LEGAL "LOOP" PATTERNS:



THESE PATTERNS ARE ILLEGAL



ANY LOOP THAT OVER-LAPS ANOTHER WILL RESULT IN AN ERROR:



USE THIS PROGRAM TO KEEP TRACK OF THE VARIABLES AND UNDERSTAND THE WORKINGS OF LOOPS:

```
FOR A=1 TO 5
FOR B=1 TO 2
FOR C=1 TO 10
?A ; B ; C
NEXT C
NEXT B
NEXT A
```

EXPERIMENT AND LEARN! I'LL SEE YOU LATER WITH MORE!



MIKE RICHARDSON

CARDCO CARDKEY/1

by DIANE & PAUL TRACHSLER
FLESHERTON ON

INEXPENSIVE AND WORTH EVERY PENNY

The VIC 20 and C64 are great machines. They are cheap and powerful considering their prices. One of the obvious features separating them from the rest of the Commodore family of microcomputers is their lack of a numeric entry keypad. Cardco of Wichita, Kansas has come up with a solution which eliminates this drawback and makes two great machines better.

The Cardco "Cardkey/1" provides an out-board keyboard which does double duty. Its 16 keys, arranged in a 4x4 matrix, allows not just all the attributes of a four-function calculator with memory, but, as a bonus, the people at Cardco have seen fit to allow you to program each of the 16 keys individually to represent any characters or words you desire. By defining the keys as basic language statements, you can enter programs faster and easier, eliminating a lot of common typing errors. Another use of the programmed keys, suggested by Cardco, would be to define them as often-used words or part numbers in a data entry program.

The Cardkey/1 comes with four programs, two for the VIC 20 and two for the C64. These programs are on cassette, but are not "protected"; therefore, they may be easily transformed to disk for convenience.

The first program is "KBasic", which is menu-driven. This program allows you to define each of the 16 keys to represent whatever number, word or programming statement you want them to represent. Once you have defined the keys to your satisfaction, you tell the KBasic program to stop, and it loads a machine language program into memory, does its thing, and then removes itself from memory. You are then free to begin programming or to load a program into memory and utilize the pre-defined keys on the keypad to aid you. One

other option available to you in this mode is that, once you have defined the keys a particular way, you may "save" those definitions to either disk or tape and reload them at a later time.

The other program provided is Card/Calc, which, when loaded, uses the keypad to turn your computer into a four-function calculator with memory. The crt displays the numbers you enter, as well as the running total, and you may choose whether to use fixed-point numbers or floating-point numbers (up to nine decimal points); the contents of the memory are also displayed, so that you don't have to try and remember what you stored there.

The Cardkey/1 numeric keypad is a solid enough unit, which won't "float" all over your work station. It comes with a three-foot cord equipped with a connector, allowing it to be plugged into the joy port of either the VIC 20 or C64. Although the keys are embossed with their calculator mode representations, the manual comes with two templates which may be cut out and used with custom keypad definitions.

The thirty-two page manual is excellent. It is simply laid out, easy to follow, and covers both applications of the keypad in depth. I do have two complaints about this product, but both are minor. First, the manual tells you to plug the keypad into joy port number one; this should actually be port number two. Secondly, and this is only a cosmetic problem, there is about a quarter-inch gap between the bottom of the keys and the top of the case. Granted, there's probably a very good reason for this design, but I haven't figured it out yet.

THE BOTTOM LINE

Should you purchase this accessory? The

HARDWARE REVIEW

answer to that is obviously a question of whether you need or want a device such as this and feel its features will enable you to use your computer easier and more efficiently. If so, go and get it! The price is only \$39.95, requires no internal connection to your computer, and comes with a life-time guarantee. Need I say more?

Device: Cardkey/1 (outboard accessory keypad)
16 programmable or pre-programmed keys

Manufacturer: Cardco, Inc.
313 Mathewson
Wichita, KS
67214
(316)267-6525

REVIEW....

TYPE ATTACK

by V.SIRUGO
SCARBOROUGH ON

The Nov./Dec. issue of TORPET included a review of "Typing Tutor" and "Word Invaders" from Academy. These programs are fine for one just learning to type. On the other hand, if you are a beginner, intermediate or expert typist "TYPE ATTACK" from SIRIUS may be the cartridge worth having. It can be used to improve your typing skills or for just plain having some fun.

Type Attack has fifteen lessons in it. Each lesson consists of two games. A) Character Attack. B) Word Attack. The black background on the screen, and the never-ending movement of stars gives a good illusion of one travelling in space. The left board will consistently give you your typing speed. The right board displays a fuel gauge indicating the time you have left to fight off the attack.

In Character Attack, you start being attacked by characters in rows and columns, similar to the aliens in VIC Avenger (Space Invaders). When you type one of the letters attacking you, a missile will take off and shoot down the letter. You continue shooting down the letters until all the letters have been destroyed. When this is done, you continue on to Word Attack.

In Word Attack, words start flying across the screen (like space ships). When you type the attacking word successfully, the missiles will fire, destroying the attacking word.

The speed of each lesson can also be controlled from the main menu. Possible speeds are from 1 for the beginner (my 4 year old) to 99 for the expert typist.

The final feature of Type Attack is option 3 from the main menu, that being the Make Lesson option. When this is selected, you receive a screen which allows you to enter your own characters and words for Character Attack or Word Attack.

The graphics and sound effects in Type Attack are excellent. All in all the cartridge is an excellent addition to your educational or game library. I would definitely rate it as an 8 or 9.

Type Attack is from:
SIRIUS
10364 Rockingham Dr.
Sacramento, CA 95827
U.S.A.

When it becomes available in the fall, we hope to do a review of another typing program that we saw at CES. It is by Epyx and is called 9 to 5. -Ed.

QUICKSILVA AND VIRGIN EXPANSION ANNOUNCED AT CES

The British are coming! The British are coming!

It is a phrase that does not mean much on the Canadian scene but it once struck fear into the hearts of the ancestors of our American readers.

Today, it is joyful news, except perhaps to a few large software suppliers who do not feel they really need a new large and powerful competitor.

The breakfast was nice and the conversation was enlightening. One of the boons of being a member of the editorial press is that you get invited to all these nice social functions. I won't bother you with details about the menu but you might be interested in some of the other enlightening details that I have learned.

A company named Virgin has now teamed up with Quicksilva, the Game Lords of Britain. Their North American offices are in San Antonio, Texas. You may not have heard of Virgin (I must admit I was innocent until the breakfast) but they are very big in Britain.

I told their salesmanager that I was reminded of the new receptionist who first day on the job in Washington was confronted by the Ambassador from the Virgin Islands. She ran into her boss's office and said, "Sir! Sir! The Virgin Ambassador is here." "Send her right in" the boss replied. "I didn't know there was one."

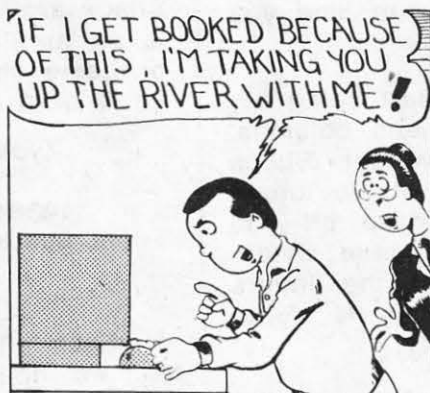
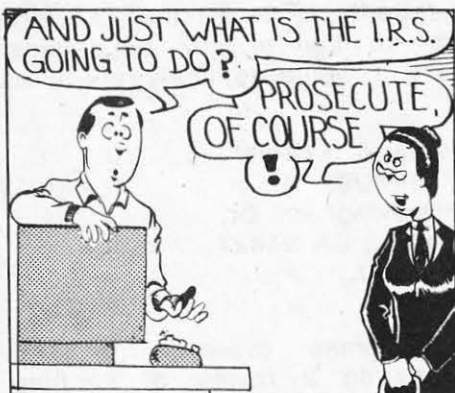
So, if you didn't know there was a Virgin company it may interest you to know that they are one of the world's leading record companies. Among their roster of artists are; Boy George and Culture Club, The Sex Pistols and in the U.K., Genesis plus many others.

Virgin is truly a corporate giant in Europe and owns many well know subsidiaries, among them an airline. They may truly be a financial power with which to be reckoned.

We look forward to reviewing some of the Quicksilva and Virgin games in forthcoming articles of The TORPET. British software has rightly won worldwide acclaim.

Garbyte

by DAN SLOAN



THE BEST OF BOTH WORLDS

VIC vs 64

Steve Garmon
Houston, Texas

There is no doubt in my mind that the VIC is still the cheapest and best way to get into computing on a true microcomputer. Even with its memory limitations and 22 column screen, it is a very useful machine limited only by the imagination (and sometimes the budget) of the user. It has been sufficient enough to keep me happy for a long time and I am still finding new uses for it all the time.

I have used a VIC for everything from a dedicated printer interface for another computer to a 27K word-processor. It is extremely versatile with respect to its 4 large blocks (8K each) that are set aside in the unexpanded VIC for use as the owner sees fit. If he needs the extra RAM memory then he can purchase it in several different sized cartridges ranging from 3K to 27K and more! There are 2 separate areas set aside for input/output expansion that I have used for things like printer interfaces, voice synthesizers, and even a 2K EPROM that held some machine language routines which I used often.

With a little imagination, a lot can be done with a VIC and I intend to keep on using mine as long as I can. I just can't beat the price for the capabilities that it gives me. On the other hand, if the user starts needing large amounts of RAM, or if he needs a 40 column screen, then he has to decide between an expanded VIC or a 64.

In most cases, a person would spend more money trying to expand a VIC to fit his needs than he would if he bought a 64 to start with.

There are some trade-offs though. The 64 has 64K of RAM built-in which eliminates any need for expanders. It also has a 40 column display but, in some cases, this could be considered a disadvantage. In school classrooms, the 22 column display offered by the VIC-20 is easier to read for small children.

Reprint from CHUG (The Computer Houston Users' Group magazine)

I think that I could sum up the differences between the VIC and the 64 by saying that the VIC was built with the hardware person in mind while the 64 was built with the programmer in mind.

Of course, I have no way of knowing exactly what Commodore, International had in mind when they designed either one of these fine machines but the descriptions I just gave seem to fit very well. I finally had to get involved with the 64 because of a job-related application. The application that I am involved with needs a very accurate real time clock. The built-in clock on both the VIC and the 64 was determined to be not accurate enough because they are software clocks and they are dependent on system software to keep them updated. I had two options. I could spend about \$130 on a plug-in card for the VIC or I could buy a 64 which has 2 built-in hardware clocks. The price of the VIC with plug-in card would be about \$220. Needless to say, I bought the 64. In this situation, the 64 heavily outweighed the VIC in terms of price/performance ratio.

So, I have entered the world of the programmer and I am having to learn the intricacies of the 64. I'm sure that with time I will become as familiar with it as I am with the VIC and when I do I will be telling you about it in this newsletter.

By the way, I couldn't leave the computer store without at least one of the excellent games for the 64, could I? I bought a copy of "JUMPMAN" and let me just say that I WAS IMPRESSED! You will have to have a disk drive to play this game because, according to the salesman, it is not available on cartridge or cassette. It was definitely the friendly way to start out a good friendship between myself and the 64.

After all, isn't it supposed to be the 'USER FRIENDLY COMPUTER'?

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SpellPack

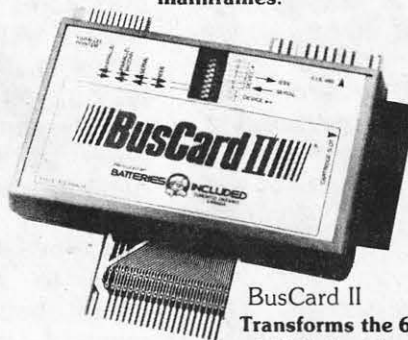
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The
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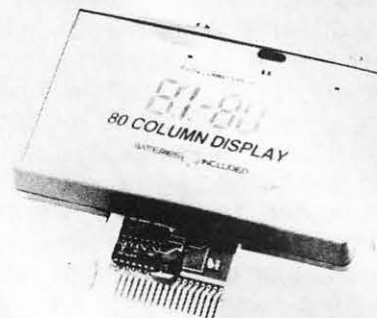
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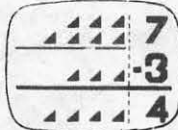
C-64 VIC20 ATARI

CHILD DEVELOPMENT SERIES

(for the 3.5K VIC and
16K ATARI)



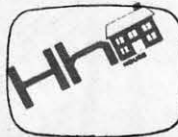
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STORAGE CONCEPTS

Robert Dray
Peterborough, ON

DATA STORAGE

Information is stored in the form of "files" on magnetic media, (cassettes or diskettes), and there are two main types of files: program files and data files. A file may be thought of much as you would a physical filing cabinet in which you open the file and add or remove some of the records, and then close the file. The major unit is called a file, and these are divided into smaller units called records, which in turn are divided into fields. If the file contained student information, then one record might have all of the data on a specific student, and the fields within that record would be the specific data on that student. The size of the single file is limited only by the amount of space on the device that contains the file, although the size of records or fields may be limited depending on the type of file which has been formed.

When you save a program, you are creating a program file, and the limit on the size of these files is obviously the amount of memory in your computer. When you load this type of file into your computer, the computer sorts out the file and puts everything in the correct places in memory. With data files, you must decide on the structure or arrangement of data in the file, and you need to know this arrangement to be able to retrieve the data. It's just like going into a new situation and trying to use someone else's filing system. Until you find out how it's organized, you cannot use it to file or retrieve data efficiently.

When one starts to use cassettes and/or disk drives in programming, life becomes a little more complicated. To output data to either of these devices, you must open a channel. The channel is given a specific number (1-255), which is called the "logical file number", and is

opened to a specific device. Cassettes are given device numbers 1 and 2, for the two cassette ports, while the disk drive is given device number 8. Either of the physical device numbers may be changed by altering the wiring in the particular piece of equipment. The command "OPEN 4,4" opens logical channel #4 to device number 4 (the printer), and the command "print#4,a\$" will send the character a\$ to channel #4 which was previously opened to the printer. In a similar manner data may be sent to or received from disks and cassettes.

Because of the nature of the cassette tape, the data stored on it must be of a sequential nature, that is one item is stored after the next, and to read item 34, you must read items 1 to 33. Each file on cassette begins with a header and ends with an end-of-file mark. The end-of-file mark causes the status to register as 64, and so you can use this to check for the end if you are reading data from a cassette file. The operator (that's you) must assume the responsibility of setting the tape recorder so that it is in the proper position to store the file.

The format for opening a cassette file is the following:

```
OPEN lf,dn,sa,"name"
```

Where: lf is the logical file number of your choice (1-255)

dn is the device number -- 1 or 2

sa is the secondary address to specify operations (0-read only, 1-write only.)

"name" is any 16-character name of your choice.

DISKETTE STORAGE:

A diskette is made of a polyethylene derivative and coated with a magnetic recording emulsion, and is stored in a

GENERAL

protective envelope. An oval slot allows the read/write head of the drive unit, access to the magnetic surface. There is another small hole in the envelope, called the index hole, which will line up with a similar hole in the diskette. The drive unit uses this hole to position itself on the disk. A disk with a single hole is said to be "soft sectored", and one with many holes is "hard sectored". The diskettes rotate at 300 rpm and have a useful life of 30,000,000 passes per track, which is about 7 days constant running.

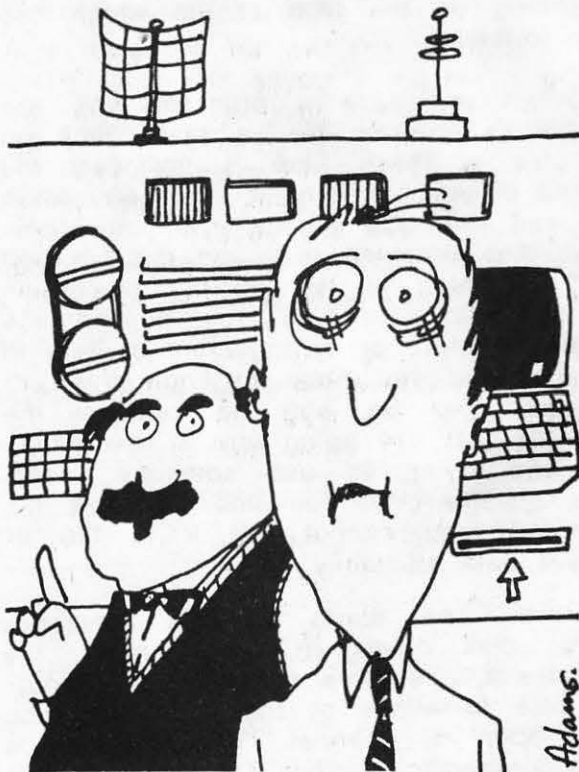
The surface of the diskette has been divided into a number of concentric circles called tracks. The number of tracks depends on the disk drive; for example the 4040 sets up 35 tracks while the 8050 will set up 77. These tracks are then divided into sectors, with each sector capable of storing 256 bytes of data. Most disk drives have the same number of sectors in all tracks, which makes the inner tracks crowded and leaves gaps in the longer outer tracks. The CBM system puts more sectors in the outer tracks (21 as opposed to 17 on the inner ones), and in this way uses more of the diskette surface. The 4040 disk drive has a total of 690 sectors (blocks), while the 8050 has 2087. This gives the user 170,180 or 527,812 bytes of storage per diskette.

Files are not stored sequentially on a diskette, but use a different method, which means that the disk drive can go directly to a specific file without first reading all the previous files. This makes disk operation much faster, but there must be a very good record-keeping job done to keep track of where everything is.

Two of the tracks are used by the system for indexing the diskette. The disk drive sets up a Block Availability Map (BAM), for each disk which indicates which sectors are free, and then stores this on track #17 (on 4040 disks). Track #18 is used to store the directory. When a file is saved to disk, it must be given a unique name which is then stored on track 18 in the directory. Along with the name is stored the address of the track

and sector where the program is stored. The program is not stored sequentially on tracks, since the space available for the program may have been created by erasing several smaller ones. The directory contains the address of the first part of the program, and the last item in that sector contains the address of the sector containing the next portion of the program. In this way the disk drive locates your file sector by sector, when you instruct it to load or read the file. The disk drive has DIRECT ACCESS to each of the files, although once it has found the file, it must read it sequentially. (This is not true for all types of files).

One disadvantage to disks is that if track #18 become damaged, the drive unit would not be able to find any of the files on the diskette. If your diskette won't give a directory, or load a file, then print DS\$ and the PET will reveal the error message. If you see number 18, then you know that the directory track has a problem.



Don't worry, its bark is worse than its byte!

DATASETTE MICRO-SURGERY

Doug Drake
Ridgeland, WI

After many months of faithful service, my Commodore Datasette suddenly started acting uncooperatively. Up to that point, I'd been amazed at the tape unit's consistency and reliability, but suddenly these past achievements meant nothing -- I was ready to toss it out the window.

Perhaps the only thing that held me back was that I'd just switched from a VIC to a 64. My first 64 was defective, and I'd had to return it for another one. Perhaps there was some obscure problem in my second 64 as well? There was just enough doubt in my mind to let me step back and analyze the situation.

My patience paid off in the form of a simple solution. If you have the same problem, perhaps this will save you a trip to the repair shop.

The problem was that the Datasette was shutting itself off. I would begin a LOAD, and everything would progress normally for a while. When the tape stopped (so the 64 could display "Found Program") and then started again, an ominous clicking noise would begin. After a few seconds, the PLAY button on the Datasette would pop up, and the tape would come to a screeching halt.

Needless to say, the LOAD was unsuccessful. When I held the PLAY button down by brute force, the tape ran a little longer, but the result was the same -- an unsuccessful LOAD.

I began my effort to solve this problem with the standard Datasette maintenance operations. I gave the unit a thorough cleaning to remove all the dust, cleaned the heads with a commercial cassette head-cleaner, and moved the unit as far as possible from the monitor.

When these efforts were unsuccessful, I opened up the unit and lubricated (very

lightly) all of the appropriate moving parts. The problem remained.

With that, I decided to shift gears a bit, to focus on defining the problem rather than blind attempts to solve it. Since the stopping and starting of the Datasette motor was obviously a contributing factor, I wrote a short program to write and read a data file. The file was long enough to force the motor to stop while the cassette buffer emptied.

I studied the still-assembled Datasette's innards from top to bottom as my test program ran. I found a series of levers and springs which caused the clicking noise I'd heard. These were connected to a small, white piece of plastic located on the top side of the mechanism, between the Erase Head and the Read/Write Head (see Diagram 1).

This plastic piece moved forward, toward the tape, along the Read/Write Head. It slipped into a small slot in the cassette. When I pushed the PLAY button (without a cassette in the unit), and then pushed backwards on the plastic piece with a pen, the unit shut itself off! The purpose of this set-up is to turn the Datasette off at the end of your tape.

I tried my test program once again. But this time I pushed that plastic piece toward the tape as the data was written, and this time it worked! I tried to read the data, again applying pressure, and again I was successful.

Obviously, it was time for some Micro-surgery.

The only tools required for this procedure are needle-nose pliers, a small Phillips-head screwdriver, and a flathead screwdriver. First, unplug the unit from your computer, turn it over and remove the

HARDWARE

four Phillips screws from the bottom. Turn it right-side-up and lift off the top cover. Now, simply grab the offending plastic piece with the pliers, and push down on the metal base below with the flathead screwdriver. Slowly and gently, move the pliers back and forth as you pull upward. Be sure you push down with the screwdriver so you don't bend the metal base.

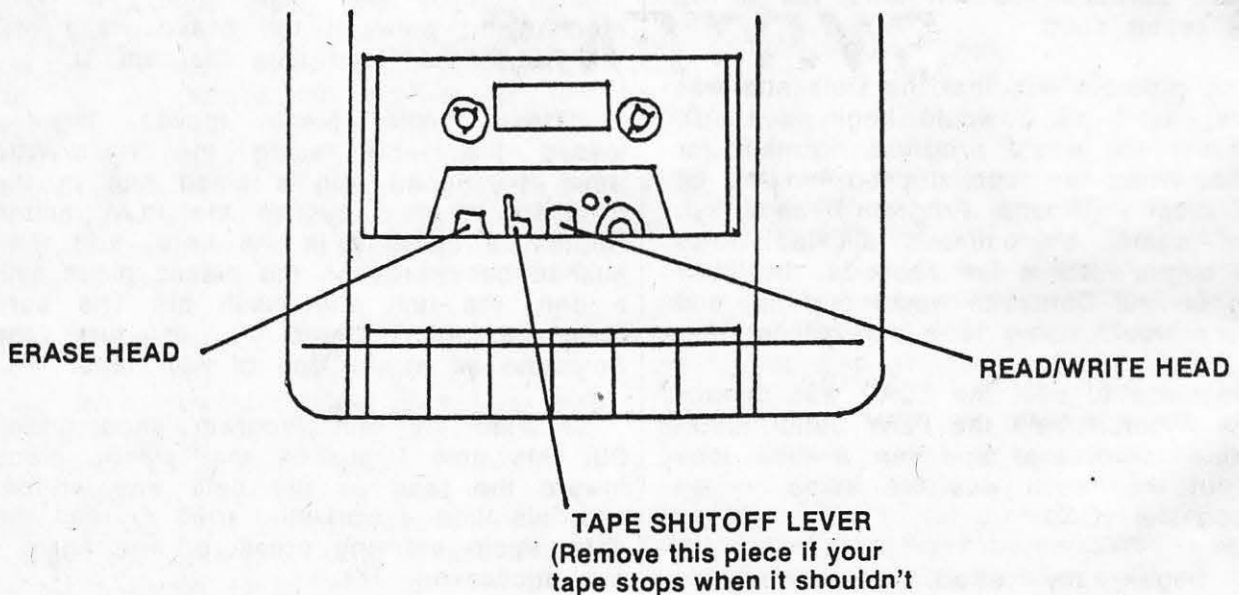
It took me about five tries of sliding the plastic piece upward, little by little, before it finally popped off. Be gentle and patient. Now re-assemble your Datasette, making sure the cord in the back fits into its slot when you replace the cover.

After this minor surgery, my Datasette

once again works just fine!

As to whether the piece I removed is really necessary, I think not. I examined some other cassette tape players and they didn't have anything similar, so it isn't needed to keep the tape aligned on the heads. My unit won't automatically shut itself off at the end of a tape anymore, but how often do you get all the way to the end of a tape anyway? Plus, you can always write a file with an EOT marker at the end of the tape (Secondary Address 2), and the computer will stop the tape motor for you.

Thanks to micro-surgery, my Datasette is once again its old, reliable self.



THE FOLLOWING PAGES CONTAIN AN:

R T C
SPECIAL
EDUCATIONAL
SYSTEMS
SECTION

WITH THIS ISSUE, OUR SECOND SPECIAL EDITION FOR SCHOOLS, WE WISH TO THANK RTC FOR THEIR GENEROUS SUPPORT.

RTC has always been a prominent supplier in the educational computer field and it is only fitting we salute them with this special section in this special edition.

RTC & PETER SMITH

James Allen
Richmond Hill, ON

"I feel very good when a customer says, 'I've got your product and I really like it.'" -- Peter Smith

Three years ago, when I caught the computer bug, I bought my Commodore/RTC word-processor in Peter Smith's TV store. At that time there were only two or three full-time employees.

When I retired from teaching this year, I ran into Peter in the shopping plaza and asked him if he had anything for me to do. I haven't sat down since. Like a number of other former customers, I've gone to work for Richvale Telecommunications.

Shortly after coming to work for Peter, I asked him what brilliant foresight had led him into computers. "My brother bought fourteen computers", he said, and I had to do something with them". What he did was let high school students from nearby schools use some of the computers. The interaction of Peter Smith and these young programmers was the basis of Richvale Telecommunications.

Now, in the sales office, it is no novelty to hear the PA call out, "Sales, line two -- Phoenix, Arizona." Or, "Sales, line four -- Oslo, Norway". The TV store has turned into a global business.

RTC is a mythical place. It has some of the elements of a dream. Marshal McLuhan would have been able to explain why the production of the highest of hitech intangibles -- computer software -- has taken the form of a tribe. Somehow, in order to take the next hurdle in our cultural evolution, we have to back up and take a run at it, and, in doing so, regress to an earlier social structure -- the extended family of the primitive tribe.

There are about fifty of us at RTC (from Richvale TeleCommunications); it might better be known as "Peter Smith's place". To the casual observer, RTC appears to be a computer retail outlet which has somehow got spread all over a small shopping plaza in the exurbia of Richmond Hill, Ontario. There is much, though, that doesn't meet the eye. The story of Peter Smith's place is the story of



The TORPET Editor congratulates Peter Smith on the opening of one of his five stores.

the incredible technological revolution that our whole society is going through.

While RTC is unique in its collective tribal personality, there appear to be similar small companies all over the continent. What is happening is that entrepreneurs of all kinds -- typewriter store owners, real estate salesmen, ma-and-pa" teams -- sniff out an area of opportunity and move into it.

In computers, the people who make the hardware are already well-established as a diminishing number of mature corporations. In between are glossy downtown middle-sized firms that have grown successfully from an entrepreneur's vision to a visible fact. Scattered around are many enterprises, like Peter Smith's RTC, that have discovered a niche and are going through the painful metamorphosis from a small one-man operation into an expanding middle-sized organization with many irons in the fire.

It isn't surprising that the first and most creative stages in the evolution of hitech enterprises should be tribal and mythic. This is simultaneously the source of their power and a tightening restriction on their further growth.

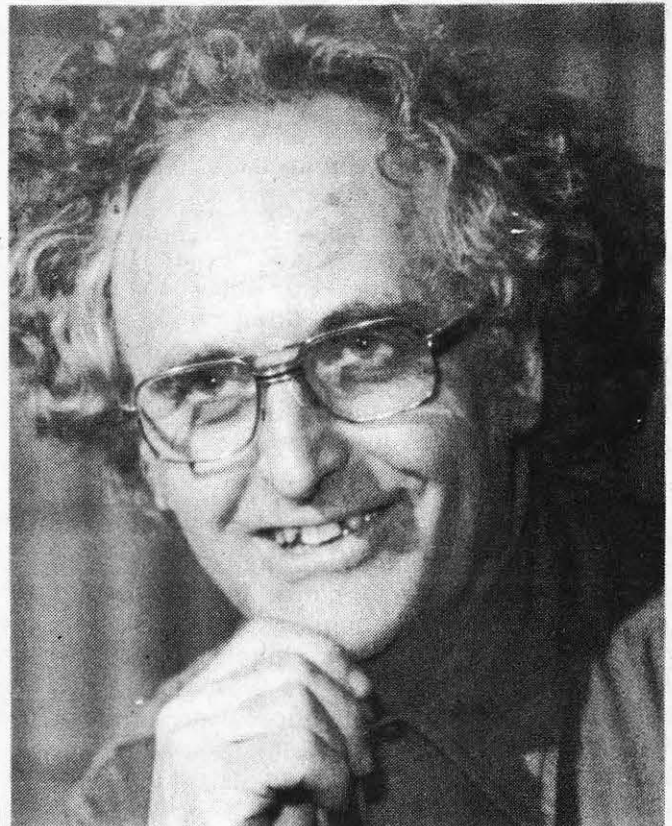
To know RTC, you have to know Peter Smith. Peter is Mr. Green-Jeans, that big, competent, reliable repair man who started a TV store in a small town near a big city in the mid-fifties. The TV store did well enough for Peter and his wife Barbara to raise five children. When small computers came along five years ago, they began a transformation from the TV store into a company with over fifty employees and a seven-figure gross.

On first encounter, unless you looked closely, you'd never take Peter Smith to be a company president. In the same sense, you'd never know what RTC really is by observing the visible activity. A lot of what goes on is all but invisible. You'd see an unusual number of people hurrying around the plaza with paper or boxes in

their hands. You would notice this particularly as the weather gets colder and the RTC people don't bother to put on coats to go a few stores down the row.

Like an archeological dig, the stores and offices that house RTC tell the story of its growth. In the plaza, there are now six locations that have been taken over by RTC, most of them in the past eighteen months.

The nerve centre of RTC is still the counter of the old TV store. An eccentric system of phones and PA equipment, long since inadequate, dominates a corner of the behind-the-counter area. Often, Peter stands behind the counter talking on two or three phones at once, dealing with customers who want stamps (it's still a post office) or want keys made. Three or four employees will be waiting to get a decision from Peter. He is like a magic juggler who is able to keep a bogging number of objects in motion.



PETER SMITH

Peter is a big, craggy, grey-haired, mercuric, 54-year-old, born-again Christian. His intelligence and energy are formidable. His endurance is unbelievable. He works six days and nights a week, virtually without sleeping, catnapping on the floor for an hour and rarely sitting down for a meal. He does this all the time -- working with programmers at 2:30 in the morning or having a six a.m. sales meeting. He took his first holiday in five years when he and his wife Barbara went to Egypt and Israel recently.

The striking thing about Peter Smith is that he is just what McLuhan said post-industrial, information-age man would be like. The electronic-age man would turn back from the man-of-the-eye into the man-of-the-ear. Peter is a man-of-the-ear -- the pre-literate tribal chief. He is a biblical prophet leading his people into a new technological promised land. He nags and drives and quarrels -- but things happen all around him.

Peter is keenly aware of his lack of formal education. He left school in Grade Nine. But it is a good guess that further academic schooling would have blunted his natural genius.

It is fascinating to see Peter function virtually without paper. He will read something and then put it down and lose it unless it somehow gets into a box in the basement labelled "Peter" and containing correspondence. It might as well go to the wastebasket because it will never be consulted.

Peter carries everything in his head. He is perfectly portable. Often he is carrying on four or five major projects at a time, moving from office to store, from person to person, answering questions and challenging them to new efforts, much of the time talking at the top of his voice, his enthusiasm impelling the people around him. He knows the telephone numbers of everyone the company deals with, the price of everything, and the location of every silicon chip in the inventory. He is aware of the detail of virtually everything that is going on.

Of course, there are limits to what even a man like Peter can do. Like the buildings that house the company, Peter is always on the verge of outgrowing himself. There are signs right now that RTC is at a juncture in its growth that is critical. It is at a point where traditional business wisdom requires that it must "rationalize" its activities. That is, it must evolve from a creative chaos that spins off dozens of new ideas a month to a "rationalized" business that manages its cash coherently and gets its exponential growth under control.

This is the central issue. Is it inevitable that a social mini-system like RTC, the inspiration of a single individual, will sacrifice some of its intuitive, proliferating creativity in order to grow past its present critical size? Peter has already turned the plaza into a kind of computer village. In a year, he wants RTC to have double its number of employees and treble its gross sales. He wants to employ the unemployable. He wants to build a school to bring Third World students to Canada in order to transfer computer technology to the developing countries. Peter shares Servan-Schrieber's World Challenge dream of a more humane, technologically-transformed planet Earth.

While he speaks of Armageddon as fact beyond argument, Peter plans for a world of peace, plenty, and human dignity.

In a sense, Peter's tribe of employees represents a multi-cultural, comparatively harmonious world. There are young and old; black, white, and yellow; school-educated and drop-out self-educated. At its present stage of evolution, RTC is not democratic in making decisions. Peter is benevolently tyrannical. He relates directly to every employee, full of praise for work well-done, but a little frightening in his anger if things are not done properly.

RTC now has a number of embryonic "profit-centres", more or less autonomic activities. A huge printing copier

dominates an extension of the TV store. Under the TV store there is a repair section where TV's and computers are serviced; it is here that some employees attend morning school on electronic repairs.

A basement nearby houses a small factory where a dozen people are a tiny cross-section of our new racial and cultural mix. They joke in a number of languages as they assemble electronic boards and cables by hand. It is exacting work that calls for close and intelligent attention. One mis-soldered connection and an expensive board is ruined.

Down the hall from "manufacturing" is a busy shipping department.

Next door is RTC's Software Store. Here, individuals come to buy computer books and magazines, and software and accessories for their computers. Downstairs, in the Software Store, is a substantial inventory of computers, monitors, disk drives, and printers.

Several doors along, a former bank is occupied by the sales department. In an office-like setting, the mostly-young sales staff deals with schools, businesses, and individuals who are buying computer systems. It is a busy place, rising to a crescendo of activity as the week progresses.

In the basement of this building are to be found the young programmers. They are mostly still in school and tend to appear in the afternoon and evenings. Peter's theory is that a programmer's best years are from fourteen to eighteen. During that time, the young programmer doesn't know that "it can't be done"; after that period, he is over the hill.

Recently, a suite of real estate offices has been taken over for the accounting, expediting, and general administrative activities. The process of expansion shows no signs of slowing down.

What is truly invisible is the expansion of RTC's export business. Realizing that a fledgling company like RTC would



Peter Smith

only make the critical transition to maturity if it had essential financial resources. Vice President Vic Kass sought foreign buyers and quickly developed a large US market for RTC software and hardware accessories (such as the "64 Link"). It is on this financial foundation that the new organization has been built.

It has been predicted that within less than a decade the computer business will be on a par with the automobile industry. If that is so, much of the growth will undoubtedly take place in the small business sector as entrepreneurial enterprises like Peter Smith's RTC recognize opportunities and move in to exploit them.

Far from reducing employment, microcomputers have brought RTC from ten employees a year ago to over fifty today. In that period, a full-time printing department, an art department, translation services, a set of administrative offices, and a branch store in Peterborough have been added to Richvale Telecommunications.

Some of the new companies that enter the computer field will not make the transition because the skills of the small entrepreneur are not necessarily those required to manage a maturing business organization. However, government seems to recognize the importance of companies like RTC and is prepared to offer advice, funding, and critical financial services. More important than this is the vision of the people involved in RTC. Intuitively, they know that they are involved in something of fundamental importance.

DISK DRIVE ENHANCEMENTS

RTC
SPECIAL
EDUCATIONAL
SECTION

SuperCopy

Single Drive Disk Utility Package

The **SuperCopy** program takes between 2 and 7 minutes to backup a disk on a single drive. SuperCopy is a set of disk utility programs for the Commodore 1541 or 2031 models single disk drives. It is menu-driven and very user-friendly with frequent on-screen prompts and an attractive screen.

SuperCopy has a change unit address feature that allows copying and duplicating with 2 single disk drive units.

Features Include:

Complete disk maintenance commands

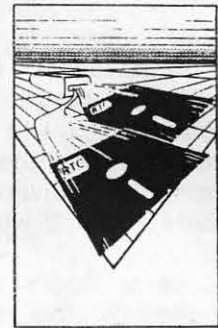
- Header
- Backup
- Rename
- Copy
- Scratch
- Catalog

Full pattern matching

Frequent, thorough prompts

Continuous display of disk status, unit numbers and free disk space

Check disk speed feature



1541 Express

Single Drive Speed-Up Cartridge

The **1541 Express** cartridge is a plug-in device for the Commodore 64 and the 1541 model single disk drive. The Express cartridge accelerates the 1541 drive to 2 or 3 times its normal operational speed. For example, to load the Script 64 word processing program with a 1541 drive normally takes about 80 seconds. But with the 1541 Express cartridge, Script 64 loads from the same drive in about 33 seconds. This compares with 28 seconds on the 2031 drive.

You can increase the speed of the drive even further with the RTC Fast cable. The Fast cable connects the

computer and the drive to make the Express cartridge work even faster. With a Fast cable in place, Script 64 can be loaded in 24 seconds.

Features Include:

Uses no BASIC memory
Transparent to most commercial software
Switch between Fast and Slow operating modes with 2 keystrokes
Speeds up both reading and writing

PRINTER/PERIPHERAL INTERFACES AND CABLES

VL Series

Peripheral Cables

RTC's "VL" series of cables and interfaces allow you to connect the Commodore's VIC, 64 and PET/CBM computers to a wide variety of peripheral devices. Many of these cables are used along with another RTC product, such as the V-LINK or Link II cartridges.

VL-1 - is a cartridge that you use with a V-LINK and IEEE cables to connect IEEE printers and drives to a VIC 20 computer.

VL-2 - is an IEEE cable for the VIC 20 computer, used with a V-LINK.

VL-3 - is a parallel printer cable for the VIC or C64 computers. Without a V-LINK or Link II cartridge, this cable requires a parallel printer program.

VL-4 - cable connects a VIC or C64 computer to an RS-232 modem.

VL-5 - cable connects a PET/CBM printer to an RS-232 modem.

VL-6 - cable connects a VIC or C64 computer to a Centronics printer, models 730, 737 and 739.

VL-7 - cable connects a C64 computer to the Smith-Corona printer model TP-1.

VL-8 - cable connects a VIC or C64 computer to an RS-232 printer.

VL-16 - cables used with the V-LINK 20-2 or the C64-LINK cartridges to "daisychain" a series of VIC or C64 computers to the same printers or drives.

VL-16-IEEE - connects the last computer in the daisychain to an IEEE printer or drive.

RTC
SPECIAL
EDUCATIONAL
SECTION

RTC I-Link

IEEE Printer Interface

The **RTC I-Link** connects the Commodore 64 to IEEE printers using no extra software.

Features Include:

- Completely transparent to software
- Emulates Commodore's MPS 801 printer
- Locked mode for word processing

RTC S-Link

Serial Printer Interface

The **RTC S-Link** connects the Commodore 64 to RS-232 printers through the 64's serial port.

Features Include:

- Completely transparent to software
- Emulates Commodore's MPS 801 printer
- Produces Commodore graphics characters on dot matrix printers
- User-selectable parity, stop bits, word length handshaking and baud rate from 75 to 2400
- 3-line, X-line and XON/XOFF handshaking

RTC P-Link

Parallel Printer Interface

The **RTC P-Link** allows the Commodore 64 to work with any parallel printer, using no extra software. P-Link connects to the serial port of the 64.

Features Include:

- Epson and Epson compatible printers emulate Commodore's MPS 801 printer
- Complete use of secondary addresses and control codes
- Print Commodore graphics characters
- Design and print special graphics characters
- Completely software transparent

EXPANSION CARTRIDGES FOR THE VIC & 64

C64-LINK II

Expansion Cartridge

The **C64-LINK II** is a plug-in expansion cartridge for the Commodore 64. It uses no BASIC memory and is completely transparent to most commercial software. The C64-LINK II cartridge allows you to connect and use both IEEE and serial devices at the same time. You can connect a serial and an IEEE drive to the Commodore 64 and use them both at the same time. You can also use a serial printer with an IEEE drive, or vice versa. On the cartridge itself, there is an IEEE and a parallel edge connector for easy connection of printers and drives.

Features Include:

- Expands input/output of 64 to use
 - parallel printers
 - IEEE single or dual disk drives
 - IEEE printers or modems
- Upgrades the 64 to work with BASIC 4.0, adding 16 extra disk commands
- Machine language monitor allows user to view and alter the 64's memory addresses
- Cartridge always enabled - uses no switches or SYS #'s
- Cartridge leaves user port free
- Daisychain up to 8 computers to the same printer and disk drive

V-Link Expansion

RTC
SPECIAL
EDUCATIONAL
SECTION

Cartridge : IEEE, Parallel, Basic 4

The **V-LINK** is a plug-in expansion cartridge for the Commodore VIC 20 computer. V-LINK is installed on VIC RAM cartridges, adding the memory in the cartridge to the memory of the VIC.

The V-LINK is also available as a package cartridge with the VicScript word processor.

Features Include:

- Expands input/output of VIC to use
 - parallel printers
 - IEEE single or dual disk drives
 - IEEE printers or modems(IEEE connection requires RTC's VL-1 or VL-2)
- Upgrades the VIC to work with BASIC 4.0, adding 16 extra disk commands
- Machine language monitor allows user to view and alter the VIC's memory addresses
- Interactive terminal mode

V-Link 20-2 Expansion

Cartridge : IEEE, Parallel, Basic 4

The **V-LINK 20-2** is a plug-in expansion cartridge for the Commodore VIC 20 computer similar to the V-LINK cartridge. Unlike V-LINK, the "20-2" cartridge is not installed on RAM cartridges; it adds no memory nor can it be combined with the VicScript word processor. But the 20-2 adds a daisy chaining feature not available with the V-LINK and it has an IEEE edge connector on the back of the cartridge.

Features Include:

- Daisy chain up to 8 computers to the same printer and disk drive
(Daisy chaining requires RTC's VL-16 cables)
- Expands input/output of VIC to use
 - parallel printers
 - IEEE single or dual disk drives
 - IEEE printers or modems
- Upgrades the 64 to work with BASIC 4.0, adding 16 extra disk commands
- Machine language monitor allows user to view and alter the 64's memory addresses
- Interactive terminal mode

C64 Link

RTC
SPECIAL
EDUCATIONAL
SECTION

Expansion Cartridge

The **C64-LINK** is a plug-in expansion cartridge for the Commodore 64. Unlike the RTC Link II, the C 64-LINK does use 8K of BASIC memory. However, all of the memory can be restored by use of "relocator" programs provided with the cartridge. The C64-LINK also has an interactive modem function not available with the RTC Link II cartridge.

Features Include:

Expands input/output of 64 to use

- parallel printers
- IEEE single or dual disk drives
- IEEE printers or modems

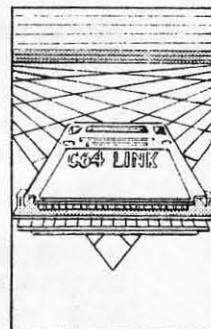
Upgrades the 64 to work with BASIC 4.0,
adding 16 extra disk commands

Machine language monitor allows user to view
and alter the 64's memory addresses

Daisychain up to 8 computers to the same
printer and disk drive

Interactive terminal mode

Relocator programs restore 8K of BASIC memory
used by the C64-LINK



C64 Link Compatibility Board

The **C64-LINK Compatibility Board** makes the C64-LINK virtually transparent to any program. Normally, if the C64-LINK cartridge interferes with the loading or running of a program, you need to use the LINK "Relocator" programs to reposition the LINK in memory. The Compatibility Board replaces the Relocators and allows you to use the many features of the C64-LINK with more programs. Two cartridge ports on the Compatibility Board let you use the LINK at the same time as you run cartridge programs.

Features Include:

Run more software:

- spread-sheets, games, word processors

Ports for 2 cartridges

Use parallel/serial/IEEE printers and drives

CARTRIDGE AND ROM EXPANSION

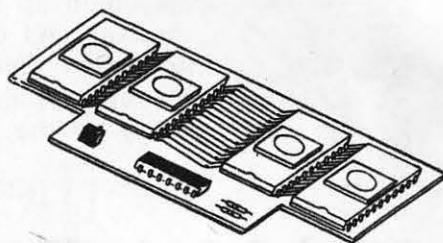
RTC
SPECIAL
EDUCATIONAL
SECTION

1234 ROM Expander

The **1234 ROM Expander** allows you to switch between 4 extra ROM chips in a PET/CBM computer. A number of programs available for Commodore's PET/CBM series of computers require you to place an extra ROM chip in the computer's board. Some of the popular BASIC programming helps, business spreadsheets and accounting packages and word processors use extra chips. If you have more than one of these programs, you have to open the computer up to replace chips each time you want to load a different program. The 1234 ROM Expander allows you to place the chips for 4 such programs in the Expander and switch between the chips without replacing chips each time.

Features Include:

- Use up to four ROM chips in each board
- Switch easily between ROM chips
- Externally mounted switch cuts down on need to open computer
- Switching configuration ensures only one chip selected each time
- Cuts down on chip handling and damage



E-P ROM Carrier

Expander Board

The RTC **E-P ROM Carrier** allows you to plug extra chips into the expansion port of the Commodore 64. The chips are placed in the Carrier, then the Carrier is inserted into the computer.

Carries ROMS, PROMS or EPROMS
Available in 2K, 4K and 8K chips
Available with or without case

Sample applications:

- BASIC extensions
- Graphics add-ons
- Business utility ROMS
- Software protection

C64 Motherboard

RTC
SPECIAL
EDUCATIONAL
SECTION

Multi-Cartridge Expander Board

The **C64 Motherboard** is an expander cartridge for the Commodore 64. It allows you to plug four cartridges in the 64 at a time. The Motherboard plugs into the 64's expansion port.

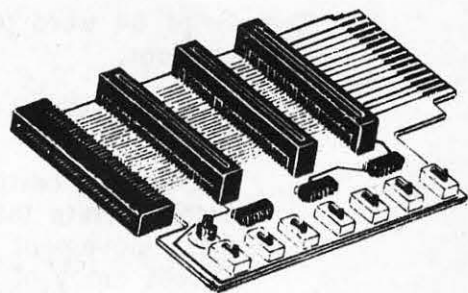
Features Include:

External switches allow easy switching
between cartridges

Use up to 4 cartridges in the 64

Sample applications:

- Link II
- Game cartridges
- CP/M cartridge
- 80-column board



Vic 20 Motherboard

Multi-Cartridge Expander Board

The **VIC 20 Motherboard** is a plug-in expander for the Commodore VIC 20. The Motherboard adds no memory or features by itself, but holds up to 3 additional cartridges for switching into memory as you want them. The Motherboard allows you to use a V-LINK cartridge, RAM expansion cartridges, games or any other cartridges - all plugged in at the same time.

Features Include:

Easy switching between cartridges

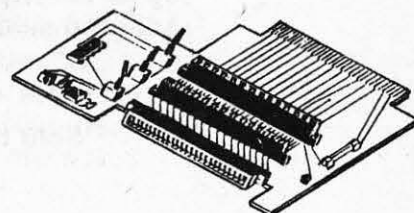
Use up to 3 cartridges in each board

Use multiple motherboards

Built-in fuse

Reset button for VIC

Takes VIC power supply or 9V DC input



WORD PROCESSING AND MAIL LIST PROGRAMS

RTC
SPECIAL
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SECTION

Script 64

Word Processor

Script 64 Version 2.3 contains two word processors: Script 64 and Script 64/80. Script 64/80 turns the 64 into an 80-column word processor. It requires no extra hardware for the 80 columns, but is compatible with both the Link II cartridge and the Video Pak 80 cartridge by Data 20.

The Script 64 word processor is available in both disk and tape versions.

Editing Features:

- Full-screen editing
- Insert/Delete letters, words, lines, sentences
- Text movement
- Direct entry of French text
- Centering text, tabs and user-created index
- Page-turning editing concept - scrolling file

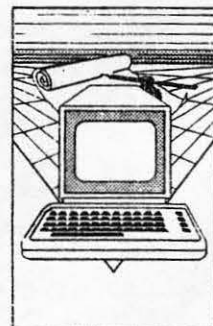
Printing Features:

- Parallel, Serial and RS-232 printers
- IEEE printers with Link II
- Side scroll to 80 columns on video print,
or use Script 64/80 for 80-column display
- Print format commands in separate control map
- Underlining, bold print and italics print
- Superscripts/subscripts
- Justification, indentation, spacing, pitch,
titles and page numbering
- Multiple copies

Special Features:

- Global search and replace
- User-created dictionary/spelling checker
- Merge with sequential files or Scratchpad data
- Up to 20 variable names for insertion in text
- Add and subtract columns of figures

Sold together with Scratchpad 64



Word Processor

The **RTC 4** Word Processing program is easy to learn and use. Simple enough to be ideal for home or school use, **RTC 4** is powerful enough for the office. **RTC 4** is available in separate versions for the Commodore 4032, 8032 and SuperPET computers.

Editing Features:

- Full-screen editing
- Insert/Delete letters, words, lines, sentences
- Text movement
- Direct entry of French text (with French ROM)
- Centering text, tabs and user-created index
- Page turning editing concept - scrolling file

Printing Features:

- Works with wide variety of standard printers
- Print format commands in separate control map
- Underlining, bold print and italics print
- Superscripts/subscripts
- Justification, indentation, spacing, pitch, titles and page numbering
- Multiple copies

PC Script

Word Processor

The **PC Script** Word Processing program runs on both the IBM Personal Computer and IBM compatible computers. **PC Script** takes full advantage of the many features provided on the PC's keyboard. The program requires 128K of memory and will work with any released version of DOS.

Editing Features:

- Full-screen editing
- Insert/Delete letters, words, lines, sentences
- Text movement, centering text, tabs to 160 columns
- Direct entry of French, German and Spanish characters
- Add/subtract figures down or across the screen
- User-created dictionary/spelling checker for quick check of spelling in text
- Read Wordstar files or any ASCII file
- Global search/replace feature checks for multiple items of text, uses wild card characters

CON'T...

Printing Features:

Drives a wide variety of standard printers
Print format commands in separate control map
Side scroll to 160 characters in video print
Underlining, bold print and shadow print
Superscripts/subscripts
Justification, indentation, spacing, pitch,
titles and page numbering
Footnotes
Backspace and forced space characters
Multiple copies

RTC
SPECIAL
EDUCATIONAL
SECTION

Other Features:

8-character file names
Alphabetized directory
Merge word processing data with dBASE II data
- up to 32 variable names in text
Help screen lists all functions
Use RAM drive for faster disk access

VicScript

Word Processor

VicScript is RTC's word processor for the VIC 20 computer. It is similar in operation and appearance to Script 64, and data created with VicScript is compatible with Script 64. The program is installed in ROM chips on VIC RAM cartridges, leaving the VIC's memory free for word processing data.

Editing Features:

Full-screen cursor editing
Insert/Delete letters, words, lines, sentences
Text movement
Tabs and user-created index

Printing Features:

Parallel and serial printers
IEEE printers with RTC's VL-1 or VL-2 cables
Print format commands in separate control map
Underlining and bold print
Superscripts and subscripts

Special Features:

V-LINK compatible
Tape or disk storage

available on tape disk & cartridge

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INVENTORY

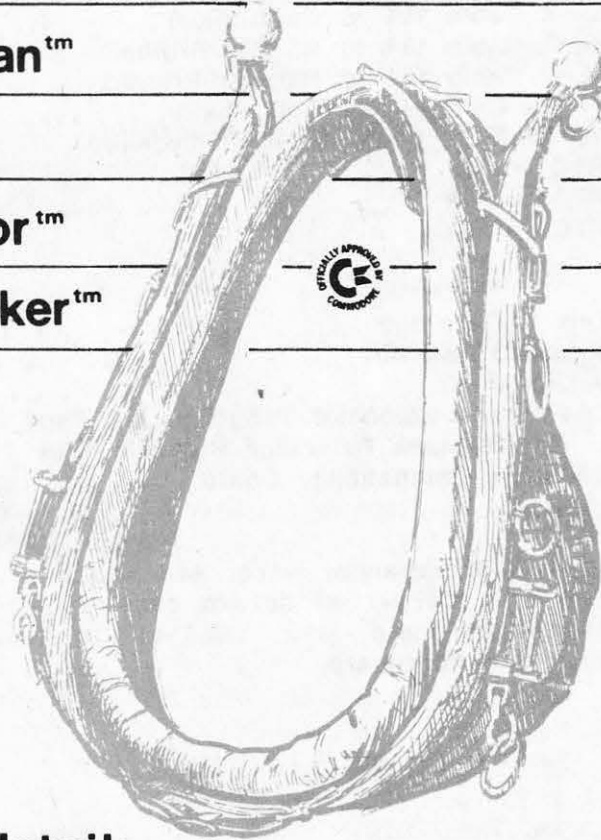
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RTC Canadian Price

Complimentary catalogs

1541 Express Cartridge	79.00
SuperCopy	39.95
VL-1 (VIC to IEEE with V LINK)	19.95
VL-2 Cable (VIC to IEEE)	60.00
VL-3 Cable (64 to Parallel)	60.00
VL-3 Parallel Printer Tape	15.00
VL-4 Cable (64 to RS-232 Modem)	60.00
VL-5 Cable (PET to RS-232 Modem)	60.00
VL-6 Cable (64 to Centronics)	60.00
VL-7 Cable (64 to RS-232/Brother)	60.00
VL-8 Cable (64 to RS-232 Printer)	60.00
VL-16 Cable (LINK Daisychain)	60.00
VL-16 IEEE Cable (LINK Daisychain)	60.00
RTC I-Link	159.95
RTC S-Link	159.95
RTC P-Link	129.95

Link II Cartridge	149.95
V-Link 3K/8K/16K	185.00/215.00/285.00
V-Link 20-2	185.00
C64-Link w/Relocator Programs on Tape	185.00
C64-Link Relocator Program Disk	10.00
C64-Link Compatibility Board	99.95

1234 ROM Expander w/ or w/o switch	69.95/59.95
E-P ROM Carrier w/ or w/o case	9.95/6.95
C64 Motherboard	99.95
VIC 20 Motherboard	79.95

NOTE: Prices subject to change without notice.

Price List (May 1, 1984)

are available on request

Script 64/Scratchpad 64 package	129.00
Dictionary Disk	25.00
RTC 4 Word Processor 4032/8032/SuperPET	129.00
PC Script Word Processor	275.00
VIC Script 8K/16K	185.00/285.00
V-LINK & VIC Script 8K/16K	315.00/385.00
Scratchpad 4032/8032/SuperPET	79.95
Scratchpad 64 (no key)	50.00
Recreate 64/PET	24.95

Intelterm 64	59.95
RTC Multi-Link Network Master Board	399.99
RTC Multi-Link Satellite Cartridge	149.95

(NOTE: Complimentary Multi-Link manuals are available to interested customers)

Basic Aid 64	49.95
SuperBASIC 64	46.95
COLOR 80	59.95

Draft-Aid CAD System	395.00
General Ledger History Program	295.00
Space Gunner	31.95
Planet Quarx	31.95
914 Interface (PET/CBM to Parallel)	195.00

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Scratchpad 64

Mail List / Database

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Scratchpad 64 is a database/mail list program for storing mail lists and addresses or any other data organizing function. It is suitable for both single or dual drives and fully compatible with RTC's C64-LINK or Link II cartridge. Scratchpad 64 is ideal for printing labels or envelopes. Data created with the Scratchpad 64 program can also be merged with Script 64 word processing data to produce hundreds of personalized letters from a single document.

Separate versions of this program are also available for Commodore's PET/CBM series of computers.

Editing Features:

Formats disk in series of "Screens"
Each Screen has 20 lines, each line with
space for 30 characters
Each line used for a different type of data
Continuous record number display
Continuous display of line definitions
Screens stored in alphabetic or numeric order
around one selected line entry
Global search on any line

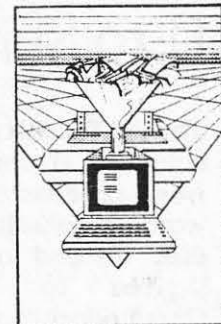
Printing Features:

Use parallel or serial printers
IEEE printers with Link II
Works with any standard printer
Print any, all or selected Screens of data
Print data in any column across page
Ideal for labels or envelopes

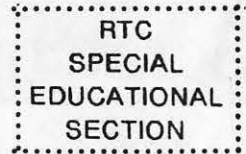
Disk Features:

Backup feature with single disk drive
Full disk maintenance features
- Backup on dual or single drives
- Data automatically saved to disk
- Disk split feature allows mail list to expand
over several disks in alphabetical order

Sold together with Script 64



Scratchpad



Mail List / Database

Scratchpad is a mail list and database program for storing mail lists and addresses or any other data organizing function. Scratchpad is ideal for printing labels or envelopes. Data created with the Scratchpad program can also be merged with RTC 4 word processing data to produce hundreds of personalized letters from a single document.

Editing Features:

Formats disk in series of "Screens"
Each Screen has 20 lines, each line with space for 30 characters
Each line used for a different type of data
Screens stored in alphabetic or numeric order around one selected line entry
Global search for data on any line

Disk Features:

Full disk maintenance features

- Backup
- Disk format
- Create disks with selected information from master disks
- Data automatically saved to disk
- Disk split feature allows mail list to expand over several disks in alphabetical order

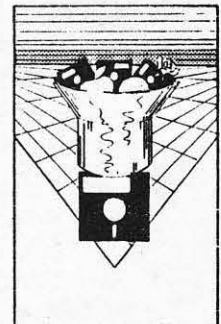
Printing Features:

Works with any standard printer
Print any, all or selected Screens of data
Print data in any column across page
Ideal for labels or envelopes

RTC Recreate

ASCII to Script 64 File Conversion

The **RTC Recreate** program takes any ASCII file and converts it into a format readable through the Script 64 word processor. ASCII files can be created on any good word processing program by sending the output to the disk instead of to a printer. However, Recreate is not limited to working with ASCII files created by Commodore computers. An ASCII file can also be



created by outputting a file from any computer over a modem to a Commodore disk drive.

Separate versions of this program are also available for the Commodore PET/CBM series of computers.

RTC
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SECTION

COMMUNICATIONS AND NETWORKING

IntelTerm 64

Terminal Program

IntelTerm is an intelligent terminal program for the Commodore 64 and RS-232 modems. It will operate with both Commodore Bulletin Board Systems and mainframe computers.

Features Include:

- Upload/download files
- 40 or 80 column display
- 4 character sets
- Uses serial, or IEEE printers (with Link II)
- User-definable keys
- Set baud rate, stop bits, parity, bits/character, printer type and duplex from within program
- Save operating defaults to disk
- Full disk maintenance commands
- Screen capture feature
- Screen dump to printer
- Scrolling editor
- Emulates ANSI or VT52/100/101 terminal

RTC Multi-Link Networking

System for the 64 & PET/CBM

The **RTC Multi-Link** networking system allows up to 48 Commodore 64's or PET/CBM computers to chain to the same printers and disk drives. One of the computers in the network functions as a "Master" computer, controlling and monitoring activities on the other "Satellite" computers. RTC Multi-Link is a powerful classroom tool for computer labs in programming, word processing or any other educational application.

Each computer in the network must be equipped with its own Multi-Link cartridge. All Satellite computers in the network are assigned a unique 2-digit number. The Master computer can view any Satellite's screen, check its programming and prevent or allow any Satellite from using the drive or printer.

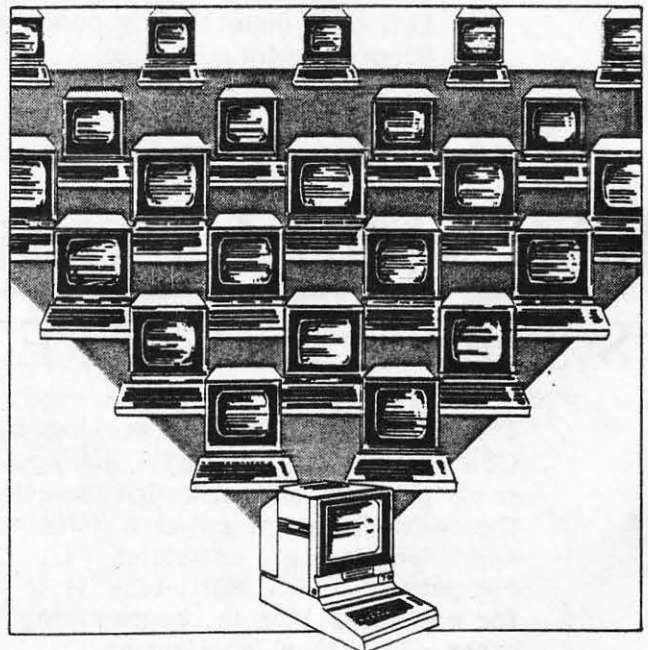
Features Include:

Transparent to most commercial software
Commands spooled to printer and drive
Allows Satellites to work with BASIC or machine language programs,
Send messages from computer to computer
Master computer has option of keeping disk files secured for loading by single Satellite or group of Satellites
Allows use of multiple disk drives and printers
Master computer has full control over all Satellites using commands such as:

DISALLOW - prevents any Satellite from using the printer or drive or both
ALLOW - enables a DISALLOWed command
CATALOG - any disk drive
LOAD - a program from disk or a Satellite
MESSAGE - sends messages from Master to Satellite
QUERY - holds up I/O commands until OK'd by Master
SAVE - program to disk or send it to a Satellite
SCREEN - reads a Satellite's screen to the Master's
ECHO - will display the contents of the Master's screen on any Satellite's screen

RTC
MULTI-LINK™

COMPLIMENTARY COPIES
OF THE MULTI-LINK MANUAL
AVAILABLE UPON REQUEST



Basic Aid 64

Basic Language Expander

Basic Aid 64 is a programmer's development tool for the Commodore BASIC language. Basic Aid adds 30 extra commands to BASIC to make programming in that language easier and more efficient.

Editing Commands:

- Scroll at top or bottom of screen
- Trace through BASIC program, displaying lines as they are executed
- Find/change any variable or string in a program
- Renumber a range of lines, including GOSUB's & GOTO's
- Move a range of lines
- Delete a range of lines
- Merge 2 BASIC programs into one

Disk Commands:

- Read sequential files to screen or printer
- Special load and run commands
- Collect, initialize, header, rename, copy, scratch and catalog disks
- Use pattern matching in all commands

Printer Commands:

- List programs to printer
- Dump single screens to printer

Other Features Include:

- Convert HEX, binary and decimal numbers
- Display size of any program or file
- HELP command to locate errors and problems

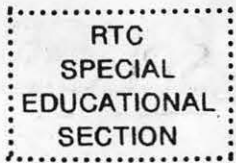
SuperBASIC 64

Basic 4.0 & Expanded Basic

SuperBASIC 64 provides 3 different versions of Commodore's BASIC programming language Version 4, plus a machine language monitor.

Version 1 - BASIC 4.0

- Disk Maintenance Commands
 - header, collect, backup, catalog
- File Maintenance Commands
 - copy, concat, rename, scratch
- Data Handling Commands
 - append, dopen, delose, dload, dsave, record#
- Full string handling and garbage collection



Version 2 - BASIC 4.1

- All the features of BASIC 4.0 plus:
- 3 graphics modes
 - Extra graphics commands
 - draw, box, locate, color, scale

Version 3 - BASIC 4.2

- All the features of BASIC 4.0 plus:
- Full error trapping commands
 - trap, resume, err\$, er, el
 - Load and save binary files
 - bload, bsave, brun
 - Function keys display BASIC commands, or may be user-defined
 - Extra BASIC commands
 - else, print using, dispose, drun, dclear



Machine Language Monitor

- Display and alter 64's memory
- Calls or breaks to monitor

Color 80

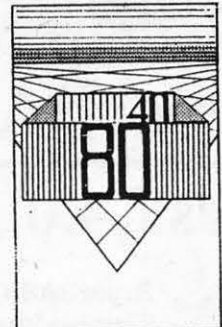
80 Column Screen Expansion

COLOR 80 is a program that turns the Commodore 64 from a 40-column computer into an 80-column computer. It requires no extra cartridges or boards.

Features Include:

- 8 different 80-column character sets
- Uses no BASIC memory
- Use Hires screen for display
- Create and run 80-column programs
- Includes a set of 5 compatible BASIC programs
 - spreadsheet
 - word processor
 - terminal program
 - mail list
 - directory boot program

- 80-column display makes BASIC programming easier
- Works with terminal programs for compatible 80-column display
- Requires no extra boards or cartridges



SPECIALTY PRODUCTS

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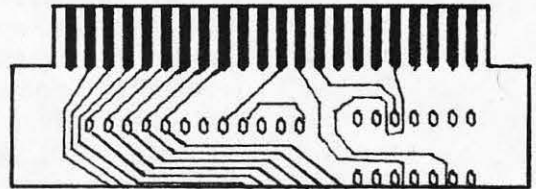
Draft-Aid Computer

Assisted Design System

The **Draft-Aid** CAD program is ideal for educational drafting, printed circuit board design and electronic drafting. Draft-Aid breaks down the process of creating finished drawings into a few easy steps, from on-screen drawing to finished plotted design. The drawings are plotted using a high-speed digital plotter, accurate to 2-thousandths of an inch.

Data Entry Features Include:

- Operational and error alarms
- Full disk and user error checking
- Fully menu-driven
- Built-in calculator, cross-referencing, file sorting, formatted screen displays



Plot Features Include:

- Create arcs and circles
- Rotate drawings through 360 degrees
- Move drawings anywhere on plot surface
- Enlarge or reduce drawings in either axis
- Draw 9800 shapes with one command

Complete Disk Maintenance:

- Catalog, backup, copy, delete and format
- Powerful pattern matching system

General Ledger History

For BPI Accounting Programs

The BPI General Ledger accounting program generates reports for only one month at a time. The **General Ledger History** program allows you to store 12 months' data of BPI General Ledger data on a separate data disk, for calculating and printing cumulative reports for up to one fiscal year.

Features Include:

- Print reports for any group of months, or entire fiscal year

Print reports for single accounts over 12 months
Start fiscal year at any month
Store several companies on same data disk
Real-time account access and printing
Menu-driven, frequent prompts and warning screens

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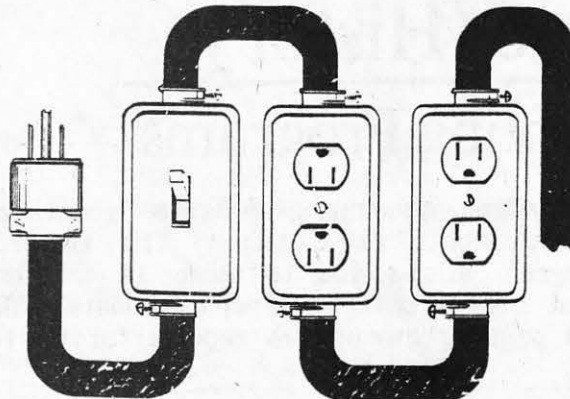
RTC Snake

Electrical Filter

The **RTC Snake** compresses electrical power surges and prevents them from damaging computers. A networking system such as the RTC Multi-Link links up to 48 computers on the same bus. Because of the way electrical power is transmitted, power surges (called "spikes") frequently occur on this bus. With one computer and one drive, spikes can be annoying and result in lost data. But with so many computers on the same bus, spikes can not only destroy data but damage equipment as well.

The RTC Snake consists of a series of dual receptacle boxes on a common cable. Metal oxide varistors on the first and last receptacles remove most of the noise in the electrical signal. The Snake filters out enough variance in the current to prevent equipment damage, but not all data loss.

For more information on the RTC Snake and other electrical filters, please call or write to Richvale Telecommunications.



RTC 1702 Projector

Monitor Screen Projection

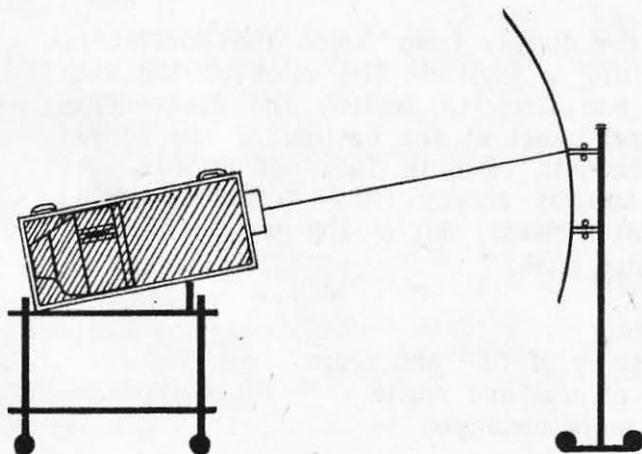
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The **RTC 1702 Projector** takes the picture from a 1702 model computer monitor and projects it onto a large screen. The Projector is ideal for educational and demonstration purposes, showing lines of programming or computer graphics clearly to a large audience. The RTC Projector transmits the picture with almost no distortion or loss of resolution.

Features Include:

- Screen included with Projector available in 50", 60", 72", 82", 100" and 120" measured diagonally
- Provides 90 degree optimum viewing area
- High quality optical acrylic f/1.2 lens system
- Specially designed aluminum surface screen
- Uses less power than most TV's
- Separate color, tint, brightness, contrast controls
- 3 year parts/labor warranty

For more information on this product, please write or call Richvale Telecommunications.

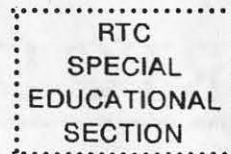


GAMES

Planet Quarx

Planet Quarx is a 3-stage video game for the Commodore 64. The object of the game is to reach the planet called Quarx.

In Stage 1, the player must maneuver his spaceship through the Asteroid zone, avoiding asteroids as they spin out toward his ship from the center of the screen.



In Stage 2, play moves into the outer defense system of Quarx. The display shows the view from the cockpit of the player's ship. Using his joystick, the player aims and fires at approaching alien spaceships, or turns on his force field to avoid collisions.

Once past the outer defenses, play moves to the Planet Quarx itself where the player destroys Quarxian tanks.

There is no time or fuel limit; play continues until all 5 ships have been destroyed.

Joystick controlled
Arcade sound and graphics displays
C64-LINK compatible

Space Gunner

Space Gunner is an exciting video-arcade style game for the Commodore 64. The object of the game is to defend the planet Namcap against the fleet of the Warlords of Zorlon.

The screen shows the display from inside the cockpit of an attack ship. Using a joystick, the pilot of the ship aims his gunsight and fires to destroy the approaching Zorlons. The control panel at the bottom of the screen gives continuous readouts of both fuel and scores. As the player's ship absorbs energy from exploding Zorlon ships, the fuel counter rises. But as the game moves on, the level of difficulty rises.

Joystick control
Continuous display of fuel and score
Arcade sound effects and music
Current high score displayed
C64-LINK compatible

CLASSROOM WIRING

PETER SMITH
RICHMOND HILL

1. Electrical Wiring and Bus Problems

1) The RTC Multi-Link networking system links up to 48 computers on the same bus. Because of the way electrical power comes in to classrooms, power surges (called "spikes") will occur on this bus. With one computer and one drive, these power surges can be annoying and result in lost data. But, with so many computers on the same bus, such power surges can cause lost data or damaged equipment. So long as the spike variance does not exceed one-quarter volt, no problems will result. However, if the spike causes a surge of 2 volts, the computers will interpret this as data or commands which could cause data loss. If the variance exceeds 10 volts, it can damage equipment.

2) If there are any breaks along the line, or pressure contacts or friction contacts, the same power variance will also result, causing the same problems of lost data or damaged equipment.

3) Figure 1. shows a "Sine Wave". This wave represents the power signal going into the computer. Most power panels use a three-phase system as shown in Figure 2.

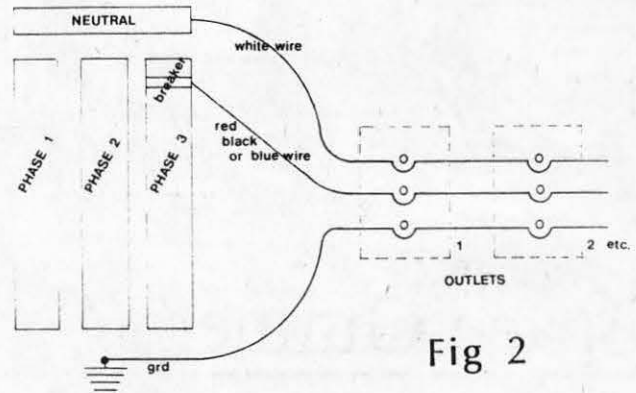


Fig 2

To picture this three-phase system, imagine three different sine waves superimposed on top of each other, with the lowest point of each wave shifted over to the right on the page. Many bus problems can result from linking computers through a power supply with different phases.

There are ways around all these problems.

2. Electronic Filter

The accompanying diagram, Figure 3. ("Typical Large Classroom Power Distribution") shows the best possible way to avoid damaged equipment and lost data.

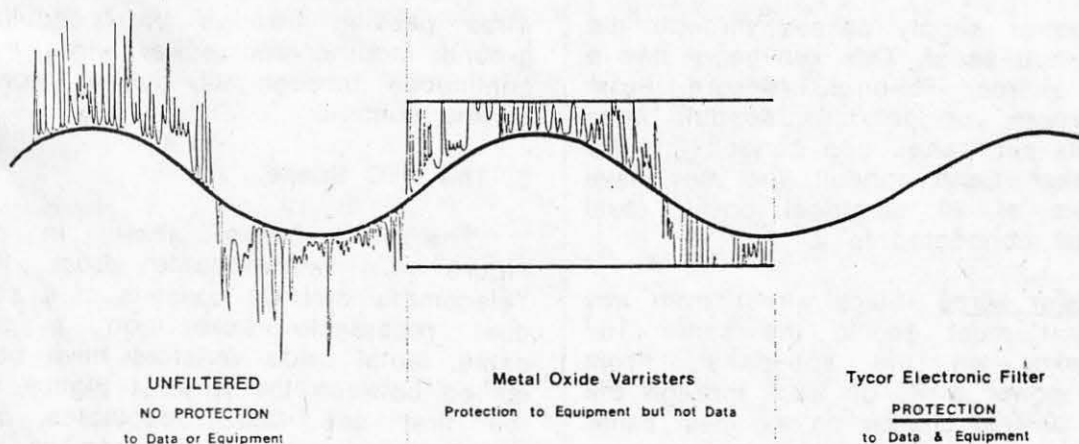
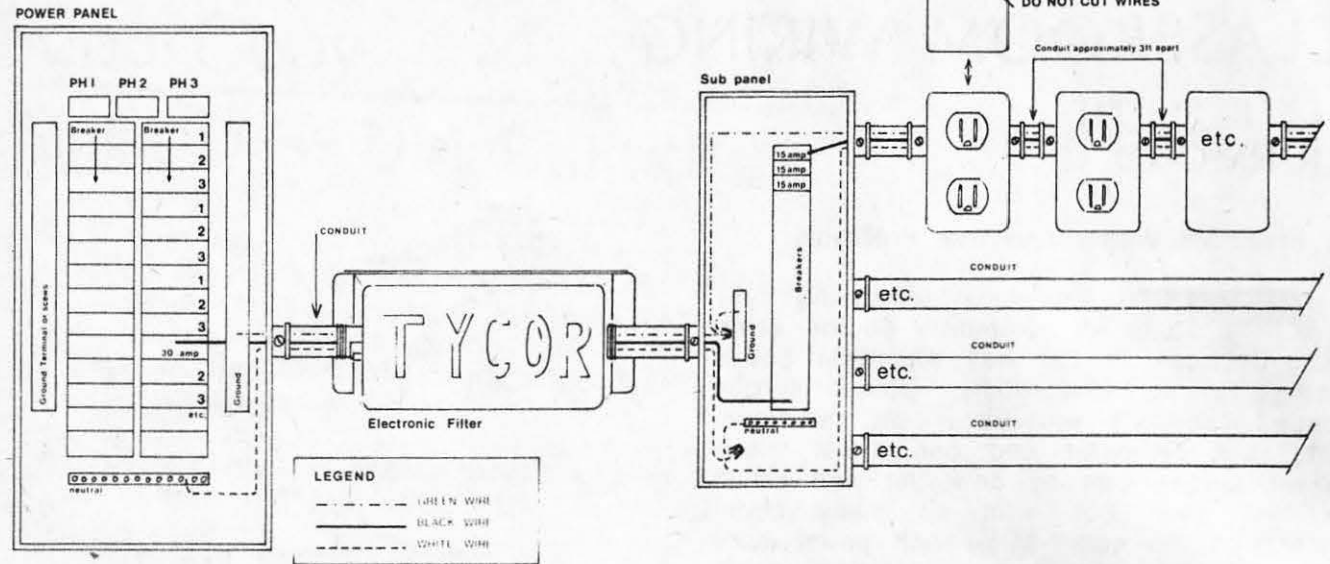


Fig 1:

Figure 3

Typical Large Classroom Power Distribution Setup



The left side of the diagram shows the power panel of most schools or classrooms. Each square represents one breaker. To make the system fail-safe requires an "electronic filter". We recommend the TYCOR filter (available from Richvale Telecommunications). The power supply in the classroom must pass through this filter which removes the noise or "grass" in the signal.

The filter should connect to a single 30-amp breaker in the main power panel. A 30-amp breaker is sufficient to run the full 48 computers with drives and printers. Use one breaker to avoid problems on the bus caused by three-phase wiring.

The power supply passes through the filter to a sub-panel. This sub-panel has a maximum of four 15-amp breakers. From the classroom, up to four conduit lines lead to this sub-panel, one conduit line for each breaker. Each conduit line may have a maximum of 20 electrical boxes (dual receptacles) connected to it.

All power wires (black wires) from any one conduit must go to the same 15-amp breaker on the sub-panel. From there, the power wires go back through the filter to a 30-amp breaker on the main panel.

All neutral (white) wires from any one

conduit must be tinned and mechanically clamped to a common point on the sub-panel. From that point, the neutral wires should be connected to the neutral bar with a pigtail joint, then back through the filter to the main power panel.

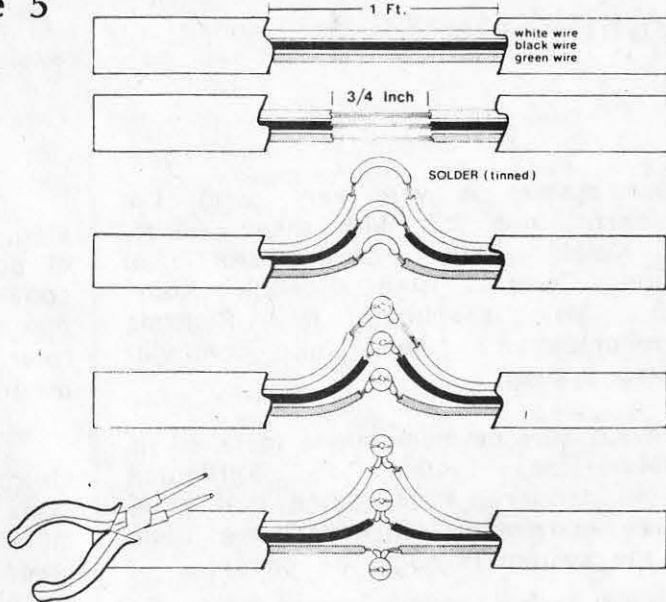
All ground (green) wires from any one conduit must also be tinned and mechanically clamped to a common point on the sub-panel. A pigtail joint connects that common point to the sub-panel's ground point. From the sub-panel ground point, the ground wire leads through the filter to the common ground on the main power panel, and from there to an earth ground.

There must be no breaks in any wires passing through the conduits. The ground, neutral and power wires must be continuous through all duplex receptacles on the conduit.

3. The RTC Snake

The RTC Snake, shown in part in Figure 4., is available from Richvale Telecommunications, consists of a series of dual receptacle boxes on a common cable. Metal oxide varistors have been installed between the wires (Figure 5.) on the first and last receptacles on this cable. These varistors will remove most of the noise in the signal, but not all.

Figure 5



Enough variance is removed to prevent any equipment damage. However, power surges may result in lost data.

4. Metal Oxide Varistors

Figure 6. illustrates how you may install the varistors in the dual receptacles. Each receptacle must be on a common line. The varistors must connect the following terminals: black to white; white to ground; and black to ground. Any breaks in the lines, or any loose connections, will cause data to be lost, and may cause equipment damage. Connect the varistors on the first and end receptacles.

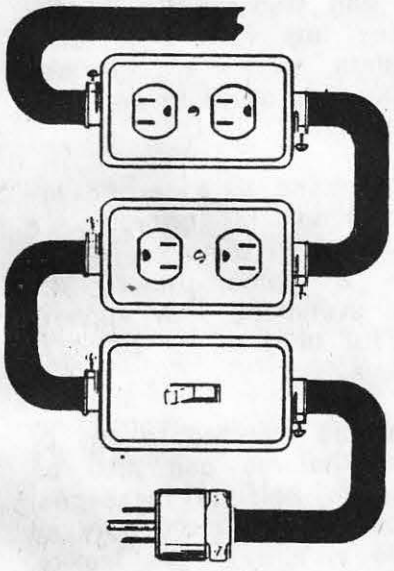


Figure 4

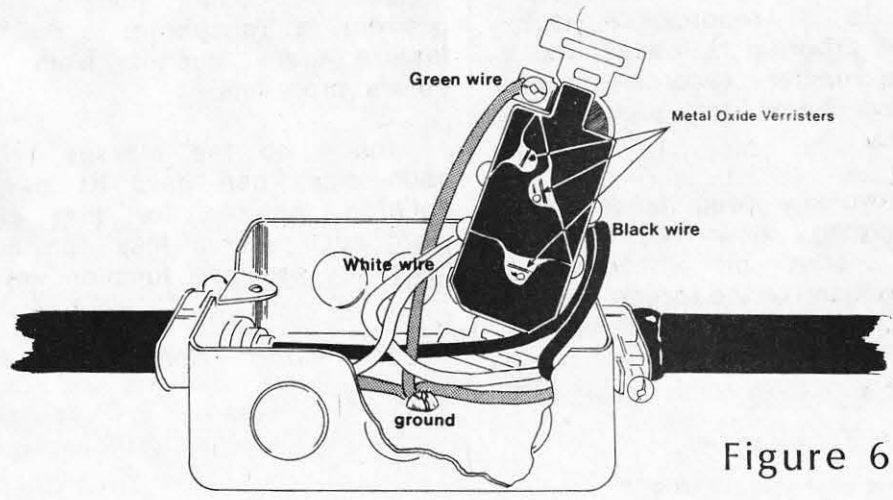


Figure 6

RTC MULTI-LINK

Michael Robinson
Thornhill, ON

RTC
SPECIAL
EDUCATIONAL
SECTION

"Your system is very very good. I'm very pleased with it." With these words, Gary Kiziak, lab co-ordinator at Burlington Central High School, summarized his reaction to Richvale Telecommunication's Multi-Link computer networking system.

Richvale Telecommunications installed its first Multi-Link system in Burlington Central in January, 1984. Since that time, Mr Kiziak and other teachers have been putting the system through it's paces.

The RTC Multi-Link networking system allows up to 48 Commodore 64's and PETs to access four disk drives and four printers. One computer controls the network. Multi-Link software adds 21 commands for use in the operation of the Multi-Link system. The master also aids in computer instruction in a number of ways, from demonstrations to fast down loading.

"I can load a bank (of computers) with Easy Script five to ten times faster than if I had to do it the regular way." Multi-Link saves the teacher time by allowing him to load a program into the master from a disk and then download it directly to some or all of the satellites. For disk-locked programs there is a record/play technique whereby the program is loaded into a satellite while the master "records" it. The master then "plays back" the program to the other satellites.

Multi-Link's two-key commands also saves time. Holding down <SHIFT> and typing the first letter of a command prints the entire command on the screen. <SHIFT> <C>, for example, prints "CATALOG" on the screen.

The master computer and satellites can also communicate. Mr Kiziak finds this way of communicating with students too impersonal, but he uses this feature to send operating commands with a carriage return to the satellites in order to set up a program for his classes.

The "ECHO" command is a terrific instructional aid. Instead of crowding a class full of students around a single monitor to watch a demonstration, the teacher can make everything that appears on his screen "echo" onto all or some of the students' screens.

All features can be directed to any or all satellites. Some features can also be turned off. Satellite to Satellite messages, for example, can disrupt classroom work so teachers may choose to turn off this feature.

Another feature that he especially likes is automatic file name prefixing on disk. If this feature is engaged, files saved to the disk are prefixed with the class letter (A, B,...), and the number of the terminal that saved the file. When a satellite catalogs the disk, only library files and files with that station's prefix will appear. All other student files and the prefixing is transparent to the Satellite. This feature keeps students from copying each others programs.

Since no two classes are the same, each class can have its own set-up file defining features for that class. Up to eight such set-up files can be saved and called by pressing function keys.

Mr Kiziak finds that students get

slightly paranoid when he is typing at the master computer, perhaps, because he can take a "snapshot" of any student's screen to see what they are doing, or even up load an entire program from any satellite without the student's knowing. In this way, he can evaluate a student's progress or help them debug a program.

Hitting <RUN/STOP> and <RESTORE> on the master computer will bring the system back from almost any crash -- acts of god excepted. In one instance, <RUN/STOP> and <RESTORE > did not revive Burlington's system and the master had to be turned off. Even so they have "never lost a file on (Multi-Link) yet ... that feature I like, I like very much. Compared with (our other) system. Oh, (our other) system is awful. I've lost a lot of files."

Proper electrical wiring will do wonders for any networking system. Richvale has taken the time to design proper wiring and clearly explains in the Multi-Link manual how a computer lab should be wired. Burlington, having followed most of the recommendations, has had no hardware damage and very few problems with data loss or system crashes. Many schools who did not heed Richvale's advice (regardless of which networking system they have) have had problems ranging from system crashes to blown hardware.

"I thought Multi-Link was well explained." The Multi-Link manual clearly explains all of the features and includes relevant examples. As well, Richvale offers excellent support for all its products. It's quite convenient dealing with the designers of the system.

Mr Kiziak did have some constructive criticisms. For example he suggested teachers should be able to name set-up files instead of using the function keys. He would also like to see a simplified log-on procedure. Log-on lets students set up a password so they can access their own files from other satellites. At present, the teacher can disallow all destructive disk commands. Mr Kiziak would like to be able to disallow only formatting, scratching, and heading. Whereas now all disk drives appear as unit 8 to the Satellites (eg drive 0, 1, 2....), he would like to be able to refer to one drive as unit 9. In fact, these and most of his criticisms can be implemented in software, and may appear in updated versions.

Other limitations of Multi-Link are inherent in any networking system. Some data base software, for example, will not work since a disk drive will only allow so many open files at one time.

Probably the best feature of the Multi-Link system is the price. A group of teachers from Ancastor came up to see Burlington's system. They said that they were particularly interested because they could buy a complete system and a C64 to act as the master computer for less than the competitor's system. The prices are \$400.00 for the master hardware and the system software, and \$150.00 for each satellite cartridge.

Call Liz Arnold or Michael Robinson for complimentary copies of the Multi-Link manual, or to arrange a free demonstration. Telephone (416) 884-4165.

1541 EXPRESS-- NEW PRODUCT REVIEW

Joseph Linzner
Willowdale, ON

One of the major complaints heard most often from Commodore 64 users concerns the 1541 drives. In brief, it is a turtle when one compares access speed with other drives such as on the Apple or IBM PC. Richvale Telecommunications on Bayview, the originators of Script 64, C-Link and other excellent products, has come up with another winner. The 1541 Express Cartridge plugs into the cartridge port and is connected to the circuit board of the 64 via two jumper wires. The fast mode is activated as soon as one powers up the computer. To toggle the Express off one presses ctrl F3 or ctrl F1 to turn it back on.

I had an opportunity to try out a prototype model in the presence of David Foster, one of the developers of the product (the other being Phillip Willow). To be candid, it worked like a charm. By way of example, Script 64, which normally takes 80 seconds to load, now took only 33 seconds! I am informed that an additional cable (called Fast Cable) will be available which runs from the user port directly into one of the chips on the 1541 drive. With the Fast Cable connected, I managed to load Script 64 in an astonishing 24 seconds!

As with any new product, there is always the question of compatibility. In my tests, I found no problems whatsoever loading any programs, with the exception of the Flight Simulator II. If problems were encountered, I toggled back to the slow mode and then the program would load as usual. In speaking with David Foster, he stated concerns that there might be problems with programs such as The Manager which use the buffers in the drive. However, I was relieved to find that my copy of The Manager (version 1.04) worked perfectly. To put it to the test, I successfully loaded such diverse programs as The Home Accountant, Paperclip, Multiplan, Jumpman and Zaxxon

without any problems. These programs normally took in excess of 80 seconds to load or sufficient time to take a coffee break. The 1541 Express averaged out to 2.27 times faster and a blazing 3.125 to 5 times faster with the Fast Cable.

Phillip Willow told me that the increase in speed comes from a modification of the DOS within the drive and is not unlike the highly-successful 1541 Supercopy which is also from Richvale. In this case, the change in DOS resides in an EPROM on the cartridge. Accordingly, since they are using an EPROM which is programmable, Richvale will probably supply any upgrades at a nominal cost.

There are a few files in the ointment (very small ones). Firstly, there is the matter of voiding your warranty by opening the C64's case to attach the jumpers. I had no trouble in attaching the leads in less than 30 seconds, and Richvale will no doubt give assistance to anyone who is uncertain in making the proper connection. Secondly, it would appear that the Express will not operate with a printer, i.e., 1525, 1526 or Cardco attached to the serial port. Any printer connected via the user port is no problem, and will not hang up the system. Furthermore, there is no problem with printers when the computer is connected to the drive via the Fast Cable; this frees the serial port entirely and allows for the use of a 1525, 1526, 801 or cardco.

Richvale planned to have it on the shelf by the beginning of May, and the cost is in the \$60 to \$70 range with an additional \$25 to \$30 for the Fast Cable option. In summary, if you are looking for speed combined with reliability, I can recommend the 1541 Express, especially if you get it with a Fast Cable. The alternative is a 4040 plus C-Link or Buscard II and the expenditure of \$1500.

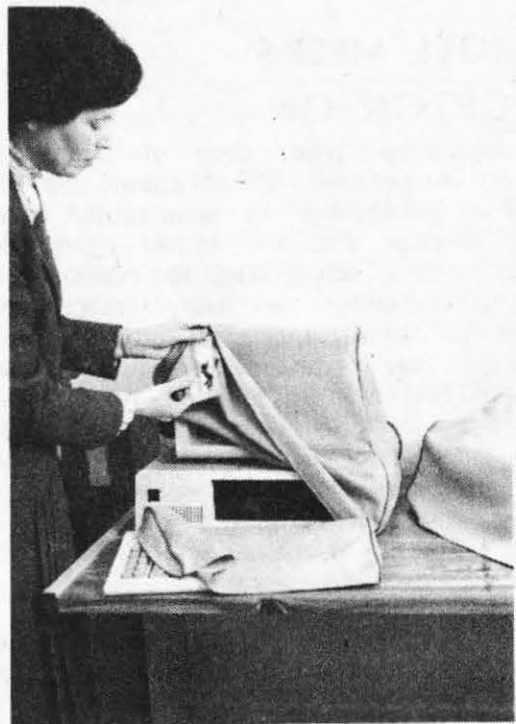
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Ada P. Kahn
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STORYWRITER AND A SIX YEAR OLD

by JOEL MEERS
KINGSTON ON

There is a great deal of discussion going on these days about computers and kids, and computers in education. Being both a teacher and the father of a six-year-old girl, I would like to make some observations about a truly remarkable program for both teachers and interested parents. The program is called STORYWRITER, written by J.M. Vayda and C.C. Capon. My particular copy came from a club disk, and is the V10.P PET version. I understand that a version is now available in the newly-released Public Domain Educational disks, and will run on the 64.

When I received my copy in the summer of '83, I sat down one evening and asked my daughter if she would like to make up a story on the computer. She loved to tell impromptu stories to her dolls and her pet rabbit, and I used to chuckle as I would listen, so when the program came along, I thought I would get her to tell one to the computer. At this stage, naturally, I did the typing and she did the telling.

Now this may not seem terribly useful, but when the story comes off the printer in enhanced primary size type and she can read it to her mother, then a wonderful thing is taking place. READING! It was a chance for her to use her mind creatively and read at the same time. When a child can read her own creations, the motivation seems to be even greater.

The stories were short, but they were hers, and they were coherent collections of complete thoughts or sentences, as we teachers like to call them. (Teachers have this thing for kids and sentences, you know!) My daughter walked proudly away with her creation, added the illustrative touch with her Crayolas, and hurried off to

read it to mommy. Even being a former Kindergarten teacher, watching my own kid learning to read had amazed me, and the kick of seeing her read her own creations was an even greater thrill.

In the fall, my daughter entered grade 1, and I was more than pleased when they began early in the fall with little keyboard familiarization exercises on the 4032 PET. I am running a SuperPET, but my daughter was delighted when she ran home and told me they had a computer like daddy's. I learned that already my poor daughter was getting caught up in the computer age when she informed me that she had told the teacher, "My daddy has a computer like that, but his is called a SuperPET."

The first use of STORYWRITER in the school was to have each child type three statements in the form "I have a red _____". The statements each had to have a color named and were left open-ended. The children then drew a red (blue, green, whatever) something to complete the sentence. Simple, but just look at the learning that was going on. All of the sentences had to start with a capital "I", so the kids were learning to create a shifted character on the keyboard, they were learning to find letters on the keyboard, to space words on the keyboard, and to hit sufficient RETURNS to leave several spaces between the sentences. In addition, they were learning sentence structure. All of these skills and they didn't even know it!

That was the start, for my daughter, anyway. That same night, she had to try the same thing at home -- I mean, had to! Either daddy got off that computer or there was going to be trouble! That was the spark for my daughter, and I'm sure

GENERAL

for many other kids at school. She had the advantage of access to the computer at home, but I can't help but feel the same motivation would rub off on many of those kids, computer at home or not.

What happened the next night was what really got me excited. She came home and asked for STORYWRITER. It was Thanksgiving and, of course, that was all the talk in school that week, and she wanted to write about it. This time, there would be no daddy on the keyboard. "I want to type my own!" With the exception of "Daddy, how do you spell?", here is what resulted (in enhanced type):

THANKSGIVING

On Thanksgiving I'm going to eat turkey.
I'll have some pumpkin pie for dessert.
I'll color a picture of a turkey.

Of course, the Crayolas came out for the finishing touches, but there it was, a story on her first try! This became an almost nightly thing, a battle for the keyboard, in fact. She would even come home for lunch and, after a peanut butter sandwich, it was, "Mommy, can I have my story on?" Watch this one; peanut butter on the keyboard rules had to be established rather quickly. A few other very interesting things became evident to me in the weeks that followed. When mommy or daddy weren't right there to spell the words, out came her word cards and a whole variety of ingenious ways of finding the spellings for words -- books, catalogs; you name it.

The other amazing thing was that, after a few stories, she was filling the whole screen. STORYWRITER allows the user to type one full screen of text, which is one full page of enhanced type. This is just over 200 words of type. There are days when I would have fallen over to get that out of a 5th grader with pencil and paper! The kids I've seen using this program are rarely happy until they have filled the screen, whether they be 1st graders or 5th graders.

The other thing that intrigued me was

that she was not satisfied unless the words were right, which of course leads to valuable skills being developed as she sought out the spellings of words she didn't know. In addition, confidence developed in using words that she was sure of when she typed them. The purchase of a picture dictionary has made her almost totally independent of adult intervention, save the printing out and saving to disk.

Other interesting things also came out of this use of STORYWRITER. Initially, all I showed her was how to erase a word with the DEL key. Eventually, she would see mistakes in the text and didn't want to erase all the way back. Of course, daddy or mommy stepped in with the CURSOR up, down, left, right. Soon, she was doing this on her own as well. On working with 5th grade kids and this program, I found that they very easily caught on to CURSOR control as well as using the INST key to separate lines for addition of text.

At school, the kids were then being sent to STORYWRITER in pairs, and they seemed to have a ball working together on their stories. They were providing ideas for each other as well as working together to produce correct spelling and sentence structure. My daughter's teachers are editing the work before it goes to print, but other teachers of older kids I have talked to have been enthused with the great desire of the kids to go back and edit and add to their stories after they get an initial copy off the printer.

The marvellous thing about the computer in creative writing is that it allows the kids to create. I feel that a lot of kids don't display this because they become bogged down in the process of writing. There is a great desire for perfection in kids when they write and, by the time they erase and scratch out, and erase and scratch out, the time or the idea, or both, are lost in the frustration. When the kids work on the computer, they see clear, distinct text, and seem more aware of errors. The difference is that the desire to correct these errors seems motivated by the computer, and the crea-

GENERAL

tive ideas can more readily be put down.

Don't get me wrong. I am not advocating the demise of printing or cursive writing. I feel that a text editor such as STORYWRITER can encourage kids to write more carefully, because they are encouraged to write and create with words, and the more they work with words, be it computer type or handwriting, the more I feel they will develop a sense of correct grammatical structure. I am finding my daughter, for instance, is spending more time than ever printing in the workbooks and on the paper that she has around the

house, and that writing and sentence structure are constantly improving. I can't help but feel the same results and spinoffs can occur with children in higher grade levels as well, and the potential for reluctant kids would seem to me to be equally as great.

I'm sure there are many teachers out there who are realizing the potential of this program every day, but, if you haven't, I urge you to give it a try. As for non-teachers, I hope you give it a try; I'm sure you will be pleased. I know that, both as a parent and teacher, I am!

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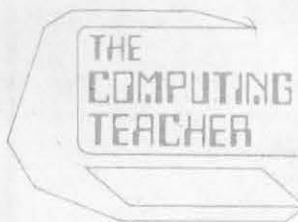


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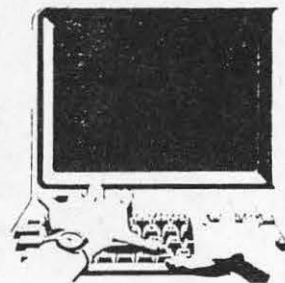
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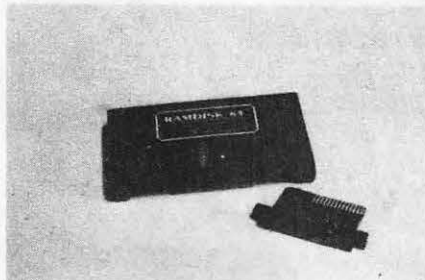
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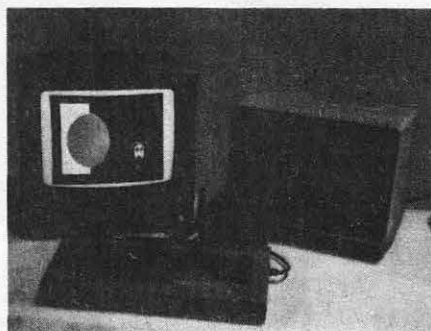
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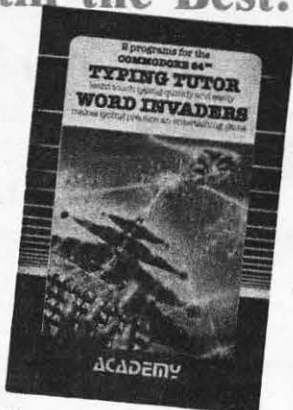
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MACHINE LANGUAGE

6502/6510 ML INSTRUCTIONS

Vince Sorenson

Regina, Sask.

When I first read that the C64's new 6510 chip had extra I/O pins, I wondered if the 6510 would also have more ML commands, in order to access these pins. After investigating, I found that both the 6502 (in the VIC, PET, and previous Commodore efforts) and the 6510 have more usable commands than previously thought.

This obviously has occurred to more people than just myself. About a month after discovering a few commands, I came across an article in the October 1983 issue of COMPUTE! that detailed some of the commands that I had found, and some that I hadn't. So, I decided to combine both my work and the additional information provided by Joel C. Shepherd in COMPUTE!, and provide fellow users with a comprehensive list of unofficial 6502/6510 machine language commands.

Generally, each bit in a 6502 opcode represents a different instruction type or addressing mode. An opcode byte can be broken down with the three most significant bits representing type, and the other bits giving the mode. There are, of course, exceptions, but we can still postulate what the 6502 thinks it sees when it encounters an undefined number.

For a list of documented opcodes, find the MOS PROGRAMMING MANUAL or the C64 PROGRAMMER'S REFERENCE MANUAL. Any hex opcodes not given here and not documented in one of those books can be placed in one of the following categories: DETRIMENTAL (your machine crashes); NON-EFFECTIVE (has no effect, except to skip one to three bytes); INCONSISTENT (different results from the same parameters, repeatedly and randomly); and REPETITIVE (this command is identical to another command, including type and mode.)

Here are the unofficial OPCODES in the

following format: HEX ##: (Mnemonic, Addressing Mode) Brief Description, Other Addressing Modes.

04: (NTW,implied) This byte and byte after ignored.

1B: (NTH,implied) This byte and two bytes afterward ignored.

07: (SLO, zero page) These four commands shift memory left then OR the accumulator with this memory.

Other modes:

0F (absolute)

17 (zero pg.x)

1F (absolute.x)

27: (RLA, zero page) These six commands roll a memory location left, then ANDs the contents of the accumulator with the result.

Other modes:

23 (indirect.x)

2F (absolute)

37 (zero pg.x)

3B (abs..y)

3F (abs..x)

43: (SRL, indirect.x) This command shifts memory right, then loads the accumulator with the result.

4B: (SRA, immediate) This command shifts the contents of the f accumulator right, and then ANDs the result with immediate data.

47: (SRE, zero page) These four commands shift memory right and then EOR the accumulator with the shifted memory.

Other modes:

4F (absolute)

57 (zero page.x)

5F (absolute.x)

67: (RRA, zero page) These 6 roll memory right, and adds with carry to the accumulator.

MACHINE LANGUAGE

Other modes:

6F (absolute)
73 (indirect.y)
77 (zero page.x)
7B (absolute.y)
7F (absolute.x)

87: (AAX, zero page) These three commands AND the contents of the accumulator with those of the X register.

Other modes:

8F (absolute)
97 (zero page.y)

8B: (AAX, immediate) This command ANDs the accumulator, the X register, and immediate data.

A3: (LAX, indirect.x) These seven commands load both the accumulator and the X register from the same location.

Other modes:

A7 (zero page)
AB (immediate)
AF (absolute)
B3 (indirect.y)
B7 (zero page.x)
BF (abs..x)

C3: (DCP, indirect.x) These six commands decrease a memory location, then compare it with the contents of the accumulator.

Other modes:

C7 (zero page)
CF (absolute)
D3 (indirect.y)
D7 (zero page.x)
DF (absolute.x)

CB: (XAS, immediate) This command first

ANDs the X register with 8, and then subtracts the data immediately following.

EB: (SOC, immediate) This command subtracts one from the accumulator, then carry, and then the data immediately following.

E3: (ISC, indirect.x) These seven commands increase a memory location by one, and then subtract the result from the accumulator, with carry.

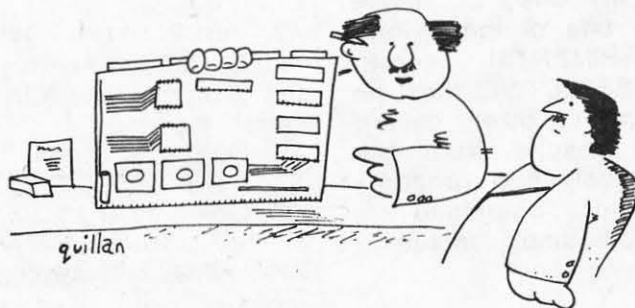
Other modes:

E7 (zero page)
EF (absolute)
F3 (indirect.y)
F7 (zero page.x)
FB (abs..y)
FF (absolute.x)

Note that the results for all of the above commands are stored in the accumulator except as follows: AAX results are stored in memory location given by data after AAX (immediate mode) results, and LAX results are placed in both the accumulator and in the X register. DCP results are shown in memory and in the processor's status byte. XAS results are put in the X register only.

Presently, only a few assemblers will accept these new mnemonics. These assemblers allow either new commands to be defined or .BYT commands which let the user put numeric data (in this case our new commands) into his program. However, everyone should be able to think of a way to get to use these new opcodes.

Until next time...happy programming!!!



HARDWARE

REDESIGNED 8K CARD

Dennis Sievers
Breese, III

One of the first pieces of equipment usually added to the VIC 20 is additional memory. Many times, this is in the form of the 8K RAM cartridge. This is a most valuable asset for the memory-poor VIC. While offering added power, even this card can be improved. Two very simple modifications are shown here to make the card even more useful and easier to use.

The RAM card can reside in any of the various expansion blocks of the VIC by changing the setting of the four-place DIP switch inside the case. Taking the case apart constantly to change the settings can be a source of many problems. As an alternative, I cut a small hole in the top of the case using a 6mm drill and small file at a point shown in Figure 1. This opening is then covered with clear tape to prevent the entry of dust, and at the same time allow the user to know the exact placement of the switches. When the card needs to be moved to another block, the tape is removed, the switches set and the hole re-covered.

A second useful modification is the installation of a write-protect switch. A common SPST switch is installed in the VR/W

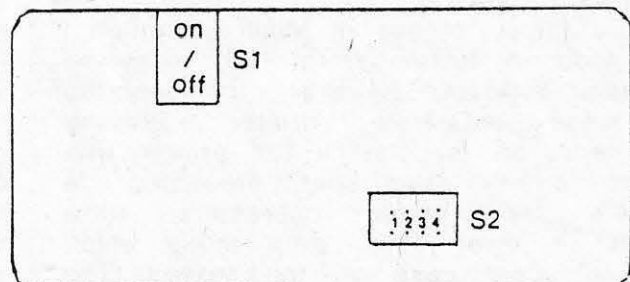
line (pin 17) of the 8K RAM cartridge. To do this, open the case and locate pin 17. Trace the lines to a small solder pad and install a #28 wire in the pad hole. The other end goes to one of the switch contacts. Turn the card over and locate the printed circuit line from this pad to one located approximately 14cm above. Check to ensure that the proper line has been isolated by using an ohm meter between the pad and pin 17. If the circuit conducts, the proper line has been found and the second solder pad located. The line between these two pads must now be cut using a thin knife. Use caution to cut only one line, and be certain that the line has been completely severed.

A second #28 wire is installed between the second solder pad and the other switch contact. When the switch is open, the information that has been poked into the card will remain active and available, even upon reset.

The above modifications will void any warranty on the card, and may also void any warranty on the computer as well. All such modifications should be carefully checked before actual trial in a computer.

FIGURE 1

8K RAM CARD
MODIFIED



Approximate locations of
switches in card case

S1=SPST switch for write protection
S2=4-place DIP switch for block selection

MICROSOFT MULTIPLAN REVIEW

T.C. Meyer
Pickering, ON

Microsoft Multiplan Version 1.06 for the Commodore 64 is an electronic worksheet developed by Microsoft Corp. and marketed by Hesware, Human Engineered Software, 150 North Hill Drive, Brisbane, CA 94005, 415-468-4111.

Electronic worksheets like Multiplan basically provide for the programming of accounting, modelling or planning type spreadsheets via entering high-level programming commands into specific cells of an electronic matrix on a microcomputer. Multiplan provides a matrix of 63 columns and 255 rows. The screen displays only a small portion of the actual worksheet available. In effect, the screen is a window which can be scrolled both horizontally and vertically so that the entire matrix can be viewed as a series of windows.

If you have used other worksheets, you will find that Multiplan for the C64 is loaded with features and options not usually found in worksheets costing less than \$130. Canadian. In fact, the C64 version is functionally similar and offers most of the features of Multiplan which runs on the IBM-PC. In this review, I won't address the numerous mathematical functions available in Multiplan other than to say that they are extensive.

The initial release of Multiplan which I purchased in November of 1983 was an excellent product; however, it supported only the VIC-1525 printer. Printing worksheets on my Gemini-10X printer with Card? printer interface presented a problem. All alpha characters were printed in lower case, even those which were in upper case on the screen. The details of this problem were forwarded to Hesware who corrected the problem and then, in January 84, shipped to me a revised release of Multiplan which supports a wider range of printers as well as

several other updated features.

The printing capability of the revised release of Multiplan is extremely powerful and flexible even with non-Commodore printers. For example, specific rows, columns, cells or the entire worksheet can be printed in a variety of print pitches, including normal and compressed print, i.e., 17 characters per inch. The margins, at the top, bottom, left and right sides can be set to control the print-out line length and location as desired, thus making full use of the Star Gemini-10X or Gemini-15X printer features. This worksheet also has extremely versatile features for formatting text and values in the rows and columns of the worksheet. Some of these features are: text centering, left and right justification of columns, per cent format, dollar sign format, integer format, and fixed format with a specified number of decimal places. Once the formats for a worksheet are entered, these will appear on both the screen as well as the printout of the worksheet. Multiplan also supports the printing of all the formulae which you have programmed for a specific worksheet. This is a valuable feature, in that it provides you with a hard copy of your worksheet logic for review and future reference. In addition, when a worksheet is saved to disk, the printing options and formats which have been set up are saved on the data file as well. Thus, the worksheet can be easily printed in exactly the same format later on.

To run Multiplan on the C64, a 1541 or compatible type of disk drive is required as tape input/output is not supported. This is not surprising, since the 1541 disk drive requires about two minutes to initially load the multiplan programs. Also, the initial release of Multiplan requires that the program disk remain in the disk drive to support many of the Multiplan functions. This makes saving and loading

SOFTWARE REVIEW

of Multiplan data files a series of swapping exercises between the program disk and the data file disk. The revised release of Multiplan solves this problem by requiring that a 97-sector support file be written to each data disk upon initialization. The data disk is placed in the disk drive after Multiplan is loaded, and therefore eliminates the need for the disk swapping. Even so, writing a data file to disk is a slow process, partly because the worksheet in some cases is automatically recalculated as the first step of the saving operation. It takes about two minutes to write a 24-sector relative file while retrieving it takes about one minute.

When using the revised version of Multiplan, the data disk with the program support file on it is automatically referenced by Multiplan to swap into memory the necessary routines to process each new worksheet function which you have entered from the keyboard. Because of the memory-conserving program swapping features of Multiplan, a fairly large worksheet can be contained in memory. For example, the 24-sector data file mentioned earlier was comprised of a worksheet of 10 columns and 31 rows of data, including formulae involving calculations on 210 cells. This worksheet used up about 25% of the C64 memory which is available for worksheet space. The original version works in a similar manner, except the Multiplan disk must be in the disk drive.

A feature of Multiplan that puts it ahead of some other spreadsheets is its ability to sort on columns of information. Numbers and text can be sorted in ascending or descending order. Multiple columns of a worksheet can be sorted in a "sort key" fashion by sorting in the order of the least significant to the most significant columns. By using this technique, a sorted report can be easily generated.

Another excellent feature of this worksheet is the capability to name cells or groups of cells, so that you can refer to them easily. Whole rows or columns or a specific cell can be assigned a name

for future reference. For example, a given row can be named "Quantity", and hence any cell in that row can be referenced in formulae by simply using the designated name. Therefore, formulae can be set up such as "Cost=Quantity*Price", where the name feature has been used to reference the cells corresponding to the specific names. Like most other worksheets, the direct cell reference modes can be used, but this results in less intelligible formulae such as R8C6=R5C2*R7C4.

Even a more significant feature related to the name function is the ability to use multiple worksheets. This function, used in conjunction with a special External copy function, provides the ability to relate worksheets to each other. While the specific details of this can become fairly complex to initially set up, once it is completed, Multiplan will automatically keep track of changes affecting both dependent and supporting worksheets. This is a valuable feature because it allows, for example, to relate "Quantity" from a January worksheet to "YTD Quantity" of a February worksheet. When the dependent worksheet, February, is loaded from disk, the interrelated information from the supporting worksheet, January, will automatically appear on the screen of the February worksheet in the "YTD Quantity" area which had been previously specified.

The biggest drawback that Multiplan has running on the C64 is the relatively slow disk operations of the 1541 drive. It can take five minutes or more for the 1541 disk drive to save a fairly large worksheet.

I found the C64 version of Multiplan to be an extremely reliable product. It is also one of the most powerful worksheets for this microcomputer. It is relatively inexpensive, yet it can be used to produce complex spreadsheet results which are often only available on much more expensive microcomputer configurations. If you need an excellent spreadsheet for your C64 to handle your "What If" modelling, or accounting requirements, I highly recommend it.

TIPS FOR GOOD PROGRAMMING

Robert Dray
Peterborough, ON

Often in our programs we will ask for input such as the name of the user or some other data. The program will then jump to the next section as soon as the user presses the RETURN key.

From the user's point of view, this often seems rather abrupt. The program can be much more "user friendly" by making the machine say "Thank you". This message need only appear on the screen for 1 to 2 seconds and then have the program continue, but this is enough to make the user feel that the machine "appreciates" his action, and therefore the user is put at ease.

Humans do not react as quickly as the computers and the judicious use of time delays can greatly enhance an interactive program. One must avoid the tendency to place time delays where other methods would work better.

It is often necessary to print instructions on the screen, and as often happens, they won't all fit on a single screen. It is tempting to try something cute here such as using a time delay or printing out each word separately and having the text eventually scroll off the top of the screen. These methods will work fine as long as you are accurately able to judge the reading ability of the user. If the user is a slower reader, or has to sneeze, the material may pass by too quickly and the user is left with a bad feeling about the program.

A better way to handle this situation is to have a little routine that lets the user control when the next material is to be presented. This routine and the time delay routine can be set up as sub-routines and can be activated with the GOSUB command. Here is a sample of each routine:

```
2000 REM TIME DELAY
2010 FOR T      1 TO TD*1000:NEXT
2020 RETURN
3000 REM USER CONTROLLED DELAY
3010 PRINT"PRESS ";CHR$(34);"C";CHR$(34);" TO CONTINUE
3020 GET G$: IF G$ "C" THEN 3020
3030 RETURN
```

The time delay is called with a line such as:

```
50 TD      2 GOSUB 2000
```

The value of TD determines the number of seconds (approximately) for the delay, and this may be varied each time the routine is called.

The CHR\$(34)'s in the other routine are necessary to place the letter C in quotation marks. The line following the GOSUB 3000 command will often start with a clear the screen command and then the new material is presented.

The REM statement is used to add documentation to a program, which means that it makes the program LISTing easier to read. These REM statements are completely ignored by the computer as it executes the program, and thus they are only used by the human who is looking at the LISTing. Some people go overboard and will put one or more REM statements for each line of program, but this can make the program harder to read than having no REMarks at all. If the program is separated into blocks which perform specific tasks, as outlined in earlier articles in this series, then one or two brief REM statements are usually sufficient to tell what that block of code is doing. A calculation that may not be obvious is also a prime candidate for a REM statement, such as the following:

```
250 FIN V*(1+I/100)*Y X):REM finds value of investment
```


PROGRAMMING

Another useful application is to outline loop structures as shown:

```
200 REM LOOP
210 FOR I      1 TO 25
220 PRINT "WHAT IS THE NUMBER";
230 INPUT NUM(I)
240 NEXT I
250 REM ENDLOOP
```

Whether an automatic FOR-NEXT loop is used, or a conditional loop using an IF-THEN statement, the use of the REM statement makes the loop more visible in the listing and thus the program will be easier to understand.

```
200 REM LOOP
210 PRINT "PLEASE GIVE A POSITIVE NUMBER"
```

```
220 INPUT NUM
230 IF NUM > 0 THEN 210
240 REM ENDLOOP
```

This is a simple example and obviously there could be many lines of code between lines 210 and 230, but the entire loop structure would stand out on the page as a unit. This will make debugging the program easier as well as trying to figure out, 6 months from now, what the program is doing.

You could also include in your programs: a list of variables and what they stand for, your name and address, what the program does...anything that helps to make the program a little easier to understand is fair game for REM statements.



"WHAT'S THIS ABOUT AN 'ESCAPE'
STATEMENT?"

PRACTICALC 64

John Scott
Toronto, ON

PRACTICALC 64 is a Spreadsheet program developed for the Commodore 64 by Computer Software Associates and imported into Canada by Advantage Computer Accessories of Mississauga. What follows is the set of impressions of a first-time user of a spreadsheet.

PRACTICALC 64 has the usual array of functions available to the user plus some very nice goodies which set it apart from most other spreadsheets that I have seen for the 64. For example: Formulae can be entered into any cell at any time, but actual calculations are done only upon command. Calculations can be done using fixed values or they can be done relative to existing or calculated values. Entries can be replicated to any set of rows or columns. The entries in a sheet may be sorted using any column of the sheet as the sorting key. A row or column or both can be designated as titled so that it (they) always appear on the screen no matter where you move around the sheet and a single column can be made a different width from all of the others.

The PRACTICALC 64 disk contains two programs. The first is a loader program and the second is the program itself. Both programs are auto-run: the user simply loads the first one and it takes over from there. Nothing more needs to be done until PRACTICALC 64 asks how many rows and columns are required in the spreadsheet. These values are preset at 40 rows and 25 columns but can be changed to any combination of rows and columns that give 2000 cells or less.

After the number of rows and columns has been set, the user is presented with a blank sheet into which numbers may be entered or data loaded from a file created from a previous session. PRACTICALC uses a dual cursor system for the entry of data into the sheet.

One cursor indicates the cell into which the data will eventually be entered and the second shows the position of the next typed character in the input area at the top of the screen. Pressing the RETURN key will transfer from the input area into the cell occupied by the main cursor, without moving the cursor. Pressing any of the cursor control keys enters the data into the appropriate cell and moves the main cursor in the direction indicated. The CLR/HOME key has the same effect, but moves the cursor to the top left corner of the sheet after entering the data. While the data is being entered into the input area it can be edited using the INST/DEL key in the normal edit mode of the 64.

PRACTICALC 64 makes good use of the Function Keys. 'F1' indicates the entry of a formula, while 'F3' is the real workhorse key. The first press of 'F3' presents a menu of items in the input area at the top of the screen. The user then indicates which entry is desired by a single keystroke. Possible entries at this stage are: 'B' to blank the cursor cell; 'C' for clearing the entire sheet (you are asked if you are sure to prevent catastrophic loss of data); 'D' for deleting a row or column; 'F' to change the format of a single cell; 'G' for setting the format of all cells or changing the width of the cells; 'I' to insert a new row or column; 'J' for right justification of labels in cells or to change numbers to graphics form; 'L' for loading files from tape or disk; 'M' to move the contents of a cell; 'P' for printing a sheet; 'S' for saving the contents of a sheet to tape or disk; 'T' for creating title rows and columns or for changing the width of a single column. 'X' for sorting a column of labels or numbers; '@' for initiating the search function and the space bar to count the number of empty cells in the sheet. 'F5' begins a replication operation and 'F7' is an escape key to abort any undesired operations or to

SPREADSHEET

correct mistakes.

Mathematical formulae may include almost any expression that the user might dream up. Included are most of the built-in functions from Commodore BASIC as well as some extras for summing a column and counting entries in a row or column.

Does it work? Yes and it works very well, although I do have some reservations about it (more on that later). As a teacher, I am essentially using it as an automated mark book -- in that regard it is the ultimate! I can "play" with marks and test marks to be sure that I weigh tests and quizzes and exams in such a way as to give the most benefit to the most students, and I can do it quickly without wearing down a set of calculator batteries and my fingernails! The fact that PRACTICALC 64 will sort entries (very quickly) makes it useful for any application which requires ordered entries of any kind. The user's imagination rules in this regard.

PRACTICALC 64 also allows the conversion of numeric data to graphics mode. This conversion can be either a simple set of asterisks or to a "high resolution" bar graph mode. The results can be printed on a Commodore compatible printer. To change to graphics the user presses 'F3' following by 'J' from the sub-menu to change the cell occupied by the main cursor. The rest of a row or column can then

be changed by using the replication function.

The manual supplied is a very well written booklet of 65 pages. Explanations are clear, concise and complete. A complete index helps to find things quickly and easily.

As mentioned above, I have found some things that I would have done differently had I written the program. For one thing, it is not possible to view the disk directory while PRACTICALC 64 is in the machine. Such a facility would help those of you who can't remember file names and provide a check that a just-saved file really exists without having to reload the file. A saved sheet does not 'remember' the column widths if these have been changed from the standard 9 characters, nor does it remember which are the title row and/or column. It is necessary to reset these each time a sheet is recalled from a tape or disk file. In the replication of a formula, PRACTICALC 64 asks if each cell reference in the formula is to be fixed or relative to the cell in which the number is being placed. This is done by using a cursor which is almost impossible to see. More contrast is definitely in order for this cursor; simply going to reverse field would be much better.

In spite of these reservations, I am not sorry that I invested in PRACTICALC 64. I like it; it does what I want it to do and does it very well. I would recommend it to my friends.

ADAMS

But Honey, the computer said
that it was a better design!



THE TOWER OF BABEL

by Herbert Gross
Elgin, Ill.

Fortunately, man did not create computers in his own image. While we can design them to look like us and program them to do tasks in a similar manner to us, the differences are profound...except in one area. For both computers and man there are enough language differences to hinder intra-species communication.

Even among Commodores, which are largely based on the same circuits, by the same manufacturer, the same problem exists. Programs for different PETs will not RUN on each other unchanged. They will have even more difficulty in RUNning on Vics, 64s or the new B series. I recently read an article about a program made to translate Chinese into English. It is ironic that such a program, designed to translate such diverse languages, has to RUN on a specific model of a specific brand of machine.

What I would really like to know is whether the translation of ideagrams from Chinese into English is easier than the translation of variables, values and operations through electrical impulses from DEC, IBM or Apple into Commodore? Perhaps because I am a novice, I take an oversimplistic view of complexities. It still seems to me that, after setting aside operations of color and sound, anything that one computer can put on one screen, another computer can put on another screen. Any operation performed by any other computer can probably be performed by a PET or 64. Though the 'techniques', for want of a better word, and even the technology may be different, the basic operations would be the same.

A translation program is basically a comparison and substitution of one value or operation for another. This is something computers should be able to be programmed to do faster, and more

accurately, than man. The major difficulties to be overcome would be programs that required more memory than the second machine had. Even this could be compensated for, to an appreciable extent, by using some kinds of interactive mass storage techniques.

Let's get back to sound and color. Sound capabilities can be added to virtually any computer without undue difficulty or expense. The add-on might not have the richness of true sound synthesis, but would probably be sufficient for 99% of games, household, business and research applications. Color would simply have to be translated to monochromatic shades. Photographic artists have been working in black and white long after color was easily available. Newspapers usually approximate shades of grey in photos by the spacing of black and white dots. This is virtually identical to the turning off and on pixels in high resolution graphics.

There has to be a change in thinking on the part of some programmers. Usually, and often with good reason, most programmers' efforts are directed toward protecting and restricting access to their programs. One of these days, though, someone will come along, do the opposite and become wealthy. Designing a program to translate yours and others' programs from one machine to another can greatly increase your income. First, it could double income from previously successful machine specific programs. It could double income from future programs. In addition, the translation program itself could be sold or licensed. Aside from monetary factors, it would improve the whole industry. After all, someone who composes a song or writes a book doesn't have to worry about the manufacturer or brand name and model number of the printing press, record or

MACHINE LANGUAGE

phonograph.

Whoever is the first to do it, please hurry!! Our local school district has just purchased some Apples, we have a 64 and

one of my child's friends has a TRS80. It would be so great if they could all learn together and see their own programs running on each other's machines.

CBM CONDITIONAL ASSEMBLY

Mark Niggemann

Ames, Iowa

GOAL OF ARTICLE

To inform other programmers that use the CBM assembler on the C64 about an undocumented feature, that of conditional assembly.

The CBM assembler for the C64 is a fairly inexpensive, yet rather complete, assembly development system. It has to be one of the best assembly development systems for the price (under \$20 in most places). Despite Commodore's good intentions on selling good software at a low price, they did leave out a very important fact about the CBM assembler on the C64. The CBM assembler on the C64 has what is called Conditional Assembly.

Conditional assembly is a very useful means of creating specialized coding using the same source file(s). For example, say, if you have to write a display driver for 40, 64 and 80 columns. Most of the coding for all of them is identical, with the exception of a small patch. Instead of having three separate source modules, you can use Conditional Assembly and include all three. If you use as a variable label COLWID, you just change whatever COLWID is and you have changed the configuration of the display driver. Conditional Assembly is also very useful in the expansion of MACRO's, but I'll let you discover more about that on your own.

HOW DO YOU DO IT?

On the CBM assembler, you have two

conditional assembler pseudo-ops, .IFE and .IFN. .IFE is IF Equal to zero. It means, if the label expression is equal to zero, it will assemble the conditional block of code. .IFN is IF Not equal to zero. If the label expression is not equal to zero, it will assemble the conditional block. A label expression can be just a single label or an expression of labels that are joined by + or -

EXAMPLES:

```
.IFE COLWID-40 <
.;The code would go
.;right here instead
.;of these dots
>
.IFN FLAT <
.;Ditto here
>
```

Notice the '<' on the line following the label expression. This must appear there; otherwise, you will get an assembly error. Also note the '>' on the line after the last line of code in the conditional block. The '>' must be in the first column on the line block. If there isn't one or you don't have it in the first column, then the assembler will crash. Other than that, there isn't much to using conditional assembly.

Conditional assembly is a very powerful tool in the bag of assembly language programming tricks, and it is well worth the effort of this article to bring to light what has been until now an unknown feature of the CBM assembler.

IF YOU OWN A

COMMODORE 64 or VIC-20

\$\$\$

HAVE FUN
and
MAKE MONEY
with a

\$\$\$

TORPETWARE PARTY

(A New Software & Hardware Marketing Concept
from Torpet Magazine)

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STRUCTURED LISTINGS FOR THE COMMODORE 64

Charles Kluepfel

New York, N.Y.

Listing 1 has two parts, both listings of the same program. Which is easier to read and understand? ...the second one, of course. The spaces that make reading easier, but take up precious program space, left out of the program listed at the top, are inserted into the listing at the bottom. That listing also shows only one statement per line, indents FOR...NEXT loops for easier reading, indents conditional statements dependent on an IF...THEN, and shows the ASC11 values of unknown characters (this on a non-Commodore printer). Line 90 was stored with some wild spacing, even putting a space between the two characters of a two-character variable name. The formatted listing corrects all this. The decimal code for PI that the C64 sends out to the printer is 255 or hex FF. My Epson printer interprets this as an instruction to delete the preceding character: thus, the last two characters in quotes in line 70 do not show up at all, as the last tells the printer not to print the next to last. The formatted listing shows the last two characters correctly. The same thing happened on line 80 $X = PI$, with the PI being spelled out as [PI] on the formatted one. Note that within quotes PI is listed as [255], but outside of quotes it is a token that translates to [PI]. See Appendices E and F of the Commodore 64 User's Guide for an explanation of ASC11 codes. The Cardco printer interface on the first listing did rescue some otherwise unprintable codes, but who would know that the italic comma at the end was a CHR\$(172); the formatted listing tells you just what is there. Note that NEXT J,I is expanded, showing in parentheses the imagined second NEXT, as the statement is equivalent to NEXT J: NEXT I, but NEXT J.NEXT I would be invalid syntax; the parentheses say "do not type in that word NEXT".

The concept of making programs easier to read has been called "structured programming", and one of the techniques used is indentation for readability.

In May of 1980, a program called LIST FORMATTER appeared in Call-APPLE magazine, written by Mark Capella. I have been using what I consider an improved version of that program to list my Apple programs. When I got a Commodore 64, I felt the need even more strongly to have such a program. An Apple, in a normal LIST at least, inserts spaces around key words so that all the spaces that it automatically strips away from within input program lines, conserving program space, are provided where necessary to separate words (no two non-key words ever appear consecutively, so all words are separated by at least one space). Accustomed as I am not to type spaces, as they are ignored by the Apple anyway (and they take up precious space in large C64 programs), I felt a strong need to have a C64 version of the LIST FORMATTER. So, I re-wrote it for the Commodore and gained all its benefits.

Four blank lines are printed for each 62 lines of actual printing, thus skipping over perforations. Note that, to get the proper standard format for an IF ... THEN with just a line number, either use IF ... THEN line number, or IF ... THEN GOTO line number; do not use IF ... GOTO line number in your program to be listed; such a line would be listed on one line. When listing to the video screen rather than a printer, the [and] (braces) appear as graphic symbols of a plus sign or cross and a vertical bar, which then surround special symbol designations.

PROGRAMMING

How Do You Use The Program?

First load the program you wish listed into memory. Then type the following:

```
POKE 251,PEEK(43):POKE 252,PEEK(44)
terminating the line with a carriage return.
Then type
POKE 43,PEEK(45):POKE 44,PEEK(46):NEW
again, ending with RETURN. Be sure you
do not make any mistakes, as you are
changing the pointers to the beginning of
BASIC program memory space. Then LOAD
the LIST FORMATTER program previously
saved to tape or disk, and RUN it.
```

You will be prompted TESTING.VIDEO:? The reply is to be two numbers, usually 0.0. If, however, you want to have the listing appear on the TV screen, make the second number non-zero, say type 0.1. Making the first number (testing) non-zero produces a listing that contains some inside information on the locations of the program in memory, and is rarely used. Try it if you would like to learn more about how BASIC is stored internally, and if you can follow the program listing.

If you selected video by making the second number non-zero, you will soon see the listing form on the TV screen. If, however, you specified the second number as zero so that you would get printed output, you will be prompted for some further information first. In response to TITLE:? enter the title of the program followed by RETURN. Then, in response to NAME:? type in your name. In response to DATE:? type in today's date, but remember, do not use a comma or colon in these entries, as they are each input via an INPUT statement, and these characters would cut off the data being input. To the prompt SECONDARY ADDRESSES:? you should respond with two numbers separated by a comma. Usually, a secondary address of 0 indicates the normal upper-case-only mode, while seven indicates upper-and-lower-case mode. The first of the two secondary addresses is for the heading (title, author's name, date) and the second for the actual program listing. I

usually use the 7 for the former, while the latter depends on whether the program being listed was written for upper/lower case. If using 7 for the titles, before responding to the TITLE:? prompt, press Commodore-Shift so that the characters go to lower case on the screen; then use the shift key to enter the headings as you want them printed; be sure not to have the shift down or locked on when pressing RETURN at the end of any input.

Once you have typed in the two secondary addresses, separated by a comma, the listing will start. If you allow it to complete, it will print COMMENTS: at the bottom, thus labelling the final blank portion of a page. You will get a READY back and the program in memory will be the one that had been being listed, and not the FORMATTER program.

If you wish to interrupt the listing while it is still in progress, you have two choices. If you press the STOP key, the LIST FORMATTER program will still be in memory, and you may even modify it and then RUN it again; the listing will start over. Before restarting, press STOP/RESTORE and type CLOSE 4 to assure that the print file is closed. If, however, you decide that you want the listing to stop and you want the program in memory to revert to that one being listed, press the F1 key instead of the STOP key. That will cause a premature end of the LIST FORMATTER as soon as the line being printed at that moment has finished printing, and the subject program will be the only one in memory.

The following is an example of a program, both listed normally and using the LIST FORMATTER program.

LISTING 1

UNFORMATTED

```
10 FORI=5TO25STEP5:FORJ=1TO5
15 IFI=JTHENNEXTJ,I:GOTO50
20 PRINTI,J;
30 PRINTI+J
40 NEXTJ,I
50 FORY=1TO30:PRINTY;:IFY<15THENPRINTSQR(Y);
60 PRINT:NEXT
70 PRINT"(BK)<WH><RD><CY><PU><GR><BL><YL><RV><RO><OR><BR><LR><G1><G2>
(LG)<LB><G3><??><??>."
80 X = "
90 J = 30 + 5 * X Y

READY.
```

list formatter test 1983 Sept 22
C.Kluepfel

LISTING 1

FORMATTED

```
10 FOR I = 5 TO 25 STEP 5 :
    FOR J = 1 TO 5
15         IF I = J THEN
                NEXT J,
                (NEXT) I :
                GOTO 50
20         PRINT I,J;
30         PRINT I + J
40     NEXT J,
    (NEXT) I
50 FOR Y = 1 TO 30 :
    PRINT Y; :
    IF Y < 15 THEN
        PRINT SQR (Y);
60     PRINT :
    NEXT
70 PRINT "(BLK)<WHT><RED><CYN><PUR><GRN><BLU><YEL><RVS><RVSO><ORNG>
<BRWN><LTRD><GR1><GR2><LTGRN><LTBLU><GR3><1><2><172><165><255>"
80 X = (PI)
90 J = 30 + 5 * XY
```

LISTING 2

Listing 2 is the actual LIST FORMATTER program listed normally, except for the [F1] in lines 7003 and 7103. They should be replaced with the actual F1 key character.

```
140 input"testing,video: ";te,vi
150 gosub1000:gosub2000:gosub3000
160 ifvi=0thenprint:print:print:print"comments: "
170 ifvi=0thenprint#4:close4
180 poke45,peek(43):poke46,peek(44):poke43,peek(251):poke44,peek(252):clr:end
1000 rem set up tokens
```



```

1030 iftestingthenprint"setting up tokens"
1040 dimtkn$(128):fori=1to75:readtkn$(i):next
1045 tkn$(128)=chr$(123)+"pi"+chr$(125)
1050 dimrp$(255)
1060 fori=5to31:readrp$(i):next:fori=129to159:readrp$(i):next
1070 return
1130 data end,for,next,data,input#,input,dim,read,let,goto
1140 data run,if,restore,gosub,return,rem,stop,on,wait,load
1150 data save,verify,def,poke,print#,print,cont,list,clr,cmd
1160 data sys,open,close,get,new,tab(,to,fn,spc(,then
1170 data not,step,+,-,*,/,^,and,or,>
1180 data =,<,sgn,int,abs,usr,fre,pos,sqr,rnd
1190 data log,exp,cos,sin,tan,atn,peek,len,str$,val
1200 data asc,chr$,left$,right$,mid$
1300 data wht,,,disc,ensc,,,,rtn,lc,,,csrd,rvs,home,del,,,,,,,red,csrr,grn,blu
1310 data orng,,,,f1,f3,f5,f7,f2,f4,f6,f8,srtn,uc,,blk,csru,rvso,clr,inst,brwn
1320 data ltrd,gr1,gr2,ltgrn,ltblu,gr3,pur,csrl,yel,cyn
2000 rem get headings
2030 ifvi=0theninput"title: ";tt$:input"name : ";fi$:input"date :";da$
2035 ifvi=0theninput"secondary addresses: ";sa(1),sa(2)
2040 return
3000 rem print the listing
3050 ifvideothenthenprint"?"
3060 ifvi=0thenopen4,4,sa(1):cmd4:print:printtt$:printfi$spc(60-len(tt$))da$:lc=3
3065 ifvi=0thenprint#4:close4:open4,4,sa(2):cmd4
3070 iftestingthenprint"main line."
3080 ln=0:tn=0:li$="":srf=0:pb=peek(252)*256+peek(251)
3081 nb=peek(43)+peek(44)*256-pb-1
3090 gosub4000:ifeop=0then3090
3100 return
4000 rem print one numbered line
4040 lp=0:tn=0:qf=0:rf=0:nx=0:df=0
4045 ifpsthengosub7000
4050 gosub6000:x=by:gosub6000:x=by*256+x:nb=nb-2:iftestingthenprint"memptr= "x
4060 iftestingthenprint"nb= ";nb
4070 ifnb<ltheneop=1:return
4080 gosub6000:x=by:gosub6000:lne=x+by*256:nb=nb-2:iftestingthenprint"line #="lne
4090 iftestingthenprint"nb= ";nb
4100 ifnb<ltheneop=1:return
4110 gosub6000:nb=nb-1:ifby=0thenreturn
4114 ifby<128then4135
4115 iftk$(by-127)="rem"andsrfthengosub7100
4120 iftk$(by-127)="rem"andsrf=0thengosub7100:ct=0:srf=1:goto4140
4130 iftk$(by-127)<>"rem"orsrf=0thengosub7100:ct=0:srf=0:goto4140
4135 gosub7100:ct=0:srf=0
4140 printright$(" "+str$(lne),5);:ct=5:goto4160
4150 gosub6000:nb=nb-1:ifby=0thenct=0:return
4160 lp=lp+1
4165 ifct>79thengosub7000
4170 ifby>127andqf=0thengosub5000:goto4150
4180 ifby=32andqf=0andrf=0anddf=0then4150
4200 ifct<8+in+tnthenprintspc(8+in+tn-ct);:ct=8+in+tn
4220 iflp=landrf=0andtf=0thenprintspc(8+in+tn-ct):ct=8+in+tn
4224 iflp<>lorrf>0ortf=0then4230
4225 ifby>=48andby<=57thenprintspc(8+tn+in-ct)"goto ";:lp=lp+5:ct=8+in+tn+5

```

```

4230 ifby=asc(":")andqf=0thenprint " ";:nx=0:ct=ct+1
4235 ifct>79thengosub7000
4240 iflp=landtftthenprintspc(8+in+tn-ct);:ct=8+in+tn
4250 iflp=landby=32then4150
4253 ifby>3landby<96or(by>3landby<128orby>19landby<224)and(sa(2)>=6)then4262
4255 ifrp$(by)>""then4259
4256 s$=mid$(str$(by),2):ifct>79-len(s$)-1thengosub7000
4257 printchr$(123)s$chr$(125);:ct=ct+len(s$)+2:goto4270
4259 ifct>79-len(rp$(by))-1thengosub7000
4260 printchr$(123)rp$(by)chr$(125);:ct=ct+len(rp$(by))+2
4261 goto4270
4262 printchr$(by);:ct=ct+1:ifct>79thengosub7000
4270 ifby=34thenqf=1-qf
4275 ifct>79thengosub7100
4276 ifby<>asc(",")ornx=0then4280
4277 iftn=0orli$="f"thenin=in-4
4278 lp=1:gosub7100:printspc(8+in+tn)"(next) ";:ct=8+in+tn+7
4280 ifby<>asc(":")orqfthen4150
4285 df=0
4290 gosub6000:nb=nb-1:ifby=0thengosub7100:ct=0:return
4300 ifby=asc(":")then4160
4310 gosub7100:lp=1
4320 goto4170
5000 rem print a token's meaning
5030 tf=0
5040 iflp>1thenprint " ";:ct=ct+1
5045 ifct>79thengosub7000
5050 iftk$(by-127)="next"thennx=1:iftn=0orli$="f"thenin=in-4
5060 iflp=1thenprintspc(8+in+tn-ct);:ct=8+in+tn
5065 ifct>79-len(tkn$(by-127))thengosub7000
5066 ifct<8+in+tnthenprintspc(8+in+tn-ct);:ct=8+in+tn
5067 iftk$(by-127)=""thenprintchr$(123)mid$(str$(by),2)chr$(125)"";:ct=ct+5:
    goto5074
5070 printtkn$(by-127)"";:ct=ct+len(tkn$(by-127))+1
5074 ps=0:iftn>0then5080
5075 iftk$(by-127)="goto"ortk$(by-127)="return"ortk$(by-127)="end"thenps=1
5076 iftk$(by-127)="run"ortk$(by-127)="stop"thenps=1
5080 iftk$(by-127)="for"thenin=in+4:li$="f":return
5090 iftk$(by-127)="then"thengosub7000:tn=tn+4:lp=0:tf=1:li$="t":return
5100 iftk$(by-127)="rem"thenrf=1
5105 iftk$(by-127)="data"thendf=1
5110 return
6000 rem get next byte of program
6030 iftestingthenprint"";
6040 by=peek(pb):pb=pb+1:return
7000 print:lc=lc+1:iflc>6landvi=0andte=0thenprint:print:print:print:lc=0
7003 getx$:ifx$="[F1]"then170:rem fl
7004 ifvi=0thencmd4
7005 printspc(8+in+tn);:ct=8+in+tn
7010 return
7100 print:lc=lc+1:iflc>6landvi=0andte=0thenprint:print:print:print:lc=0
7103 getx$:ifx$="[F1]"then170:rem fl
7104 ifvi=0thencmd4
7105 ct=0
7110 return

```

PRINTER

THE 1526 -- GOOD PRINTER, LOUSY MANUAL

Howard M. Mesick
Hartly, DE

I'm very happy with my new Commodore 1526 printer. It hooks up directly to my VIC (or your 64) through a 3-1/2 foot (too short) cable, without need for an expensive interface. While it doesn't have the print enhancement options of the Epsoms, it doesn't need them. Its regular 8x8 matrix is very sharp and pleasing. One problem: the nines look almost like eights. Only the OKI 92 and the IDS 480 do better, for 50% more at a discount, plus interface.

Nominally a pica machine (10 characters/inch), my 1526 squeezes 32 letters and spaces into 3 inches, close enough. Double- and quad-wide characters also print. A platten allows the use of single sheets, while the tractor width is adjustable, unlike some more expensive friction/pinfeed competitors.

Great device, great price!

Only one component is clearly defective, part #983001810 -- the "friendly" user's guide. Lucky for you that aging pot-bellied boy geniuses like me are around to fill in the instructions that Commodore left out.

SET-UP SNAGS

The first major omission is in the section, "Preparing to Use Your Printer". While mention is made that you should take out any "foreign material that may have fallen into the mechanism", you are not told to remove the tape holding down the print head or the little plastic block next to the head. Please do so. On the bottom of the 1526 are two Phillips bolts labelled shipping screws. Though the manual didn't even hint at their existence, I took them off. You may leave them in at your own risk. Having assembled umpteen mechanical and electronic devices, I have

never met a shipping screw, bolt, brace or gizmo that wasn't meant to be removed before operation.

In the same prep section is this marvellous obfuscation.

"Hold the ribbon cartridge with the plastic knob at the top left side, then set it on the two side frames of the printer mechanism with tilting the cartridge so the two front hooks on the side frames be engaged with two catches on both the left and right sides of bottom of cartridge, then steer down while pressing the ribbon side so the two side tabs of cartridge are positioned into the slots on the side frames of the printer mechanism."

Whew!

The illustrations show pretty well how to install the ribbon, which looks very much like an Epson MX-80 cartridge. I've heard that Epson makes the 1526. Just be careful, when loading the cartridge, that you slip it far enough forward, away from the print head, so that only the ribbon itself is near the platten. Then, if it is properly centered right to left, it should snap in. Never force it, but try to match tabs on the cartridge with niches in the chassis.

Oh yes. Swing the paper bail up out of the way first, or you will snag the ribbon. The bail is that little rod with two rubber rollers on it on the top front of the platten. The platten is the large black roller around which the paper goes. But you already knew that, right?

The Commodore guessbook shows how to install the wire paper holder, but doesn't mention that you must route incoming continuous forms UNDERNEATH it, so that printed sheets may accumulate on top of it. Never use this rack to hold a box of

PRINTER

feed paper. That will bend it or pull the printer off the table.

Loading the paper isn't really explained, but should be obvious to anyone who has used a typewriter. It's easier to use the knob on the side of the housing to advance the paper than the paper feed button that Commodore recommends.

One important control not described or shown is the pressure release lever just to the left of the platten. (I always speak as though you were facing the front of the printer.) When pulled toward you, it releases the pressure rollers beneath the platten, allowing the paper to slide around somewhat. This looseness enables you to adjust a single sheet of paper so that it is perfectly straight. Then you can push the lever back to lock the paper tight so it won't shift during printing. Always keep the lever forward when printing on continuous forms. If you don't, slight speed differences between the tractor and the tight platten will eventually tear, crinkle or skew your paper. A resulting paper jam could damage the 1526.

Both tractors are very hard to slide to adjust for paper width. The left pinwheel moves only about 1/2 inch right and left. Don't try to move it farther. The right pinwheel will slide left past the centre of the platten. Hold the rod on which they are mounted when you adjust them, and apply force as gently as possible to ease strain on the chassis.

PROGRAMMING PITFALLS

If you don't know BASIC, you probably won't want to learn it by programming this device. If you do know it, you'll probably muddle through. Explanations of the various commands aren't very clear. Many vital steps are shown in the examples, but never covered in the narrative. In some cases, questions are answered further along so, when in doubt, keep reading. A VIC or 64 programmer's reference manual can sometimes clear up the murk. Often, you'll just

have to play around to see for yourself how a command works.

The format control commands, being peculiar to this smart peripheral, are the only ones not explained in other books. These are sent to the 1526 through a third and optional parameter of the OPEN command called the "secondary address" or "SA". SA's regulate the printing of dollar signs, leading zeros, PET graphics, user-defined characters, lines per page, line spacing, diagnostic messages, etc.

The manual says 11 SA's are available, then lists only 10, 0 through 9. That list is wrong. There is no #8. 8 should be 9, and 9 should be 10. Cut and paste marks indicate that an 11th control code once existed, but was removed. In the individual examples, the two last SA's are correctly numbered 9 and 10. Does this deletion have anything to do with the recall of this printer after it was released last June?

The 1526's on-board RAM can hold only one user-defined character at a time, printing it when CHR\$(254) is sent by the program. Yet any shape that can be created in an 8x8 dot matrix can be placed in that RAM by sending a character string variable containing the shape. Thus, an entire character set can be held in the computer's memory. The characters must be sent one at a time, then printed in a following instruction. To do that, the 1526 must be OPENed as two different files -- one to send the special characters to printer RAM, and another to print them and everything else. Important: only one user-defined character can be printed on a line, though it can be repeated on that line many times. Use of PET graphics is unlimited.

Control code 10 is the printer reset. It is not explained at all! According to common sense and my own experiments, it works the same as turning the machine OFF then ON again. It wipes out all format instructions and returns the print head to the far left. It's easier on the

PRINTER

electronics to use SA10 than the power switch.

Instead of the skip (blank) character, CHR\$(29), spaces enclosed in quotes usually work. A semicolon does the same as in a screen print command, while a comma inserts 11 blanks. SPC works if it isn't the first item in a print command. TAB acts like SPC instead of the screen TAB.

When setting the number of lines per page, do not include the six lines that the 1526 automatically skips at each page break. If you want 33 lines/page (double spacing on 11" paper), for example, code in 27. To set the number of lines per inch, the user's guide says to divide 144 by the number of lines desired and plug the quotient into the command. WRONG! Divide the lines/inch figure into 216. Then use that quotient. Example: to get 3 LPI (double spacing), $216/3=72$. Plug in 72.

Commodore has made its fortune by mass-producing state-of-the-art equipment dirt cheap. If it ever does release its new business machines, it should thin out the flock of stale turkeys that sell for over \$50 a pound because of three silly initials on their faceplates. Even though the Fortune 500 boys buy prestige rather than value, lots of small businessmen will appreciate reasonable prices. But big, billion-dollar-a-year Commodore will have to stop putting out manuals that look like preliminary documentation from upstart companies that can't afford to do it right. It could at least hire some smart Alec like me to tell it what non-technical users might not understand.

Keep this article around, Kiddies. If you ever purchase Commodore's little best buy, the 1526, you'll need it.

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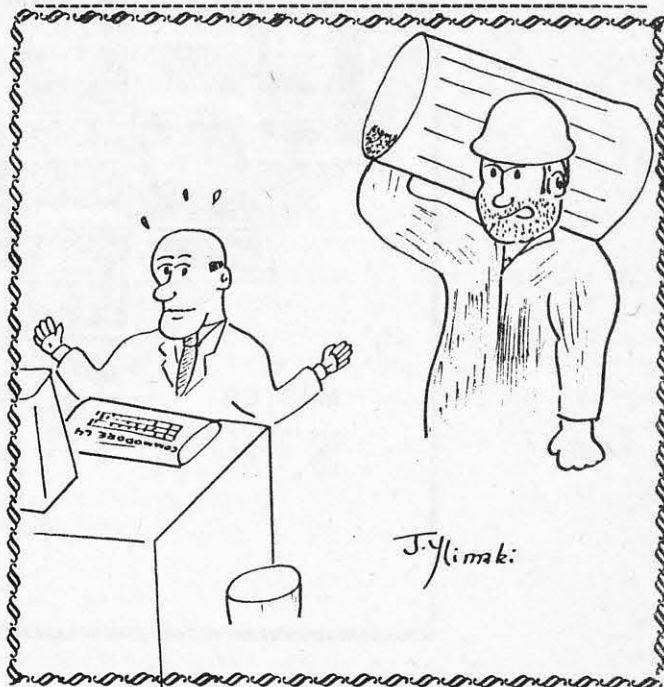
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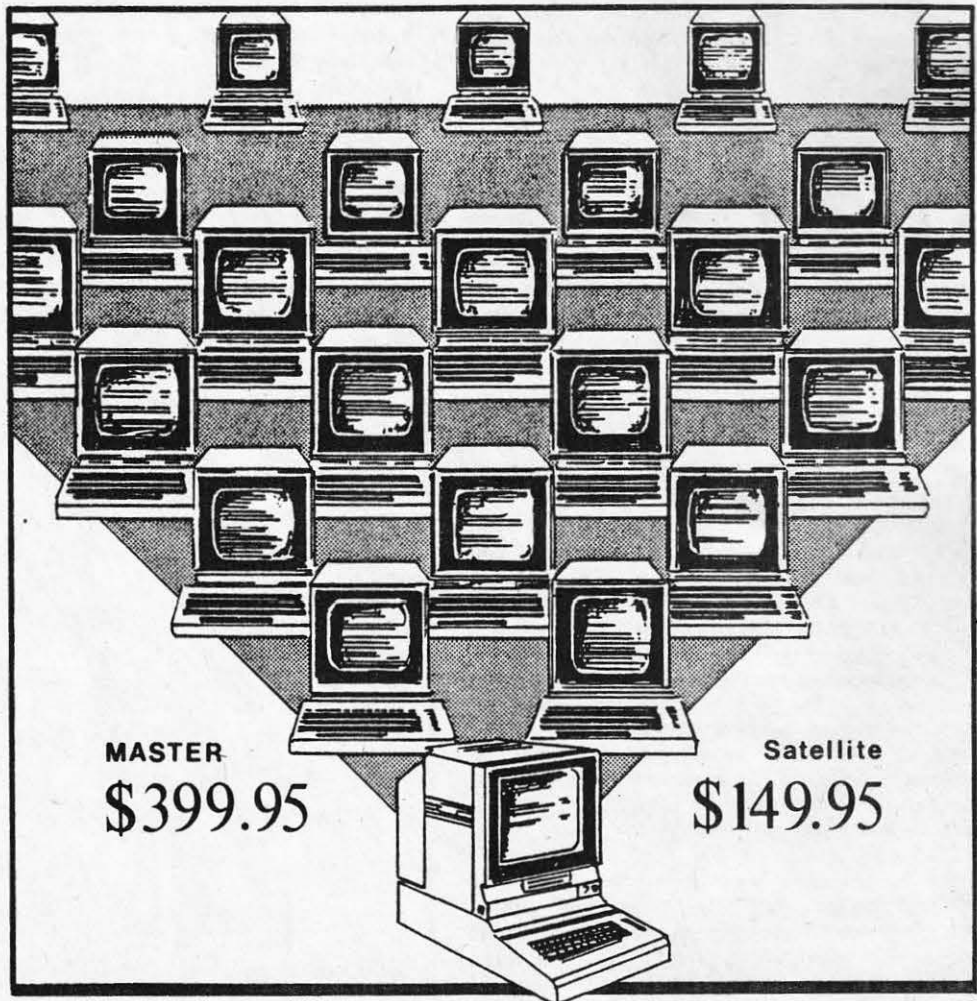
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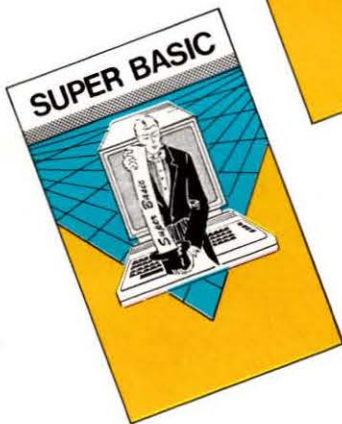
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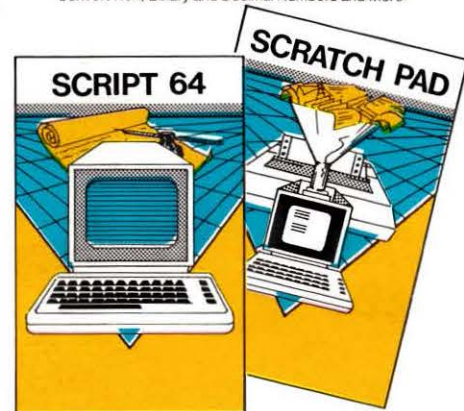
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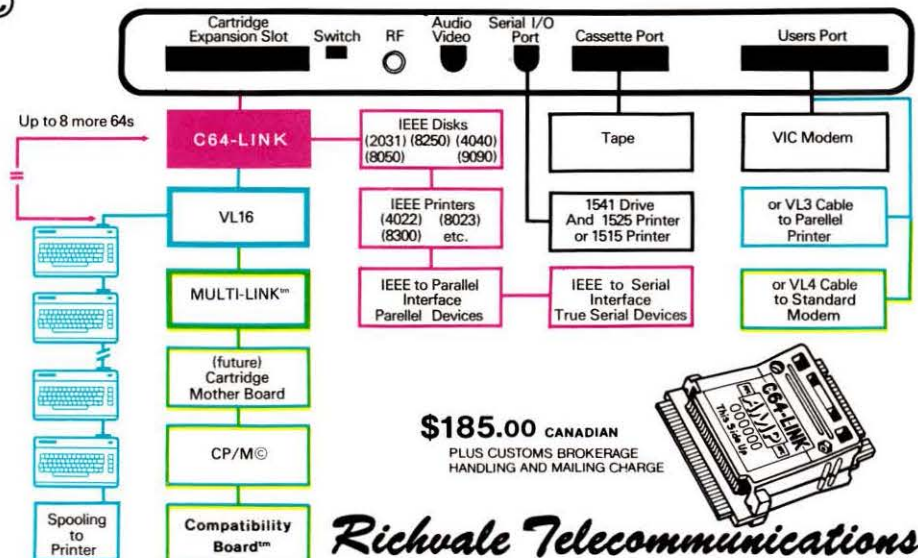
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