and you'll see that the line has changed to

```
A 01500 A2 00 LDX #$00
```

The machine code in addresses 1500 and 1501 (bank 0, but in this area that's the same as bank 15) is hex A2 00. These two bytes have been placed in memory, and the monitor is ready for your next line of code; in fact, it has typed part of it for you. Complete the next line so that it reads

```
A 01502 LDA #$2A
```

This instruction, when the program runs, will load the ASCII code for an asterisk (hex 2A) into the A register; that's the register we use for printing. Continue with

```
A 01504 JSR $FFD2
A 01507 INX
A 01508 CPX #+20
```

The first instruction in this group prints a character, calling the Kernal ROM routine usually known as BSOUT (also known in the Commodore 64 as CHROUT). The next adds one to the X register, which we're using as a counter. The last instruction says, "Compare the counter with decimal 20." Note the plus sign for decimal. When you press RETURN, the line changes to

```
A 01508 E0 14 CPX #$14
```

The value 20 has been changed to hexadecimal. Don't be surprised; it's still the same number. Continue entering with

```
A 0150A BNE $1504
A 0150C LDA #$0D
A 0150E JMP $FFD2
```

The instruction BNE $1504 sends the program back to print again if we haven't reached 20 characters. The sequence LDA #$0D:JMP $FFD2 prints a carriage return and terminates the program (we know that the ROM routine at $FFD2 ends with RTS, so we can save a little code by using that RTS to return, rather than ending with the more conventional JSR $FFD2:RTS). After typing the last line, the computer prompts you with A 01511. Simply press RETURN to end the assembly.

If you like, you can proofread your program by entering the command D 1500 150C. The D command is for disassemble, which performs an activity more or less the reverse of an assembly.

Starting Up

You can go to this program with a G (go) command, which doesn't permit a return. Better, you can call it with a J (jump subroutine) command. But first, *you must think about what bank you are in.*

If you enter the command J 1500, you'll have a disaster on your hands. Why? Because you're entering bank 0 which contains no Kernal ROM and no I/O chips. Remember, the program uses the Kernal ROM routine BSOUT to print each character. If you JSR to this routine when the Kernal ROM is absent, you'll never print those asterisks, and your program will almost certainly fail. If you really want to call this program from the machine language monitor, invoke bank 15 with J F1500.

It's also quite simple to call the routine from BASIC. First, find the starting address. Type $1500 and read the answer, decimal +5376.

Back To BASIC

Return to BASIC by giving the X (exit) command. You'll see the familiar READY response of BASIC. Now type NEW (don't worry, your machine language program won't be harmed) and enter the following program:

```
100 BANK 15
110 SYS 5376
120 PRINT "THIS WORKS"
130 SYS 5376
140 PRINT "WITHOUT PROBLEMS"
150 SYS 5376
```

Run the program and you should see a row of asterisks. If you've done these exercises, you should have a feeling for the 128's machine language monitor. It's convenient and flexible. In upcoming articles we'll learn more about the monitor, and how to link BASIC and machine language programs together. ©

COMPUTE!
TOLL FREE
Subscription
Order Line
1-800-247-5470
In IA 1-800-532-1272

Copies of articles from this publication are now available from the UMI Article Clearinghouse.

For more information about the Clearinghouse, please fill out and mail back the coupon below.

UMI Article Clearinghouse

Yes! I would like to know more about UMI Article Clearinghouse. I am interested in electronic ordering through the following system(s):

☐ DIALOG/Dialorder ☐ ITT Dialcom
☐ OnTyme ☐ OCLC ILL Subsystem

☐ Other (please specify)_____
☐ I am interested in sending my order by mail.
☐ Please send me your current catalog and user instructions for the system(s) I checked above.

Name_____
Title_____
Institution/Company_____
_____
Department_____
Address_____
City_____ State_____ Zip_____
Phone (_____)_____

Mail to: University Microfilms International
300 North Zeeb Road, Box 91 Ann Arbor, MI 48106

www.commodore.ca

Stringing Atari Machine Language

Robert Martinsons

Storing Atari machine language in a string is a time-honored technique, but how do you get the ML into the string in the first place? This program does the job automatically, creating the necessary string and appending it to the BASIC program of your choice. It's easy and very fast.

A good way to enhance the performance of BASIC programs is to use machine language subroutines for tasks which either take too much time or consume too much memory. And one of the most popular places to store short ML routines is in an Atari BASIC string. Once the ML code is stored in a string, BASIC's ADR function can calculate the string's address, and the USR function can call it.

Short machine language routines can be dealt with by manually typing them into strings, but this can be somewhat tricky, since it usually involves typing strange-looking control characters. Another possibility is to use DATA statements which BASIC can READ under program control. Neither of these methods is attractive for large routines, however. Substantial ML programs are usually written with an editor/assembler, which produces a binary file as output. The problem, then, is how to convert the contents of a binary file into a string that BASIC can easily handle.

The routine that accompanies this article solves the problem of converting binary files into string form. It reads binary data from a disk or tape file, stores it in a series of strings through the editor's *forced read* mode, then deletes itself from memory. Type in the program lines listed below, then LIST the routine to disk or tape. Do not save the routine: It must be LISTed so that you can later ENTER it into memory without disturbing a program that's already present.

Stringing Along

To use the routine, first load the BASIC program to which you would like to add a machine language routine. Of course, the ML routine is one which normally resides in a binary file. (Note that the ML routine *must* be relocatable, since Atari BASIC strings can move around in memory while a program runs.) The BASIC program must not use any line numbers higher than 31499, since this routine itself uses the lines beginning at 31500. Next, ENTER the routine from disk. This brings it into memory without altering the BASIC program. To activate the routine, type GOTO 31500 and press RETURN.

The program begins by requesting the filename of your binary file. Be sure to include the correct device prefix in your response. For instance, to read the binary file CODE.BIN from disk, enter D:CODE.BIN at the prompt. At the next prompt, enter the name of the BASIC string which will hold your machine code. Limit the name to eight characters or fewer (if you enter too many characters, the routine automatically truncates the name). Answer the last prompt with the line number where you want the new ML strings to begin. When answering this prompt, you should take care not to start the new lines at a place which would overwrite existing lines. A safe rule of thumb is to allow ten line numbers for every 256 bytes of machine language.

At this stage, the routine begins reading the ML code into memory and converting it into strings. When the process is complete, the routine deletes itself, leaving your original program plus the strings that contain the machine language. Before you can resave the program, you must manually add a DIMension statement for the new string and add USR calls for the routine where needed. It's also a good idea to LIST the revised program to disk, type NEW, and ENTER it again, before saving it a final time. In this way you can clear out all the variables used by the deleted routine.

The Editor Does All The Work

For those who are interested, here is a short explanation of how the

www.commodore.ca

From the publishers of *COMPUTE!*

September 1986 *COMPUTE!* Disk

All the exciting programs from the past three issues of *COMPUTE!* are on one timesaving, error-free, floppy disk that is ready to load on your Atari 400/800, XL, and XE. The September 1986 *COMPUTE! Disks* contain the entertaining and useful Atari programs from the July, August, and September 1986 issues of *COMPUTE!*.

The September 1986 *COMPUTE! Disk* costs $12.95 plus $2.00 shipping and handling and is available only from COMPUTE! Publications.

For added savings and convenience, you may also subscribe to the *COMPUTE! Disk.* At a cost of only $39.95 a year (a $12.00 savings), you'll receive four disks, one every three months. Each disk will contain all the programs for your machine from the previous three issues of *COMPUTE!*. To order a subscription, call toll free 800-247-5470 (in IA 800-532-1272).

This is an excellent way to build your software library while you enjoy the quality programs from *COMPUTE!*.

Disks and subscriptions are available for Apple, Atari, Commodore 64 and 128, and IBM personal computers. Call for details.

For more information or to order individual issues of the September 1986 *COMPUTE! Disk,* call toll free 1-800-346-6767 (in NY 212-887-8525) or write *COMPUTE! Disk*, P.O. Box 5038, F.D.R. Station, New York, NY 10150.

COMPUTE!™ Publications, Inc. abc

Part of ABC Consumer Magazines, Inc.
One of the ABC Publishing Companies
825 7th Avenue, 6th Floor, New York, NY 10019

Publishers of COMPUTE!, COMPUTE!'s Gazette, COMPUTE!'s Gazette Disk, COMPUTE! Books, and COMPUTE!'s Apple Applications

www.commodore.ca

conversion routine works. All Atari binary files have a six-byte header, which contains the information shown in the table.

Typical Binary File Header

Byte	Number	Number	Description
1	255	FF	Identification
2	255	FF	code for binary load file
3	0	00	Starting address (LSB)
4	10	0A	(MSB)
5	72	4C	Ending address (LSB)
6	13	0D	(MSB)

The conversion routine opens the binary file and executes a CIO (Central Input/Output) system call to bring in the first six bytes. It examines these and confirms that you have accessed a binary file, and then computes the file size by subtracting the starting address from the ending address. Next, a subroutine which dimensions a temporary string (TEMP$) is created and executed. For the sample header shown, the dimension of TEMP$ will be 841. TEMP$ becomes the input buffer for the next CIO call which reads in the remainder of the binary file.

A loop beginning at line 31610 now begins to break the data from TEMP$ into segments short enough to be stored in a BASIC line. Each new string will hold 90 bytes unless we find the ATASCII equivalent of a quotation mark (34) or carriage return (155). These values are handled separately to avoid confusing the screen editor.

The POKEs in the subsequent lines switch the editor into forced read mode, causing it to enter the new line just as if you'd typed it manually and pressed RETURN. Because the address of TEMP$ moves every time the editor enters a new line, its address is recomputed at the beginning of each loop. After the last byte of data has been packed into the new string, the conversion routine again uses forced read mode to delete itself from the finished program.

Chances are that you've been using a more manual method of embedding your assembly language routines into BASIC. If so, this routine should become a welcome part of your toolkit. Sit back and enjoy watching the screen editor do all the work. A final note: Every effort was made to keep the program as compact as possible. Therefore, no REMark statements are included and error trapping is held to a minimum.

String Atari Machine Language

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing In Programs" in this issue of COMPUTE!.

```
BD 31500 CLR :GRAPHICS 0:IND
         EX=1:LINENO=0:STRTL
         INE=45:DIM BUFFER$(
         8),FILNAM$(15),STRN
         AME$(8),A$(1):CIO=A
         DR("h■{P}LV■")
GN 31510 ? "Enter filename f
         or binary load file
         ":INPUT FILNAM$
BO 31520 ? "Enter BASIC stri
         ng name":INPUT STRN
         AME$
NL 31530 ? "Enter starting l
         ineno for string":I
         NPUT LINENO
PK 31540 A=ADR(BUFFER$):OPEN
          #1,4,0,FILNAM$:POK
         E 850,7:B=INT(A/256
         ):POKE 852,A-256*B:
         POKE 853,B:POKE 857
         ,0
CO 31550 POKE 856,6:N=USR(CI
         O):IF PEEK(A)<>255
         OR PEEK(A+1)<>255 T
         HEN CLOSE #1:? "ERR
         OR: Not a binary fi
         le":STOP
HC 31560 FILSIZ=(PEEK(A+4)+2
         56*PEEK(A+5))-(PEEK
         (A+2)+256*PEEK(A+3)
         )+1
PH 31570 GRAPHICS 0:POSITION
          2,4:PRINT "31750 D
         IM TEMP$(";FILSIZ;"
         ):RETURN"
FK 31580 PRINT "CONT":POSITI
         ON 2,0:POKE 842,13:
         STOP
FK 31590 POKE 842,12:GOSUB 3
         1750:TEMP$(1)=" ":T
         EMP$(FILSIZ)=" ":TE
         MP$(2)=TEMP$:ADDRES
         S=ADR(TEMP$):B=INT(
         ADDRESS/256)
OC 31600 POKE 852,ADDRESS-25
         6*B:POKE 853,B:B=IN
         T(FILSIZ/256):POKE
         856,FILSIZ-256*B:PO
         KE 857,B:N=USR(CIO)
         :CLOSE #1
FB 31610 GRAPHICS 0:ADDRESS=
         ADR(TEMP$):POSITION
          2,4:LINELIM=INDEX+
         89
OL 31620 IF LINELIM>FILSIZ T
         HEN LINELIM=FILSIZ
OM 31630 A$=TEMP$(INDEX,INDE
         X):IF A$=CHR$(34) O
         R A$=CHR$(155) THEN
          31690
CA 31640 LINESTRT=INDEX:FOR
         INDEX=LINESTRT TO L
         INELIM
CM 31650 A$=TEMP$(INDEX,INDE
         X):IF A$=CHR$(34) O
         R A$=CHR$(155) THEN
          LINEND=INDEX-1:GOT
         O 31670
PC 31660 NEXT INDEX:LINEND=L
         INELIM
HK 31670 PRINT LINENO;" ";ST
         RNAME$;"$(";LINESTR
         T;",";LINEND;")=";C
         HR$(34);
FK 31680 FOR I=LINESTRT TO L
         INEND:? "{ESC}";TEM
         P$(I,I);:NEXT I:? C
         HR$(34):GOTO 31700
BM 31690 ? LINENO;" ";STRNAM
         E$;"$(";INDEX;",";I
         NDEX;")=CHR$(";ASC(
         A$);")":INDEX=INDEX
         +1
LB 31700 LINENO=LINENO+1:PRI
         NT "CONT":POSITION
         2,0:POKE 842,13:STO
         P
BC 31710 POKE 842,12:IF LINE
         LIM<FILSIZ THEN 316
         10
GP 31720 GRAPHICS 0:POSITION
          2,4:FOR I=31490 TO
          31650 STEP 10:? I:
         NEXT I:? "CONT":POS
         ITION 2,0:POKE 842,
         13:STOP
FB 31730 POKE 842,12:GRAPHIC
         S 0:POSITION 2,4
OB 31740 FOR I=I TO 31750 ST
         EP 10:? I:NEXT I:?
         "POKE 842,12":POSIT
         ION 2,0:POKE 842,13
         :STOP
```

©

COMPUTE! Subscriber Services

Please help us serve you better. If you need to contact us for any of the reasons listed below, write to us at:

COMPUTE! Magazine
P.O. Box 10954
Des Moines, IA 50340

or call the Toll Free number listed below.

Change Of Address. Please allow us 6–8 weeks to effect the change; send your current mailing label along with your new address.

Renewal. Should you wish to renew your **COMPUTE!** subscription before we remind you to, send your current mailing label with payment or charge number or call the Toll Free number listed below.

New Subscription. A one year (12 month) US subscription to **COMPUTE!** is $24.00 (2 years, $45.00; 3 years, $65.00. For subscription rates outside the US, see staff page). Send us your name and address or call the Toll Free number listed below.

Delivery Problems. If you receive duplicate issues of **COMPUTE!**, if you experience late delivery or if you have problems with your subscription, please call the Toll Free number listed below.

COMPUTE!
1-800-247-5470
In IA 1-800-532-1272

www.commodore.ca

Sandbox Fred And His Media Maniacs

Recently, while I was in Vancouver, Canada, at the World Congress on Education and Technology, I was asked to teach an intensive week-long teacher's workshop at Simon Fraser University, one of Canada's leading universities. The first night of my course at Simon Fraser, I learned that most of the teachers taking my course were novices in electronic media, and that some of them had never even touched a computer. They saw me as a media expert and hoped the course would give them some hands-on experience creating teaching units with different media equipment.

The learning resources center where I taught the course has one of the richest collections of electronic media that I have ever seen. To be frank, there were so many darkrooms, multitrack tape decks, audio/video mixers, computers, projectors, and the like, that it was downright intimidating. Even I was scared, so how were my fearful teachers to acquire the courage to use all that stuff?

Electronic Sandbox

As I stood in front of my class that first night, I dug deep inside myself for the one thing that I stood for, the one thing that would charge up the class to leap into the media with gusto and pizzazz. Then I thought of the magic word: *sandbox*. To me a sandbox is more than four boards and a bag of sand. It is a metaphor for play, storytelling, world building, and for a child's personal journey of exploration and discovery. And sand is a metaphor for what good media should be—rich, malleable, and gritty. Playing with media should be a multisensory experience. As with sand, you should smell it, taste it, and touch it. It should get in your ears, in your shorts, and in your hair.

I told my teachers that I was not a media expert nor a teacher, but an author. And what I could bring to the course was not technical expertise, but my imagination, my gift for storytelling, and my playfulness. I wasn't going to teach them. I was going to climb into the sandbox with them as "head kid." This approach was not what the teachers expected, but it turned out to be just what they needed.

We began the week with imagination exercises: We closed our eyes and tried to imagine holding a baby. We tried to smell the baby, touch the baby, taste the baby, see the baby, and hear the baby coo, laugh, and cry. We explored how media affects the imagination and how imagination is instrumental in creating good media. Although many of the students had never used a computer before, some had, and the veterans coached the beginners so they could sign on to the university's network. Beginning that first night we kept an electronic journal online that eventually amounted to 50 typed pages. We used the journal to reflect on the week's experiences and to examine the effectiveness of the sandbox approach to learning electronic media.

The teachers eventually divided themselves, according to their interests, into four groups:

- Mandalas (video, animation, sound synthesis, poetry, the arts)
- Choclit (a cartoon with sound synthesis)
- The Sandbox Saga (desktop publishing)
- The Media Maniacs (a documentary video of our week together)

Although no one had planned it, all the groups became intensely involved in storytelling and the imagination. And the groups divided neatly into Mandalas and Choclit, which were an exercise of the imagination looking outward, and Sandbox Saga and Media Maniacs, which showed the imagination looking inward at ourselves. The Media Maniacs theme came from the *Fred's Media Maniacs* buttons that one of the teachers made for us with the help of his mentally retarded students.

Jumping In Headfirst

By week's end I knew that grown-up, high-tech sandboxing can really work. Teachers threw themselves into their projects with ferocious energy and creativity. They mastered machines that they had never even seen before, fussed with buggy software and malfunctioning equipment, and moved on. Nothing stopped them. And their movies, stories, and cartoons were delightful.

But sandboxes have their dark side, too, and we stumbled into this area often. Playing is good, but sometimes there is nothing in a sandbox to play with. My metaphor of a sandbox as a free, unstructured environment encouraged the teachers to be childlike and playful, but they needed guidance and instruction to produce real results. "It's exciting to watch people playing in a sandbox," said one of my students. "But it's no fun at all if you can't get in."

The best part came at week's end when we held a Sandbox Media Festival for a class of computer software teachers. All the teachers' products were terrific, but I especially liked the ones done by the Media Maniacs. One of its producers, Morey, had gotten his three-year-old son, Cameron, to play the part of Sandbox Fred as a child. In the sequence Cameron zigs and zags around the sandbox in his red shorts and a white sun hat and says, "I'm Sandbox Fred, and I like to play in sandboxes. I'm Sandbox Fred, and I like computers. I'm Sandbox Fred, and I have to go potty on the tree." ©

www.commodore.ca

Sampled Sounds

While the debate continues to rage over the destiny of the home computer, specialized programmable computers are showing up in people's homes in record numbers. These computers are the inexpensive music synthesizers manufactured by Casio, Yamaha, Seiko, Kawai, and several others.

In an earlier column I mentioned that the acceptance of the MIDI interface standard has resulted in a powerful merging of synthesizer technology with personal computers. I expect that within a few years every new personal computer will have a built-in MIDI interface.

Music For Everyone

Our love affair with music is extraordinary. At any time of the day or night you can turn on your radio and find that the vast majority of stations are playing music. Given the popularity of recorded music and concerts, you might conclude that we are more interested in hearing music than making it. While this is probably true to some extent, it's not as pervasive as it seems. Musical instruments sell briskly.

Millions of people want to enjoy music by playing it themselves. Historically there have been two barriers to this creative urge. The first is the difficulty of learning to play a conventional musical instrument, and the second is the difficulty of learning to read and write music using traditional notational schemes. Faced with the need to practice for years, many would-be musicians give up in frustration.

From the moment it is brought home, the modern digital synthesizer allows music to be created. Unlike a real trumpet, whose first sounds seem better suited for burglar alarms than for music, a synthesized trumpet sounds sweet from the very beginning.

In addition to providing high-quality sounds, the inexpensive modern synthesizer provides additional help to musicians in the form of sophisticated rhythm sections, automatic arpeggios and chords, and even the ability to sequence several tracks of music into a completely orchestrated piece. All these features can be found at the local discount store for under $200.

New Instruments

If I felt for a moment that synthesized instruments were going to replace traditional instruments, I would be concerned. Instead, we are seeing the synthesizer emerge as a class of instrument in its own right, taking its place next to traditional instruments.

The most exciting aspect of synthesizers is that they can produce sounds unavailable in traditional instruments. If you think about it, musical sounds are made in one of four ways: by hitting something (drums or pianos), plucking something (harpsichords, guitars), blowing air into or across something (organs, horns), or scratching two things together (violins). The synthesizer can emulate many of these sounds, but more importantly, it can be used to create sounds that can't be made by traditional methods. This allows the design and creation of new musical instruments by a new breed of craftsperson—one who works with programs rather than with chisels and glue.

The SK-1

If there is a major limitation to modern synthesizers, it is that new sounds can be hard to implement. For instance, the Yamaha DX-7, one of the standard instruments in the field, is difficult to program without the use of a separate computer.

A recent entry into the low-cost synthesizer market has made this task a lot easier. This instrument is Casio's SK-1 sampling keyboard, which retails for well under $200. The computer in the instrument allows sounds to be captured from external sources through a built-in microphone. Suppose you would like to make an instrument that sounds like a hammer hitting a pipe. To capture this sound, you need only place the SK-1 near a pipe (an external mike can be used), press the Sample key on the synthesizer, and hit the pipe with a hammer. The internal computer samples the sound for 1.4 seconds, encodes the sound digitally, and stores it in about 14K bytes of RAM. The sound you record is assigned to the A key. Once the sound is entered, you can play it at any pitch by pressing the appropriate key on the keyboard. You can also modify the sound's envelope after it is recorded.

Experimentation

The most exciting aspect of this instrument, and others like it, is that it stimulates creative experimentation. If it took hours to create new sounds, you might be reluctant to try offbeat ideas, simply because they might turn out to be a waste of time. With the SK-1, a new sound can be captured in a few seconds. As a result, new owners of the instrument typically spend the first day or so capturing everything from motorcycle engines to recited poetry and using these sounds to create new music.

This playful aspect of the synthesizer is its greatest strength. The computer in this synthesizer is completely transparent to the user. There is no barrier between your goal—music making—and a satisfying result. Technology has receded into the background to facilitate the creation of music, and another computer has quietly entered the home. ©

www.commodore.ca

The Beginners Page

Tom R. Halfhill, Editor

That Other Computer Language

Usually when someone talks about a "computer language," we think of programming languages like BASIC, Pascal, Forth, Logo, and so on. These languages are of interest only to programmers—if you merely want to *use* a computer, you don't have to learn anything about these languages at all.

But no matter how far removed you want to remain from the inner workings of the machine, there is one computer language you *do* have to learn: *lingo*, all those complicated terms and odd slang words that only computer experts seem to understand. You know what I mean: "Oh, you're having RS-232 glitches? This is just a kludge, but try checking your DTR pin and changing duplexes, and if that doesn't work, flip your floppy and warm-boot DOS with an ASCII batch file."

Alien Conversations

When you're a struggling computer-illiterate, it's tempting to assume that this kind of gibberish was invented merely to exclude outsiders from the inner circle. Actually, every occupation, hobby, and field of interest has its own lingo. Listen to yourself someday when talking to a co-worker or a fellow student; you'll be surprised how alien the conversation might sound to someone who is uninitiated.

This was brought home to me recently when I was helping a new computer owner learn to set up and use his system. Suddenly he interrupted: "*Boot it up?* Does that mean the same thing as *turn it on?*" I was caught off-guard. Once you learn lingo, it's amazing how fast you take it for granted.

To help clear up any similar confusion you may be experiencing, let's take a look at some of the terms which make up computer lingo:

Back door A secret method of gaining entry to a restricted program by circumventing the password protection. Usually planted by the programmer.

Boot To start up a computer system, usually by switching on the power. Some computers equipped with disk drives must be booted with a disk in the drive (a *boot disk*) that contains the disk operating system (DOS). Commodore computers are exceptions, because DOS is built into the drives themselves. On the Amiga and early versions of the Atari ST, the computer's operating system itself must be loaded from disk when booting.

Bug A malfunction of hardware or software that can often be replicated. Usually the fault of the programmer or designer.

Bus A connector on a computer into which accessories and cables are plugged. Usually referred to as a *system bus* or *expansion bus*.

Clone A computer that is designed to run the same programs and accept the same accessories as another computer made by a rival manufacturer. Clones typically sell for less than the computer they're imitating. The computers most often cloned are the IBM PC and Apple II.

Cold start To boot up a computer system by switching on the power.

Crash Sudden, total failure of a program or computer system. The program or computer refuses to acknowledge commands, usually because of a bug or glitch.

Daisychain Two or more accessories—such as disk drives, a printer, or a modem—all hooked together sequentially to form a chain. The term can also be used as a verb to describe the process of connecting a device to the chain.

Elegant Perhaps the highest compliment that can be paid to the design of a program or piece of computer hardware. A solution that achieves both success and efficiency.

Gender changer An adapter that turns a male plug into a female jack or vice versa. Intended for matching cables to various kinds of computers and accessories.

Glitch A momentary malfunction of hardware or software. Similar to a bug, but more transitory, and not necessarily the fault of the designer or programmer.

Hacker Originally, someone who became deeply absorbed in programming or exploring the innards of the machine, even if nothing practical ever resulted—sometimes to the point of obsession. Recently this term has taken on a different connotation, due largely to misuse in popular media. In this usage, a hacker is someone who gains access to a computer system with mischievous intent, often via a telephone link.

Kludge (Pronounced *klooj*) A sloppy design or an inelegant solution to a problem. It works, but is clumsy or inefficient.

Lockup The keyboard refuses to respond to typed commands. Usually indicates a crash.

Meg Short for *megabyte*, a measurement of computer memory capacity. One megabyte equals 1024 *kilobytes* (1024K). A kilobyte equals 1024 *bytes*. A byte, in turn, is roughly equivalent to one character of storage. Thus, a meg of memory can hold 1,048,576 (1024 × 1024) characters.

Motherboard The main circuit board inside a computer.

Warm start To reboot a computer system that has already been cold-started, but has crashed or needs to be reset for some other reason. Most computers have a reset button or special key sequence for this purpose. ©

www.commodore.ca

IBM Personal Computing

Donald B. Trivette

Photo Labeling

There should be a law requiring all photographs to be labeled with the date and content; otherwise, how is one to remember when and where each snapshot was taken? Unfortunately, writing on the back of a photograph is about as much fun as writing on wax paper. Writing on a word processor, on the other hand, is lots of fun—so if we could somehow get our PC to print on the backs of photographs, we just might have something useful. The solution is the BASIC program listed below to print address labels, which stick nicely to almost any surface—including wax paper and photographs. In addition, the program incorporates features to print multiple labels with the same information and to date each label automatically.

The program reads a file named LABELS, which you create using a word processing program or text editor. The file must be in ASCII format, and the length of each line should not exceed the width of a label. The program is designed to use 3-1/2 × 15/16 inch, fanfolded, pressure-sensitive labels that may be purchased in most office-supply stores for about $7 per thousand. This size label holds five 34-character lines of text.

In order to separate one label from another, the program looks for a dash (–) in the first column of the data. If there is a number immediately after the dash, the program will print that many labels with the text that follows. The first line in the file must either be a blank or contain a date that will be appended automatically to each label. The following figure shows an example of a LABELS file.

```
 (July '86)
-15
Vacation at Yellowstone
-
Uncle Eric
-6
Family Reunion
Miller Park
Mayberry, N.C.
-
Joe and Phyllis
-
Aunt Mary's house
```

This file prints 15 labels for the photos taken at Yellowstone, 1 label for Uncle Eric's photo, 6 to be stuck on the backs of the reunion photos, and 1 each for Joe and Phyllis and Aunt Mary's house. The program prints only five lines to a label; lines after the fifth are discarded, but it's up to you to format the length of each line to stay within the label boundary. The program includes a line-up routine to make it easy to get the labels positioned in the printer.

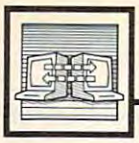
Photo Labeler

```
GA 10 REM
AF 20 REM Program to print 3 1/2
      x 15/16 inch
WJ 30 REM labels for the backs o
      f photographs.
DD 40 REM First line in LABELS f
      ile may either be
OI 50 REM blank or a date. The -
       sign signals
CI 60 REM the end of one label a
      nd beginning of
DP 70 REM a new one. The -n opti
      on may be used to
BN 80 REM print "n" identical la
      bels. Each label
DN 90 REM may have a maximum of
      34 characters
MA 100 REM by 5 lines.
PG 110 REM
GI 120 KEY OFF:CLS:DIM S$(20)
FB 130 X=1:I=1:SW=0:CNT=0
MO 140 OPEN "labels" FOR INPUT A
      S #1
LJ 150 LINE INPUT #1,DAT$
BI 160 REM Ready printer and ali
      gn labels
DJ 170 REM Print a test label.
IP 180 PRINT "Insert labels in p
      rinter and press"
OD 190 PRINT "any key to continu
      e..."
KO 200 A$=INKEY$:IF A$="" THEN 2
      00
DM 210 LPRINT "<<****";SPACE$(6)
      ;"Top Line";SPACE$(6);"**
      **>>"
PN 220 FOR I=1 TO 5:LPRINT:NEXT
      I
KF 230 PRINT "Is label aligned?
      (Y/N)"
CO 240 A$=INKEY$:IF A$="" THEN 2
      40
BJ 250 IF A$="Y" OR A$="y" THEN
      270 ELSE 210
LL 260 REM Read data from file
KG 270 IF MID$(A$,1,1)="-" THEN
      X=ABS(VAL(A$))
IN 280 IF X=0 THEN X=1
BC 290 LINE INPUT #1, B$
PG 300 IF MID$(B$,1,1)="-" THEN
      GOSUB 360:A$=B$:I=1:GOTO
      270
NF 310 S$(I)=B$
JC 320 I=I+1
IE 330 IF EOF(1) THEN GOSUB 360:
      PRINT:PRINT CNT;" Labels
      printed":END
HD 340 GOTO 290
NM 350 REM Print Label(s)
GC 360 IF SW=0 THEN SW=1:RETURN
LM 370 I=I-1
JO 380 IF I>5 THEN I=5
MI 390 FOR J=1 TO X
IP 400 CNT=CNT+1
DB 410 FOR K=1 TO I-1
JB 420 PRINT S$(K)
NP 430 LPRINT S$(K)
OG 440 NEXT K
FN 450 PRINT S$(I);DAT$
MB 460 LPRINT S$(I);DAT$
LG 470 FOR L=1 TO 5-I
MB 480 PRINT SPACE$(4)
AB 490 LPRINT SPACE$(4)
PJ 500 NEXT L
DJ 510 PRINT  SPACE$(4)
PE 520 LPRINT SPACE$(4)
OL 530 NEXT J
NJ 540 FOR K=1 TO I
FH 550 S$(K)=SPACE$(4)
PL 560 NEXT K
NN 570 RETURN
QP 580 REM End of Labels Program
```

©

COMPUTE!
TOLL FREE
Subscription
Order Line
1-800-247-5470
In IA 1-800-532-1272

www.commodore.ca



Telecomputing Today

Arlan R. Levitan

A Well-Deserved Feast

What restaurant in your home town has the best Szechuan fare? How about barbecue, or Mexican, Thai, or Continental cuisine? Make a mental list of those places, then figuratively fold it up and put it aside for a few moments.

About a year ago, while cruising through the message section of a Chicago-based bulletin board, I ran across a message that caught my attention. It announced the opening of a new bulletin board in the Detroit area for IBM PC and PC-compatible computer owners. Dubbed "The Business Board," it was located in a nearby suburb. I was intrigued. While there were dozens of Atari-, Commodore-, and Apple-oriented BBSs in and around the Motor City, there had been a distinct paucity of PC-related boards. Prior to this time, I had been calling boards in other cities—not an economical practice when you count the long distance charges. A local PC BBS might open up new fields of interest as well as relieve my pocketbook.

As the modem dialed the new board's number, I purposely held down my expectations. Bulletin boards come and go. Most are started by well-intentioned folks who don't realize how much work is involved in maintaining and operating a BBS. The life expectancy of an average new board is about 30 to 60 days.

Two Deadly Errors

Why such a high mortality rate? There are two common, often fatal mistakes. Many a would-be SYSOP decides to run a board during hours when his or her computer is not otherwise in use. These moonlight boards are usually down more often than they're up. As the novelty wears thin, the neophyte SYSOP soon decides that taking the board up and down constantly is more bother than it's worth. An even more deadly mistake is attempting to use the same phone line for both voice and BBS communications.

As I logged onto "The Business Board," I was pleasantly surprised to see a nice introductory bulletin with slick graphics. Based on a dedicated Compaq portable with a 30-megabyte hard drive, the BizBoard (as it's called by users) has a download area containing over 1000 files. That's one of the most complete and up-to-date collections of "freeware" and public domain software that I've run across in years.

Dedicated Downloading

A quick electronic chat with SYSOP Rick Brenner revealed that the BizBoard's collection of files is the result of untold hours of downloading from a dozen or so of the nation's best bulletin boards. Apart from the phone charges, which are not insignificant, that sort of activity represents a very substantial investment in time.

Brenner started his board to facilitate the exchange of information among professionals who use computers in business. In keeping with this special focus, access to the board is limited. Membership is by registration only and costs $25 per year. You must also participate actively in the board's message traffic. Those whose sole interest is in downloading files are politely dropped from the rolls (and given a refund of their registration fees).

While the BizBoard's house rules may seem straight-laced to some, they have succeeded in fostering an unusually high degree of computer literacy and esprit de corps among BizBoard members. There's much humor to be found in the message bases and recently-added special interest forums, in addition to useful technical information, discussions of some of the more obtuse business applications of microcomputers, and accounts of member experiences with new products.

When Onliners Meet Offline

In February of this year, at my suggestion, the local BizBoard membership met for some offline conferencing at a local French bistro. Prior to the event, some new members had voiced concerns about holding their own in face-to-face communications with established technical heavies. To add to the interest, the suit-to-sandals ratio among the twenty-odd group members ran just about fifty/fifty. How did it go? The dinner meeting had been scheduled to run from 6:30 to 9:00 in the evening. We were finally ushered out the door at 2:00 the next morning. Since that auspicious beginning, bimonthly dinner meetings have become a BizBoard tradition.

It's been a year now since the BizBoard began. Since then, my favorite BBS has garnered about a hundred members, and survived several hard disk crashes, power failures, and even a fried motherboard. Most of the credit is due to its hard-working SYSOP.

There are hundreds of Rick Brenners across the land running bulletin board systems for telecomputing enthusiasts. Their labor of love goes largely unheralded. Have you got a local BBS in your area that deserves recognition? Unfold that piece of paper you stashed away mentally a few minutes ago. In my book, September is National SYSOP Month. Put off buying that new piece of software until next month. Instead, treat your local SYSOP to a gastronomic feast as rich as the one proffered to you via the telephone lines day after day. You'll both be better off for the experience. ©

www.commodore.ca

ST Outlook

Philip I. Nelson, Assistant Editor

Pointer Potpourri

Welcome to "ST Outlook." Beginning this month, I'm taking over COMPUTE!'s Atari ST column from Bill Wilkinson, who had agreed to do the column on an interim basis. By way of an introduction, I'm an ST owner and programmer, as well as a writer and editor. In addition to *COMPUTE!'s ST Programmer's Guide*, which I coauthored, I'm currently collaborating with COMPUTE! programmer Tim Victor on an upcoming book, *Mapping the Atari ST*, the first volume of which is scheduled for an early 1987 release.

Pick Your Pointer

Every ST owner is familiar with the way the mouse pointer changes appearance in response to system events. When you open an application from the desktop, or load a program from BASIC, the pointer changes from an arrow to a busy bee, and so on. In many situations, the ST manages the pointer shape automatically. But you can also change it under program control to suit your own needs.

This month's program shows how to access the ST's eight built-in pointer shapes from BASIC. It displays all the pointers in turn, prompting you to click the mouse button when you're ready to see the next one in the series. In addition to the familiar arrow and bee, you'll see two hand shapes, three different crosshair pointers, and a cursor shaped like a slender I-beam.

It's not difficult to see how alternate pointer shapes can come in handy. For instance, the bee does not automatically appear when you read or write to disk or perform other time-consuming chores in BASIC. While you can print the conventional PLEASE WAIT message under those circumstances, it's also prudent (and it adds a touch of elegance) to change the pointer to a bee. By reducing the user's temptation to fiddle with the menus or wave the pointer absent-mindedly, this little icon increases the chances that your program will work as intended. These cautions are doubly important because BASIC freezes program execution whenever the pointer is in motion and offers no easy means for disabling its own menus.

If you've used *1st Word*, the word processor supplied with the ST, you may recognize the pointing hand, which appears whenever you drag the pointer to define a block of text. The I-beam cursor, thin enough to fit neatly between text characters, is ideally suited to word processing and similar applications. The grabbing hand pointer is often used to manipulate objects such as window sliders. And the crosshairs are ideal for drawing or any activity that requires precise positioning.

Suit Yourself

Of course, you're free to use these pointers as you please. The grabbing hand, for instance, is suitable for jobs that resemble grasping or pulling, but it works just fine as an eraser, too. One exception is our old friend, the bee, whose significance is already defined in clear and narrow terms. Unless you're writing software for apiarists, it's confusing (and, hence, lousy GEM etiquette) to use the bee shape to signify anything other than "busy."

In addition to the pointer-changing routine (labeled CHANGE) the program demonstrates VDI routines which read the mouse button, make the pointer invisible, and force it back onto the screen. The routine labeled CLICK calls VDI routine 124, which can read the pointer's screen coordinates as well as monitor button activity. To read the pointer's *x* and *y* coordinates, add this line to the program:

```
305   print "x=";peek(ptsout),
      "y=";peek(ptsout+2)
```

The subroutines HIDE and SHOW call VDI routines that disable and enable the mouse pointer, respectively. If you don't hide the pointer before you change its shape, it may misbehave, depositing an unwanted ghost image in some cases. Watch out for such unexpected side effects whenever you call a GEM routine from BASIC. It's fun to manipulate GEM artifacts such as the pointer, but with that added power comes an extra measure of responsibility.

The BASIC Difference

Calling GEM routines from BASIC is significantly different from using them in a language like C or Pascal. Some system routines are downright antagonistic to BASIC, others are a waste of time, and others are redundant. The first difference arises because BASIC is itself a GEM application—a large, complicated program with its own ideas about what should be happening at any given time. Certain GEM routines shouldn't be used because they conflict with BASIC's own manipulation of the GEM environment.

The second category of routines includes those which do a job already performed by BASIC. For instance, since BASIC provides an output window, it's usually not necessary to open a virtual workstation or obtain a device handle before you call a system routine that draws on the screen. In the third category are routines that duplicate an existing BASIC command; why call a VDI routine to draw a circle, when CIRCLE is more convenient and achieves exactly the same result?

There's a fourth—fortunately, quite large—category of GEM routines: those which are both useful

www.commodore.ca

and usable from BASIC. In the months to come, we'll look at more of them.

```
100    fullw 2:clearw 2
110    for j=0 to 7 :rem Show all 8 pointers
120    gosub HIDE:gosub CHANGE:gotoxy 1,1
130    print:read shape$:print shape$
140    print "Click left button to continue..."
150    gosub SHOW:gosub CLICK
160    next j
170    gosub HIDE :rem Restore the arrow
180    j=0:gosub CHANGE
190    closew 2:gosub SHOW
200    end
210    HIDE: poke contrl,123:rem Hide pointer
220    vdisys(0):return
230    SHOW: poke contrl,122 :rem Show pointer
240    vdisys(0):return
250    CHANGE: a#=gb :rem Key to Pandora's box
260    gintin=peek(a#+8) :rem From me to AES
270    poke gintin,j :rem New mouse shape
280    gemsys(78):return
290    CLICK: poke contrl,124:rem Read mouse
300    vdisys(0)
310    if peek(intout)<>1 then CLICK
320    return
330    data Ye Olde Arrow,I-Beam Cursor
340    data Busy Bumblebee,"Pointing Hand "
350    data Grabbing Hand,Skinny Crosshair
360    data Chubby Crosshair,Hollow Crosshair
```

Programming the TI

C. Regena

Game Programming

Many computer games are translations of games that already exist in some other form. The challenge in making such a conversion is to offer features that make you want to play the game on a computer instead of the usual way (with cards, dice, a board, or whatever). In the next two columns, we'll construct a game that has been popular under various names, but is usually called "Solitaire."

The original Solitaire game consists of several pegs arranged in a pattern of holes on a board. The center hole is left without a peg. Your goal is to get rid of pegs by jumping: One peg jumps over another into an adjacent hole, then the jumped peg is removed. You keep jumping and removing pegs until you can no longer jump. The optimum solution is to end up with one peg in the center hole. Actually, if you end up with one peg anywhere, you are an excellent player, and even two, three, or four remaining pegs would be a good score.

Why create this game on a computer? The main reason is that you'll often start to play the game, but find that some pegs are missing. You can't even set up the board without the right number of pegs. The computer will always set up the game without losing pegs, and can also check for impossible moves and thus prevent cheating. In a computerized version, we can also include a feature which would allow backing up and changing a move, or even replaying several moves. As a final enhancement, the program can keep track of every move in the game and print them out so you could prove to a friend that you really solved the puzzle.

I usually start game programming by designing the graphics. This playing board consists of yellow circles for the pegs and black circles for the holes. Lines 190–240 define graphic characters and colors, and lines 250–280 define strings for printing the board. The subroutine in lines 620–770 prints the starting board on the screen.

The next step is to move the pegs. CALL KEY is used for keyboard input. Use the arrow keys to move to the peg you want to move, then press ENTER. Now press an arrow key to show which direction to jump. The computer then needs to check to see whether you made a valid move.

Since the complete program is too long to include in a single column, I've split it into two separate portions. This month's listing includes enough of the program to draw the graphics and move the pegs, so you can play a complete game. However, not all of the features are included. Next month's column will explain more of the programming techniques and add the sections that let you back up to change a move, replay the game, or make a game printout.

If you to prefer to save typing time, you may obtain a copy of the complete program by sending a check for $3 together with a stamped, self-addressed mailer and a blank cassette or disk to:

C. Regena
P. O. Box 1502
Cedar City, Utah 84720

Be sure to specify the title, "Solitaire" for the TI-99/4A.

```
100 REM  SOLITAIRE
110 DIM G(12,12),M$(43)
120 CALL CLEAR
130 PRINT TAB(5);"** SOLITAIRE **"
140 PRINT ::"MOVE A PEG BY JUMPING OVER"
150 PRINT :"ANOTHER PEG TO AN EMPTY HOLE"
160 PRINT :"THEN REMOVE THE JUMPED PEG."
170 PRINT :"TRY TO END WITH ONLY ONE"
180 PRINT :"PEG IN THE CENTER HOLE."
190 CALL CHAR(96,"0")
200 CALL CHAR(97,"000183C3C18")
210 CALL CHAR(98,"00183C7E7E3C18")
220 CALL COLOR(9,11,7)
230 CALL CHAR(105,"00183C7E7E3C18")
240 CALL COLOR(10,2,7)
250 A$="````````"
260 B$="`a`a`a`"
270 C$="````````"&A$&"````````"
```


www.commodore.ca

```
280 D$="'a'a'a"&B$&"a'a'a'"
290 FOR J=0 TO 12
300 FOR K=0 TO 12
310 READ G(J,K)
320 NEXT K
330 NEXT J
340 DATA 2,2,2,2,2,2,2,2,2,
    2,2,2,2
350 DATA 2,2,2,2,2,2,2,2,2,
    2,2,2,2
360 DATA 2,2,2,2,2,1,1,1,2,
    2,2,2,2
370 DATA 2,2,2,2,2,1,1,1,2,
    2,2,2,2
380 DATA 2,2,2,2,2,1,1,1,2,
    2,2,2,2
390 DATA 2,2,1,1,1,1,1,1,1,
    1,1,2,2
400 DATA 2,2,1,1,1,1,0,1,1,
    1,1,2,2
410 DATA 2,2,1,1,1,1,1,1,1,
    1,1,2,2
420 DATA 2,2,2,2,2,1,1,1,2,
    2,2,2,2
430 DATA 2,2,2,2,2,1,1,1,2,
    2,2,2,2
440 DATA 2,2,2,2,2,1,1,1,2,
    2,2,2,2
450 DATA 2,2,2,2,2,2,2,2,2,
    2,2,2,2
460 DATA 2,2,2,2,2,2,2,2,2,
    2,2,2,2
470 PRINT :::"PRESS <ENTER>
    ."
480 CALL KEY(0,K,S)
490 IF K<>13 THEN 480
500 CALL CLEAR
510 PRINT "USE THE ARROW KE
    YS THEN"
520 PRINT "<ENTER> TO SELEC
    T THE PEG,"
530 PRINT "THEN PRESS AN AR
    ROW KEY TO  MOVE."
540 PRINT ::"PRESS FCTN-8 T
    O REDO A PLAY."
550 PRINT ::"PRESS FCTN-5 T
    O SHOW ALL"
560 PRINT "MOVES FROM THE S
    TART."
570 PRINT ::"PRESS FCTN-P T
    O PRINT THE"
580 PRINT "SEQUENCE OF MOVE
    S."
590 PRINT :::"PRESS <ENTER>
     TO START NOW."
600 CALL KEY(0,K,S)
610 IF K=13 THEN 780 ELSE 6
    00
620 CALL CLEAR
630 FOR T=1 TO 3
640 PRINT TAB(11);A$
650 PRINT TAB(11);B$
660 NEXT T
670 FOR T=1 TO 3
680 PRINT TAB(5);C$
690 PRINT TAB(5);D$
700 NEXT T
710 PRINT TAB(5);C$
720 FOR T=1 TO 3
730 PRINT TAB(11);B$
740 PRINT TAB(11);A$
750 NEXT T
760 CALL HCHAR(14,16,105)
770 RETURN
780 GOSUB 620
790 PRINT ::
800 R=6
810 C=4
820 ROW=R*2
830 COL=C*2+4
840 CALL GCHAR(ROW,COL,GG)
850 CALL KEY(0,K,S)
860 CALL HCHAR(ROW,COL,96)
870 CALL HCHAR(ROW,COL,GG)
880 IF S<1 THEN 850
890 IF K=13 THEN 1100
900 IF K<>69 THEN 950
910 IF R-1<2 THEN 850
920 IF G(R-1,C)=2 THEN 850
930 R=R-1
940 GOTO 820
950 IF K<>83 THEN 1000
960 IF C-1<2 THEN 850
970 IF G(R,C-1)=2 THEN 850
980 C=C-1
990 GOTO 830
1000 IF K<>68 THEN 1050
1010 IF C+1>10 THEN 850
1020 IF G(R,C+1)=2 THEN 850
1030 C=C+1
1040 GOTO 830
1050 IF K<>88 THEN 850
1060 IF R+1>10 THEN 850
1070 IF G(R+1,C)=2 THEN 850
1080 R=R+1
1090 GOTO 820
1100 CALL SOUND(50,1400,2)
1110 IF GG=105 THEN 850
1120 CALL KEY(0,K,S)
1130 CALL HCHAR(ROW,COL,98)
1140 CALL HCHAR(ROW,COL,97)
1150 IF S<1 THEN 1120
1160 IF K<>69 THEN 1240
1170 IF (G(R-2,C)<>0)+(G(R-
     1,C)<>1)THEN 1530
1180 G(R-1,C)=0
1190 CALL HCHAR(ROW-2,COL,1
     05)
1200 CALL HCHAR(ROW,COL,105
     )
1210 G(R,C)=0
1220 R=R-2
1230 GOTO 1470
1240 IF K<>83 THEN 1320
1250 IF (G(R,C-2)<>0)+(G(R,
     C-1)<>1)THEN 1530
1260 G(R,C-1)=0
1270 CALL HCHAR(ROW,COL-2,1
     05)
1280 CALL HCHAR(ROW,COL,105
     )
1290 G(R,C)=0
1300 C=C-2
1310 GOTO 1470
1320 IF K<>68 THEN 1400
1330 IF (G(R,C+2)<>0)+(G(R,
     C+1)<>1)THEN 1530
1340 G(R,C+1)=0
1350 CALL HCHAR(ROW,COL+2,1
     05)
1360 CALL HCHAR(ROW,COL,105
     )
1370 G(R,C)=0
1380 C=C+2
1390 GOTO 1470
1400 IF K<>88 THEN 1100
1410 IF (G(R+2,C)<>0)+(G(R+
     1,C)<>1)THEN 1530
1420 G(R+1,C)=0
1430 CALL HCHAR(ROW+2,COL,1
     05)
1440 CALL HCHAR(ROW,COL,105
     )
1450 G(R,C)=0
1460 R=R+2
1470 G(R,C)=1
1480 ROW=R*2
1490 COL=C*2+4
1500 CALL HCHAR(ROW,COL,97)
1510 CALL SOUND(50,1400,2)
1520 GOTO 840
1530 CALL SOUND(100,135,2)
1540 GOTO 850
```

©

Save Your Copies of COMPUTE!

Protect your back issues of *COMPUTE!* in durable binders or library cases. Each binder or case is custom-made in flag-blue binding with embossed white lettering. Each holds a year of *COMPUTE!*. Order several and keep your issues of *COMPUTE!* neatly organized for quick reference. (These binders make great gifts, too!)

Binders	**Cases:**
$8.50 each;	$6.95 each;
3 for $24.75;	3 for $20.00;
6 for $48.00	6 for $36.00

(Please add $2.50 per unit for orders outside the U.S.)

Send in your prepaid order with the attached coupon

Mail to: Jesse Jones Industries
P.O. Box 5120
Dept. Code COTE
Philadelphia, PA 19141

Please send me _____ COMPUTE! ☐ cases ☐ binders.
Enclosed is my check or money order for $ _____. (U.S. funds only.)
Name _____
Address _____
City _____
State _____ Zip _____
Satisfaction guaranteed or money refunded.
Please allow 4–6 weeks for delivery.

www.commodore.ca

INSIGHT: Atari

Bill Wilkinson

Five-Year Retrospective

This month marks my fifth anniversary writing "INSIGHT: Atari" for COMPUTE!. In the course of the last five years, I've covered a lot of different topics. Just for fun, I decided to look back through the last 60 issues of COMPUTE! and engage in some healthy self-criticism—listing the worst of Wilkinson as well as the best.

You may or may not agree with my assessments. But the point isn't simply to rate what's been done. After five years of writing about the same family of machines, it can be difficult to come up with a fresh topic every month. As you read these lists, let me know about some new topics you want me to cover, or some old topics that could stand further explanation or a fresh treatment. Not all of you have been reading COMPUTE! for a full five years, after all. And even long-time programmers can grow rusty in certain areas. This column is designed to serve you, the readers, so please provide some feedback in a card or letter addressed to:

Bill Wilkinson
P.O. Box 710352
San Jose, CA 95171-0352

The Brightest And Best

First, here's what I consider the best of "INSIGHT: Atari." Whether you agree will depend on your own viewpoint and needs. I have listed articles chronologically within broad categories.

- Getting more out of Atari BASIC: 9/81, 10/81, 12/81, 4/82, 5/82, 2/83, 1/84, 2/84, 3/84, 12/85, 3/86
- Calling I/O and GRAPHICS routines from assembly language: 11/81 through 2/82, 7/82 through 10/82, 8/85 through 10/85
- Assembly language techniques, with or without Atari BASIC: 12/81, 4/82, 10/82, 12/82, 7/83 through 9/83, 1/84, 12/84, 1/85, 3/85, 2/86, 4/86
- Converting BASIC programs to assembly language: 12/81, 2/82, 8/82 through 10/82, 5/84 through 7/84
- Atari BASIC internals: 1/82 through 7/82
- Bugs in Atari BASIC: 11/81, 5/85, 6/85
- Benchmarks: 9/82, 1/84, 11/84, 2/85, 3/85
- Playing music and sounds in background while a BASIC program runs: 3/82
- User definable function keys: 5/82
- Undocumented graphics mode: 10/83 and 11/83
- Using the extended memory of XL machines (with pictorial map): 12/83

Not So Memorable

Now for the less memorable columns. Some of my self-appointed projects have met with less than enthusiastic response. Perhaps the worst of these was "BAIT," a pseudo-BASIC interpreter written in Atari BASIC. The program was supposed to show you how language interpreters worked: It was so slow that you could literally watch the FOR-NEXT loops plod along. I prolonged the agony for four months (March, May, June, and August 1983).

Then I tried to rescue 1050 disk drive owners with an enhanced version of DOS 2.0S. It worked, but I doubt that more than a couple of dozen readers managed to get it installed properly. This series appeared May through September 1984. Less than four months later, we reworked DOS 2.0S for Atari to produce DOS 2.5. More time and energy down the drain.

My April Fool's columns have always received mixed reviews. This year, I got distracted and actually forgot to do a joke column. A couple of readers wrote me to compliment me on my restraint. Thanks, folks.

Some of the funniest installments of "INSIGHT: Atari" were unintentionally humorous, consisting of various predictions regarding future Atari products. I could have done better with a ouija board.

In addition to the obvious honkers, I've omitted from this list several columns which were relevant at the time they were written, but have since become outdated. One general regret is that I covered certain topics in less depth than now seems desirable. But that's a difficult factor to measure. When I invite you to explore a subject, do you ever sit down to research it further? If so, then I have succeeded. If not, perhaps the topic is inappropriate, or the treatment needs to be refined. Again, the more feedback you provide, the better I can meet your needs.

Truth Stranger Than Fiction

Since I just made fun of my precognitive powers, it's only fair to mention that one of my predictions is actually coming true. In July 1984, Jack Tramiel and company had just bought Atari. I wrote a column (published in October that same year) containing several predictions about what the "new" Atari would produce. On some points, I was correct: The 1450 died quickly, and the "Atari MAC" was already under development (it became what is now the ST).

Though it caused chuckles at the time, I also stated that Atari would continue to produce game machines and that they would soon come out with the already-designed 7800. As it happened, Atari sold over a million 2600 game machines in 1985. And, at the 1986 Summer Consumer Electronics Show, Atari announced that the 7800 will be available this autumn. Now, how would you like to know what's in store for 1988? ©

www.commodore.ca

The Operating System

Amiga has released beta-test copies of version 1.2 of the operating system. These experimental versions are being distributed to software developers, but Amiga is encouraging informal distribution to help them get as much testing as possible. There will be a few more beta versions released, and we should see version 1.2 (which may actually be called version 2.0) out by Christmas.

However, it is also reported that Amiga is preparing to replace the WCS (Writeable Control Store, the area of RAM used to store the Kickstart portion of the operating system) with EEPROM (Electrically Erasable Programmable Read Only Memory), finally burning the operating system permanently into ROMs on the motherboard. This would have to be the final version, since replacing ROMs, if bugs are later discovered in the operating system, is not a trivial task.

The End Of WCS?

If Amiga replaced the WCS with ROM, we would lose the advantage of WCS: the ability to upgrade to a new (and even completely different) operating system at any time. On the other hand, there would be no need for a Kickstart disk, so booting up wouldn't take as long. 256K of ROM is cheaper than 256K of RAM, so this may be Amiga's primary consideration. But does Amiga plan to offer this ROM upgrade to current Amiga owners, or will we just use a Kickstart containing the equivalent of what gets burned into ROM?

Not everyone is clear on the hierarchy of the Amiga operating system, popularly referred to as Intuition. Although Intuition is fundamental, it's only part of the complete operating system (OS). There are actually several layers in the Amiga OS, which can be grouped into four major categories: Exec, Graphics, Intuition, and DOS.

Exec is the core of the operating system and controls every machine language program. Every task in the Amiga is part of a *task list*, and each task has a priority. Tasks with the most priority are allowed to run first. Whenever a task "goes to sleep" while waiting for something (keyboard or disk input, graphics, a response from another task, and so forth), the next highest priority task is allowed to run. However, no task is allowed to run longer than 64 milliseconds, the unit of time defined as a *quantum*. When a task's quantum is up, it is put to sleep to allow other lower-priority tasks to take their turn. Exec also contains subroutines for allocating and deallocating chunks of memory, and low-level input/output routines for accessing Amiga devices directly.

The Graphics library performs all the screen drawing functions such as line, rectangle, filled rectangle, and polygon drawing (and in version 1.2 includes functions for drawing hollow or filled circles and ovals). It contains powerful routines for animating graphic objects (bobs) and virtual sprites (vsprites), as well as providing direct access to the sprite hardware. In addition, the Graphics library allows programmers to modify the copper list, which controls the vertical aspect of the display. If you count the Layers library and Diskfont library as part of the Graphics library, the package also manages overlapping screen areas and multiple text fonts and styles.

Remarkable Flexibility

Intuition draws upon the resources of Exec and the Graphics library to create the high-level metaphors of windows, screens, menus, and gadgets. Intuition is large and complex, but it offers the programmer a remarkable level of flexibility. AmigaDOS uses Intuition for its CLI (Command Line Interface) and console windows, and Workbench relies heavily on Intuition to support its illusion of a desktop. Intuition is clearly the most visible part of the Amiga operating system (and probably the most important), but it cannot run on its own.

AmigaDOS is the topmost level of the operating system, the last part written, and was contracted from MetaComCo in England. Most Amiga applications are considered AmigaDOS *processes*, as opposed to Exec tasks. The Workbench is a layer above AmigaDOS, an application that creates a graphic world which performs many of the same functions as an AmigaDOS CLI without the cumbersome typing required by a command-driven DOS. AmigaDOS is much more than just a CLI, though. It includes the tools programmers need to read, write, and manage files and directories, rather than having to resort to direct track and sector access, as well as routines to load and execute programs as processes.

All these parts work in harmony (well, to be honest, with a few sour notes here and there) to orchestrate the complete Amiga system. You boot Kickstart, which loads in Exec, Intuition, and the Graphics library. You then insert a Workbench disk, which boots AmigaDOS and, finally, the Workbench. You open Workbench windows via Intuition and AmigaDOS, and execute applications, which have full access to all Amiga resources, even if many other programs are running at the same time. You can build your own unique working environment by choosing which programs you'd like to run together, and customize other options via Preferences. And when you add extra memory and peripherals, you have a symphony of exceeding range and power. ©

www.commodore.ca

COMPUTE!'s Guide To Typing In Programs

Computers are precise—type the program *exactly* as listed, including necessary punctuation and symbols, except for special characters noted below. We have provided a special listing convention as well as a program to check your typing—"The Automatic Proofreader."

Programs for the IBM, TI-99/4A, and Atari ST models should be typed exactly as listed; no special characters are used. Programs for Commodore, Apple, and Atari 400/800/XL/XE computers may contain some hard-to-read special characters, so we have a listing system that indicates these control characters. You will find these Commodore and Atari characters in curly braces; *do not type the braces.* For example, {CLEAR} or {CLR} instructs you to insert the symbol which clears the screen on the Atari or Commodore machines. A complete list of these symbols is shown in the tables below. For Commodore, Apple, and Atari, a single symbol by itself within curly braces is usually a control key or graphics key. If you see {A}, hold down the CONTROL key and press A. This will produce a reverse video character on the Commodore (in quote mode), a graphics character on the Atari, and an invisible control character on the Apple.

Graphics characters entered with the Commodore logo key are enclosed in a special bracket: [<A>]. In this case, you would hold down the Commodore logo key as you type A. Our Commodore listings are in uppercase, so shifted symbols are underlined. A graphics heart symbol (SHIFT-S) would be listed as S. One exception is {SHIFT-SPACE}. When you see this, hold down SHIFT and press the space bar. If a number precedes a symbol, such as {5 RIGHT}, {6 S}, or [<8 Q>], you would enter five cursor rights, six shifted S's, or eight Commodore-Q's. On the Atari, inverse characters (white on black) should be entered with the inverse video

Atari 400/800/XL/XE

When you see	Type	See	
{CLEAR}	ESC SHIFT <		Clear Screen
{UP}	ESC CTRL -		Cursor Up
{DOWN}	ESC CTRL =		Cursor Down
{LEFT}	ESC CTRL +		Cursor Left
{RIGHT}	ESC CTRL *		Cursor Right
{BACK S}	ESC DELETE		Backspace
{DELETE}	ESC CTRL DELETE		Delete character
{INSERT}	ESC CTRL INSERT		Insert character
{DEL LINE}	ESC SHIFT DELETE		Delete line
{INS LINE}	ESC SHIFT INSERT		Insert line
{TAB}	ESC TAB		TAB key
{CLR TAB}	ESC CTRL TAB		Clear tab
{SET TAB}	ESC SHIFT TAB		Set tab stop
{BELL}	ESC CTRL 2		Ring buzzer
{ESC}	ESC ESC		ESCape key

Commodore PET/CBM/VIC/64/128/16/+4

When You Read:	Press:	See:
{CLR}	SHIFT + CLR/HOME	
{HOME}	CLR/HOME	
{UP}	SHIFT + ↑ CRSR ↓	
{DOWN}	↑ CRSR ↓	
{LEFT}	SHIFT + ← CRSR →	
{RIGHT}	← CRSR →	
{RVS}	CTRL + 9	
{OFF}	CTRL + 0	
{BLK}	CTRL + 1	
{WHT}	CTRL + 2	
{RED}	CTRL + 3	
{CYN}	CTRL + 4	
{PUR}	CTRL + 5	
{GRN}	CTRL + 6	
{BLU}	CTRL + 7	
{YEL}	CTRL + 8	

When You Read:	Press:	See:
[<1>]	COMMODORE + 1	
[<2>]	COMMODORE + 2	
[<3>]	COMMODORE + 3	
[<4>]	COMMODORE + 4	
[<5>]	COMMODORE + 5	
[<6>]	COMMODORE + 6	
[<7>]	COMMODORE + 7	
[<8>]	COMMODORE + 8	
{ F1 }	f1	
{ F2 }	SHIFT + f1	
{ F3 }	f3	
{ F4 }	SHIFT + f3	
{ F5 }	f5	
{ F6 }	SHIFT + f5	
{ F7 }	f7	
{ F8 }	SHIFT + f7	
←	←	

www.commodore.ca

key (Atari logo key on 400/800 models).

Whenever more than two spaces appear in a row, they are listed in a special format. For example, {6 SPACES} means press the space bar six times. Our Commodore listings never leave a single space at the end of a line, instead moving it to the next printed line as {SPACE}.

Amiga program listings contain only one special character, the left arrow (←) symbol. This character marks the end of each program line. Wherever you see a left arrow, press RETURN or move the cursor off the line to enter that line into memory. Don't try to type in the left arrow symbol; it's there only as a marker to indicate where each program line ends.

The Automatic Proofreader

Type in the appropriate program listed below, then save it for future use. The Commodore Proofreader works on the Commodore 128, 64, Plus/4, 16, and VIC-20. Don't omit any lines, even if they contain unfamiliar commands or you think they don't apply to your computer. When you run the program, it installs a machine language program in memory and erases its BASIC portion automatically (so be sure to save several copies before running the program for the first time). If you're using a Commodore 128, Plus/4 or 16, do *not* use any GRAPHIC commands while the Proofreader is active. You should disable the Commodore Proofreader before running any other program. To do this, either turn the computer off and on or enter SYS 64738 (for the 64), SYS 65341 (128), SYS 64802 (VIC-20), or SYS 65526 (Plus/4 or 16). To reenable the Proofreader, reload the program and run it as usual. Unlike the original VIC/64 Proofreader, this version works the same with disk or tape.

On the Atari, run the Proofreader to activate it (the Proofreader remains active in memory as a machine language program); you must then enter NEW to erase the BASIC loader. Pressing SYSTEM RESET deactivates the Atari Proofreader; enter PRINT USR(1536) to reenable it.

The Apple Proofreader erases the BASIC portion of itself after you run it, leaving only the machine language portion in memory. It works with either DOS 3.3 or ProDOS. Disable the Apple Proofreader by pressing CTRL-RESET before running another BASIC program.

The IBM Proofreader is a BASIC program that simulates the IBM BASIC line editor, letting you enter, edit, list, save, and load programs that you type. Type RUN to activate. Be sure to leave Caps Lock on, except when typing lowercase characters.

Once the Proofreader is active, try typing in a line. As soon as you press RETURN, either a hexadecimal number (on the Apple) or a pair of letters (on the Commodore, Atari, or IBM) appears. The number or pair of letters is called a *checksum*.

Compare the value displayed on the screen by the Proofreader with the checksum printed in the program listing in the magazine. The checksum is given to the left of each line number. Just type in the program a line at a time (without the printed checksum), press RETURN or Enter, and compare the checksums. If they match, go on to the next line. If not, check your typing; you've made a mistake. Because of the checksum method used, do not type abbreviations, such as ? for PRINT. On the Atari and Apple Proofreaders, spaces are not counted as part of the checksum, so be sure you type the right number of spaces between quote marks. The Atari Proofreader does not check to see that you've typed the characters in the right order, so if characters are transposed, the checksum still matches the listing. The Commodore Proofreader catches transposition errors and ignores spaces unless they're enclosed in quotation marks. The IBM Proofreader detects errors in spacing and transposition.

IBM Proofreader Commands

Since the IBM Proofreader replaces the computer's normal BASIC line editor, it has to include many of the direct-mode IBM BASIC commands. The syntax is identical to IBM BASIC. Commands simulated are LIST, LLIST, NEW, FILES, SAVE, and LOAD. When listing your program, press any key (except Ctrl-Break) to stop the listing. If you enter NEW, the Proofreader prompts you to press Y to be especially sure you mean yes.

Two new commands are BASIC and CHECK. BASIC exits the Proofreader back to IBM BASIC, leaving the Proofreader in memory. CHECK works just like LIST, but shows the checksums along with the listing. After you have typed in a program, save it to disk. Then exit the Proofreader with the BASIC command, and load the program as usual (this replaces the Proofreader in memory). You can now run the program, but you may want to resave it to disk. This will shorten it on disk and make it load faster, but it can no longer be edited with the Proofreader. If you want to convert an existing BASIC program to Proofreader format, save it to disk with SAVE *"filename"*,A.

Program 1: Atari Proofreader

By Charles Brannon, Program Editor

```
100 GRAPHICS 0
110 FOR I=1536 TO 1700:REA
    D A:POKE I,A:CK=CK+A:N
    EXT I
120 IF CK<>19072 THEN ? "E
    rror in DATA Statement
    s.  Check Typing.":END

130 A=USR(1536)
140 ? :? "Automatic Proofr
    eader Now Activated."
150 END
160 DATA 104,160,0,185,26,
    3,201,69,240,7
170 DATA 200,200,192,34,20
    8,243,96,200,169,74
180 DATA 153,26,3,200,169,
    6,153,26,3,162
190 DATA 0,189,0,228,157,7
    4,6,232,224,16
200 DATA 208,245,169,93,14
    1,78,6,169,6,141
210 DATA 79,6,24,173,4,228
    ,105,1,141,95
220 DATA 6,173,5,228,105,0
    ,141,96,6,169
230 DATA 0,133,203,96,247,
    238,125,241,93,6
240 DATA 244,241,115,241,1
    24,241,76,205,238
250 DATA 0,0,0,0,0,32,62,2
    46,8,201
260 DATA 155,240,13,201,32
    ,240,7,72,24,101
270 DATA 203,133,203,104,4
    0,96,72,152,72,138
280 DATA 72,160,0,169,128,
    145,88,200,192,40
290 DATA 208,249,165,203,7
    4,74,74,74,24,105
300 DATA 161,160,3,145,88,
    165,203,41,15,24
310 DATA 105,161,200,145,8
    8,169,0,133,203,104
320 DATA 170,104,168,104,4
    0,96
```

Program 2: IBM Proofreader

By Charles Brannon, Program Editor

```
10 'Automatic Proofreader Vers
   ion 3.0 (Lines 205,206 adde
   d/190 deleted/470,490 chang
   ed from V2.0)
100 DIM L$(500),LNUM(500):COLO
    R 0,7,7:KEY OFF:CLS:MAX=0:
    LNUM(0)=65536!
110 ON ERROR GOTO 120:KEY 15,C
    HR$(4)+CHR$(70):ON KEY(15)
     GOSUB 640:KEY (15) ON:GOT
    O 130
120 RESUME 130
130 DEF SEG=&H40:W=PEEK(&H4A)
140 ON ERROR GOTO 650:PRINT:PR
    INT"Proofreader Ready."
150 LINE INPUT L$:Y=CSRLIN-INT
    (LEN(L$)/W)-1:LOCATE Y,1
160 DEF SEG=0:POKE 1050,30:POK
    E 1052,34:POKE 1054,0:POKE
     1055,79:POKE 1056,13:POKE
     1057,28:LINE INPUT L$:DEF
     SEG:IF L$="" THEN 150
170 IF LEFT$(L$,1)=" " THEN L$
    =MID$(L$,2):GOTO 170
```


www.commodore.ca

```
180 IF VAL(LEFT$(L$,2))=0 AND
    MID$(L$,3,1)=" " THEN L$=M
    ID$(L$,4)
200 IF ASC(L$)>57 THEN 260 'no
     line number, therefore co
    mmand
205 BL=INSTR(L$," "):IF BL=0 T
    HEN BL$=L$:GOTO 206 ELSE B
    L$=LEFT$(L$,BL-1)
206 LNUM=VAL(BL$):TEXT$=MID$(L
    $,LEN(STR$(LNUM))+1)
210 IF TEXT$="" THEN GOSUB 540
    :IF LNUM=LNUM(P) THEN GOSU
    B 560:GOTO 150 ELSE 150
220 CKSUM=0:FOR I=1 TO LEN(L$)
    :CKSUM=(CKSUM+ASC(MID$(L$,
    I))*I) AND 255:NEXT:LOCATE
     Y,1:PRINT CHR$(65+CKSUM/1
    6)+CHR$(65+(CKSUM AND 15))
    +" "+L$
230 GOSUB 540:IF LNUM(P)=LNUM
    THEN L$(P)=TEXT$:GOTO 150
    'replace line
240 GOSUB 580:GOTO 150 'insert
     the line
260 TEXT$="":FOR I=1 TO LEN(L$
    ):A=ASC(MID$(L$,I)):TEXT$=
    TEXT$+CHR$(A+32*(A>96 AND
    A<123)):NEXT
270 DELIMITER=INSTR(TEXT$," ")
    :COMMAND$=TEXT$:ARG$="":IF
     DELIMITER THEN COMMAND$=L
    EFT$(TEXT$,DELIMITER-1):AR
    G$=MID$(TEXT$,DELIMITER+1)
     ELSE DELIMITER=INSTR(TEXT
    $,CHR$(34)):IF DELIMITER T
    HEN COMMAND$=LEFT$(TEXT$,D
    ELIMITER-1):ARG$=MID$(TEXT
    $,DELIMITER)
280 IF COMMAND$<>"LIST" THEN 4
    10
290 OPEN "scrn:" FOR OUTPUT AS
     #1
300 IF ARG$="" THEN FIRST=0:P=
    MAX-1:GOTO 340
310 DELIMITER=INSTR(ARG$,"-"):
    IF DELIMITER=0 THEN LNUM=V
    AL(ARG$):GOSUB 540:FIRST=P
    :GOTO 340
320 FIRST=VAL(LEFT$(ARG$,DELIM
    ITER)):LAST=VAL(MID$(ARG$,
    DELIMITER+1))
330 LNUM=FIRST:GOSUB 540:FIRST
    =P:LNUM=LAST:GOSUB 540:IF
    P=0 THEN P=MAX-1
340 FOR X=FIRST TO P:N$=MID$(S
    TR$(LNUM(X)),2)+" "
350 IF CKFLAG=0 THEN A$="":GOT
    O 370
360 CKSUM=0:A$=N$+L$(X):FOR I=
    1 TO LEN(A$):CKSUM=(CKSUM+
    ASC(MID$(A$,I))*I) AND 255
    :NEXT:A$=CHR$(65+CKSUM/16)
    +CHR$(65+(CKSUM AND 15))+"
     "
370 PRINT #1,A$+N$+L$(X)
380 IF INKEY$<>"" THEN X=P
390 NEXT :CLOSE #1:CKFLAG=0
400 GOTO 130
410 IF COMMAND$="LLIST" THEN O
    PEN "lpt1:" FOR OUTPUT AS
    #1:GOTO 300
420 IF COMMAND$="CHECK" THEN C
    KFLAG=1:GOTO 290
430 IF COMMAND$<>"SAVE" THEN 4
    50
440 GOSUB 600:OPEN ARG$ FOR OU
    TPUT AS #1:ARG$="":GOTO 30
    0
450 IF COMMAND$<>"LOAD" THEN 4
    90
460 GOSUB 600:OPEN ARG$ FOR IN
    PUT AS #1:MAX=0:P=0
470 WHILE NOT EOF(1):LINE INPU
    T #1,L$:BL=INSTR(L$," "):B
    L$=LEFT$(L$,BL-1):LNUM(P)=
    VAL(BL$):L$(P)=MID$(L$,LEN
    (STR$(VAL(BL$)))+1):P=P+1:
    WEND
480 MAX=P:CLOSE #1:GOTO 130
490 IF COMMAND$="NEW" THEN INP
    UT "Erase program - Are yo
    u sure";L$:IF LEFT$(L$,1)=
    "y" OR LEFT$(L$,1)="Y" THE
    N MAX=0:LNUM(0)=65536!:GOT
    O 130:ELSE 130
500 IF COMMAND$="BASIC" THEN C
    OLOR 7,0,0:ON ERROR GOTO 0
    :CLS:END
510 IF COMMAND$<>"FILES" THEN
    520
515 IF ARG$="" THEN ARG$="A:"
    ELSE SEL=1:GOSUB 600
517 FILES ARG$:GOTO 130
520 PRINT"Syntax error":GOTO 1
    30
540 P=0:WHILE LNUM>LNUM(P) AND
     P<MAX:P=P+1:WEND:RETURN
560 MAX=MAX-1:FOR X=P TO MAX:L
    NUM(X)=LNUM(X+1):L$(X)=L$(
    X+1):NEXT:RETURN
580 MAX=MAX+1:FOR X=MAX TO P+1
     STEP -1:LNUM(X)=LNUM(X-1)
    :L$(X)=L$(X-1):NEXT:L$(P)=
    TEXT$:LNUM(P)=LNUM:RETURN
600 IF LEFT$(ARG$,1)<>CHR$(34)
     THEN 520 ELSE ARG$=MID$(A
    RG$,2)
610 IF RIGHT$(ARG$,1)=CHR$(34)
     THEN ARG$=LEFT$(ARG$,LEN(
    ARG$)-1)
620 IF SEL=0 AND INSTR(ARG$,".
    ")=0 THEN ARG$=ARG$+".BAS"
630 SEL=0:RETURN
640 CLOSE #1:CKFLAG=0:PRINT"St
    opped.":RETURN 150
650 PRINT "Error #";ERR:RESUME
     150
```

Program 3: Commodore Proofreader

By Philip Nelson, Assistant Editor

```
10 VEC=PEEK(772)+256*PEEK(773)
   :LO=43:HI=44
20 PRINT "AUTOMATIC PROOFREADE
   R FOR ";:IF VEC=42364 THEN
   {SPACE}PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VI
   C-20"
40 IF VEC=35158 THEN GRAPHIC C
   LR:PRINT "PLUS/4 & 16"
50 IF VEC=17165 THEN LO=45:HI=
   46:GRAPHIC CLR:PRINT"128"
60 SA=(PEEK(LO)+256*PEEK(HI))+
   6:ADR=SA
70 FOR J=0 TO 166:READ BYT:POK
   E ADR,BYT:ADR=ADR+1:CHK=CHK
   +BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*
    ERROR* CHECK TYPING IN DATA
    STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+L
   F,LB:POKE SA+HF,HB:NEXT
110 IF CHK<>22054 THEN PRINT "
   *ERROR* RELOAD PROGRAM AND
   {SPACE}CHECK FINAL LINE":EN
   D
120 POKE SA+149,PEEK(772):POKE
    SA+150,PEEK(773)
130 IF VEC=17165 THEN POKE SA+
   14,22:POKE SA+18,23:POKESA+
   29,224:POKESA+139,224
140 PRINT CHR$(147);CHR$(17);"
   PROOFREADER ACTIVE":SYS SA
150 POKE HI,PEEK(HI)+1:POKE (P
   EEK(LO)+256*PEEK(HI))-1,0:N
   EW
160 DATA 120,169,73,141,4,3,16
   9,3,141,5,3
170 DATA 88,96,165,20,133,167,
   165,21,133,168,169
180 DATA 0,141,0,255,162,31,18
   1,199,157,227,3
190 DATA 202,16,248,169,19,32,
   210,255,169,18,32
200 DATA 210,255,160,0,132,180
   ,132,176,136,230,180
210 DATA 200,185,0,2,240,46,20
   1,34,208,8,72
220 DATA 165,176,73,255,133,17
   6,104,72,201,32,208
230 DATA 7,165,176,208,3,104,2
   08,226,104,166,180
240 DATA 24,165,167,121,0,2,13
   3,167,165,168,105
250 DATA 0,133,168,202,208,239
   ,240,202,165,167,69
260 DATA 168,72,41,15,168,185,
   211,3,32,210,255
270 DATA 104,74,74,74,74,168,1
   85,211,3,32,210
280 DATA 255,162,31,189,227,3,
   149,199,202,16,248
290 DATA 169,146,32,210,255,76
   ,86,137,65,66,67
300 DATA 68,69,70,71,72,74,75,
   77,80,81,82,83,88
310 DATA 13,2,7,167,31,32,151,
   116,117,151,128,129,167,136
   ,137
```

Program 4: Apple Proofreader

By Tim Victor, Editorial Programmer

```
10 C = 0: FOR I = 768 TO 768 +
   68: READ A:C = C + A: POKE I
   ,A: NEXT
20 IF C < > 7258 THEN PRINT "ER
   ROR IN PROOFREADER DATA STAT
   EMENTS": END
30 IF PEEK (190 * 256) < > 76 T
   HEN POKE 56,0: POKE 57,3: CA
   LL 1002: GOTO 50
40 PRINT CHR$ (4);"IN#A$300"
50 POKE 34,0: HOME : POKE 34,1:
    VTAB 2: PRINT "PROOFREADER
   INSTALLED"
60 NEW
100 DATA 216,32,27,253,201,141
110 DATA 208,60,138,72,169,0
120 DATA 72,189,255,1,201,160
130 DATA 240,8,104,10,125,255
140 DATA 1,105,0,72,202,208
150 DATA 238,104,170,41,15,9
160 DATA 48,201,58,144,2,233
170 DATA 57,141,1,4,138,74
180 DATA 74,74,74,41,15,9
190 DATA 48,201,58,144,2,233
200 DATA 57,141,0,4,104,170
210 DATA 169,141,96
```

©

www.commodore.ca

COMPUTE's Author Guide

Most of the following suggestions serve to improve the speed and accuracy of publication. COMPUTE! is primarily interested in new and timely articles on the Commodore 64/128, Atari, Apple, IBM PC/PCjr, Amiga, and Atari ST. We are much more concerned with the content of an article than with its style, but articles should be clear and well-explained.

The guidelines below will permit your good ideas and programs to be more easily edited and published:

1. The upper left corner of the first page should contain your name, address, telephone number, and the date of submission.

2. The following information should appear in the upper right corner of the first page. If your article is specifically directed to one make of computer, please state the brand name and, if applicable, the BASIC or ROM or DOS version(s) involved. In addition, *please indicate the memory requirements of programs.*

3. The underlined title of the article should start about 2/3 of the way down the first page.

4. Following pages should be typed normally, except that in the upper right corner there should be an abbreviation of the title, your last name, and the page number. For example: Memory Map/Smith/2.

5. All lines within the text of the article must be double- or triple-spaced. A one-inch margin should be left at the right, left, top, and bottom of each page. No words should be divided at the ends of lines. And please do not justify. Leave the lines ragged.

6. Standard typing paper should be used (no erasable, onionskin, or other thin paper) and typing should be on one side of the paper only (upper- and lowercase).

7. Sheets should be attached together with a paper clip. Staples should not be used.

8. If you are submitting more than one article, send each one in a separate mailer with its own tape or disk.

9. Short programs (under 20 lines) can easily be included within the text. Longer programs should be separate listings. *It is essential that we have a copy of the program, recorded twice, on a tape or disk.* If your article was written with a word processor, we also appreciate a copy of the text file on the tape or disk. Please use high-quality 10 or 30 minute tapes with the program recorded on both sides. The tape or disk should be labeled with the author's name, the title of the article, and, if applicable, the BASIC/ROM/DOS version(s). Atari tapes should specify whether they are to be LOADed or ENTERed. We prefer to receive Apple programs on disk rather than tape. Tapes are fairly sturdy, but disks need to be enclosed within plastic or cardboard mailers (available at photography, stationery, or computer supply stores).

10. A good general rule is to spell out the numbers zero through ten in your article and write higher numbers as numerals (1024). The exceptions to this are: Figure 5, Table 3, TAB(4), etc. Within ordinary text, however, the zero through ten should appear as words, not numbers. Also, symbols and abbreviations should not be used within text: use "and" (not &), "reference" (not ref.), "through" (not thru).

11. For greater clarity, use all capitals when referring to keys (RETURN, TAB, ESC, SHIFT), BASIC words (LIST, RND, GOTO), and three languages (BASIC, APL, PILOT). Headlines and subheads should, however, be initial caps only, and emphasized words are not capitalized. If you wish to emphasize, underline the word and it will be italicized during typesetting.

12. Articles can be of any length—from a single-line routine to a multi-issue series. The average article is about four to eight double-spaced, typed pages.

13. If you want to include photographs, they should be either 5×7 black and white glossies or color slides.

14. We do not consider articles which are submitted simultaneously to other publishers. If you wish to send an article to another magazine for consideration, please do not submit it to us.

15. COMPUTE! pays between $70 and $800 for published articles. In general, the rate reflects the length and quality of the article. Payment is made upon acceptance. Following submission (Editorial Department, COMPUTE! Magazine, P.O. Box 5406, Greensboro, NC 27403) it will take from four to eight weeks for us to reply. If your work is accepted, you will be notified by a letter which will include a contract for you to sign and return. *Rejected manuscripts are returned to authors who enclose a self-addressed, stamped envelope.*

16. If your article is accepted and you have since made improvements to the program, please submit an entirely new tape or disk and a new copy of the article reflecting the update. We cannot easily make revisions to programs and articles. It is necessary that you send the revised version as if it were a new submission entirely, but be sure to indicate that your submission is a revised version by writing, "Revision" on the envelope and the article.

17. COMPUTE! does not accept unsolicited product reviews. If you are interested in serving on our panel of reviewers, contact the Review Coordinator for details.

www.commodore.ca

64 Uncruncher

The first line was omitted from the MLX-format listing for this program in the August issue (p. 100). It should read as follows:

```
C000:AD 20 D0 8D 0A C6 A5 73 7D
```

Screen Machine II

When entering the program that accompanies Part 1 of this article in the July issue (p. 86), you'll encounter many lines for which the published "Automatic Proofreader" checksum will not match the one returned by the Proofreader even when the line is entered exactly as listed. The program in the July listing was generated by processing the commented listing from Part 2 of the article in the August issue (Program 1, p. 95) with the "REMover" program in that issue (Program 2, p. 99). REMover removes all comments, but in the case of comments at the end of program lines it leaves the space between the last BASIC statement and the apostrophe ('). This space affects the checksum calculated by our lister program, but cannot be typed when you enter the program (any spaces after the last character in a program line are ignored). Except for the Proofreader checksums, the July "Screen Machine II" program is correct as listed, so it should work if entered as listed without using the Proofreader. The checksums should all be correct in the commented (August) version.

Apple ProDOS Catalog Sorter

The article with this utility program in the July issue (p. 96) states that the program can be modified for a 40-column video display simply by changing the PR#3 in line 260 to PR#0. Actually, several other changes are also required if you wish to display the sorted catalog on a 40-column screen: The HTAB statements should be removed from lines 340 and 780. The PRINT L2$: in line 460 should be changed to PRINT LEFT$(L2$,80 − 41 * (A$ <> "P")): and the PRINT DA$(I): in line 740 should be changed to PRINT LEFT$(DA$(I),80 − 41 * (A$ <> "P")):.

Also, the author has provided the following enhancement (this is not a correction). As published, the program sorts programs strictly by name. However, it's often useful to have programs sorted by type as well as by name, especially for directories on a hard disk. If you would like to modify the program to add this feature, change the assignment of the variable SK$(E) in line 680 to SK$(E) = MID$(L4$, 18, 3) + MID$(L4$, 2, 15).

Converting IBM ML to BASIC DATA

The article for this program erroneously states that this program will work on the PCjr. Cartridge BASIC for the PCjr does not support the SHELL command. (SHELL is included in Cartridge BASIC, but control does not return to BASIC after the command has executed.) Reader Wayne E. Robinson suggests a novel solution for PCjr owners: The PCjr normally uses Cartridge BASIC rather than either of the PC versions provided on the DOS disk, but it's not impossible to use the disk versions which properly support SHELL. When you type either BASIC or BASICA at a DOS A> prompt, DOS checks for the presence of Cartridge BASIC and displays an error message if no cartridge is found. You can trick the computer and use the disk versions of BASIC simply by changing their names. For example, you can use the ML-to-DATA program by using DOS to rename BASICA.COM as BASICB.COM, then typing BASICB (instead of BASICA) to start Advanced Disk BASIC, which can be used to run the program as listed.©

TANDY® COMPUTERS
SAVE 20—40%
Off List on All Tandy and RS Equipment

The IBM* PC compatible computer that's ahead of the crowd!
Includes DeskMate® software for word processing, spreadsheet analysis, telecommunications and more, so you can use your computer right away. #25-1000
*IBM/TM International Business Machines Corp.

Call For Latest Prices!

Call for monthly RS flyer specials.

Tandy Model 3000HD, List 3599, Our	2699.00	Model 6000 Multi-user with XENIX,list 4499, our	CALL
Tandy Model 600, List 1599, Our	CALL	Tandy 1200HD, (XT-compatible), List 1999, Our	CALL
Tandy Model 3000, List 2599, Our	CALL	Lotus 1-2-3, List 495, Our	CALL
Model 200 Portable, List 999, Our	CALL	Wordstar Professional, List 395, Our	CALL
Model 102 Portable, List 499, Our	CALL	DMP 130 Printer, List 350, Our	CALL
Non-RS Expansion Boards	CALL	EPSON Printers	CALL
Non-RS Hard Drives	CALL	All Tandy and RS monitors, peripherals	CALL

You will be pleased with our courteous, efficient service . . . and with the knowledge that we WILL NOT be undersold!

FOR COLORADO RESIDENTS AND INFORMATION CALL 303-249-9125.

CALL TOLL FREE FOR ORDERS
1-800-44SHACK

GREAT WESTERN ELECTRONICS

228 E. MAIN, MONTROSE, COLORADO 81401 HOURS: Mon. - Fri. 9 a.m. - 5 p.m.

www.commodore.ca

News & Products

Epyx Ships New Entertainment Packages

COMPUTE!'s coverage of the Summer Consumer Electronics Show (CES) in last month's issue inadvertently omitted significant new products from Epyx of Sunnyvale, California.

Epyx has introduced a variety of new entertainment programs for Apple, Commodore, Atari, and IBM computers.

Among the new releases are three bestselling packages recently converted for the Amiga and Atari ST computers: the classic *Temple of Apshai Trilogy*, three adventure role-playing games in one; *Rogue*, a 26-level graphic adventure game; and the popular *Winter Games*, featuring seven Winter Olympic contests. Epyx announced that many more of its most popular titles will appear in Amiga and ST versions later this year.

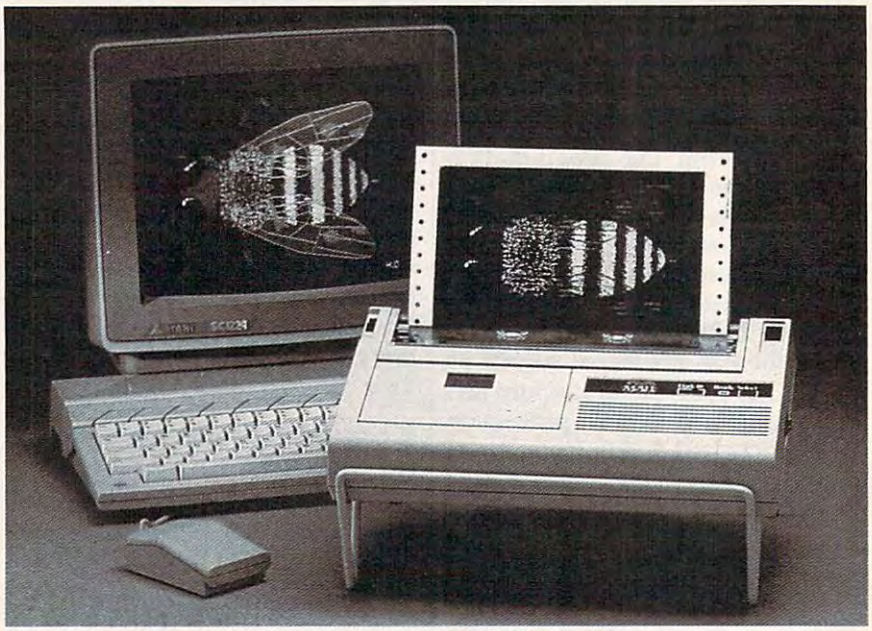
New titles include *The Movie Monster Game*, featuring the ever-popular Godzilla, an action game that lets the player take part in movie monster mayhem; *World Games*, a new series of Olympic contests in which players become international athletes and travel to eight different countries to compete in an event specific to each locale—for example, cliff-diving in Mexico or sumo wrestling in Japan; *Super Cycle*, an arcade-action motorcycle racing game that features a realistic first-person perspective; *Championship Wrestling*, a fast-action wrestling contest in which you choose your own wrestling personality and climb into the ring with a formidable opponent; and *World Karate Championship*, a graphically detailed karate-action program that features eight different compeition locations against increasingly difficult opponents. As with most earlier Epyx titles, these entertainment packages are available currently, or soon, for all major personal computer systems. Prices vary.

Epyx, Inc., 1043 Kiel Ct., Sunnyvale, CA 94089.

Circle Reader Service Number 170.

Color Printer Interfaces For Amiga, ST

Okidata has announced that the Okimate 20, a color thermal transfer printer, can now be easily interfaced with the Amiga and Atari ST through its Plug 'N Print modules. The module is included in the $268 price for the printer, and contains everything the user needs to begin printing immediately: a data cable, black and color cartridge ribbons, and sample computer paper.



The Okimate 20 now works with the Amiga and ST computers.

In addition to printing over 100 colors, the Okimate 20's 24-element printhead provides correspondence at 80 cps in draft mode and 40 cps in NLQ mode. Users can select from several different type fonts, including wide print, boldface, fine print, and italics. Underlining, superscript, and subscript are also standard features.

Okidata, 532 Fellowship Rd., Mt. Laurel, NJ 08054.

Circle Reader Service Number 171.

Electronic Greetings

Create and send electronic greetings—including animation and sound—with *Color Mail* from Hallmark Cards. This program lets you combine graphics, animation, music, sound, and personal messages to send greetings to other subscribers of CompuServe.

To use *Color Mail*, a subscriber develops a greeting offline and sends it through the electronic mail facility. The recipient transfers the greeting for offline viewing using his or her own *Color Mail* disk.

Color Mail can be ordered from CompuServe for $40. This includes CompuServe's VIDTEX communications program, 103 design elements, and illustrated user guides. A PalPak costs $60 and contains two disks, one for the sender and one for the recipient. There is a fee of 25 cents in addition to the connect time charge when using *Color Mail*. New groups of design elements can be ordered for $3.50 to $5.00.

Hallmark Color Mail, 2440 Pershing Rd., Ste G-40, Kansas City, MO 64108.

Circle Reader Service Number 172.

Database Manager For Commodore 128 And Amiga

Mid-Kansas Computers recently announced the release of Woodsoftware's *Flex File* for the Commodore 128 and Amiga, based on the earlier *Flex File* database manager for the 64 and PET computers.

On the Amiga version, all of the earlier command formats have been retained, and new features have been

www.commodore.ca

added that take advantage of the Amiga's power. These features include sophisticated virtual window entry editor with UNDO and CLEAR LINE functions; minimal mouse commands to speed data entry, editing, and processing; and storage of housekeeping data in machine memory to maximize file space. Two versions are included: An Amiga BASIC version that you can customize; and a machine language version for speed, multitasking with other programs, and more memory to handle extremely large and complex files. It retails for $79.95.

Flex File 128 is completely compatible with data disks created on earlier versions of *Flex File* and *Practifile* for other Commodore computers. Its command structure is identical to that of the older version, with a few enhancements. Up to 10,000 records can be created, with up to forty fields per record. 80-column FAST mode is supported, and HELP screens are available without disk access. It retails for $49.95.

Mid-Kansas Computers, 204 W. 6th, P.O. Box 506, Newton, KS 67114.

Circle Reader Service Number 174.

MECC Apple Educational Software

MECC has introduced two educational tools for Apple II series computers.

Quickflash! is a utility package that lets teachers create electronic flashcards. The program includes automatic recordkeeping, randomization of questions, control of mastery level, and printed progress reports.

Quickflash! can be adapted to various subject levels and includes diacritical marks and special characters for foreign language study. A printer option lets teachers print the questions and answers.

Students in grades six through nine can learn to write plays with *Show Time*. The students pick the cast from over 1000 possible combinations, build the sets, compose the music, and write the scripts using the integrated word processor, *MECC Writer*. With *Show Time*, students add stage directions, rehearse, edit the scripts, and finally watch the play. A support manual is included. Both *Quickflash!* and *Show Time* require an Apple II series computer with at least 64K. Contact MECC for prices.

MECC, 3490 Lexington Ave. N., St. Paul, MN 55126-8097.

Circle Reader Service Number 175.

Commodore 128 And IBM Compatibility

S.O.G.W.A.P. Software has introduced *The Big Blue Reader*, a software program that lets users transfer word processing and ASCII files generated on most IBM-compatible software to Commodore 128 DOS files, and vice versa.

Release 1.0 of *The Big Blue Reader* is priced at $29.95, plus $2 for shipping and handling (California residents add $1.95). *The Big Blue Reader* is self-booting. A full menu appears on the 80-column screen, while on the 40-column screen the program offers a main menu and submenus. Prompts take the user through the copying process, whether going from Commodore to IBM or IBM to Commodore.

The Big Blue Reader also offers the user the option of translating MS-DOS standard ASCII characters to Commodore ASCII characters—and vice versa—solving the problem of reversed capitals and lowercase letters.

S.O.G.W.A.P. Software, Inc., 611 Boccaccio Ave., Venice, CA 90291.

Circle Reader Service Number 176.

Pro Golf Simulator For Atari ST

Leader Board, for the Atari ST, is a realistic golf simulator that provides the player with a true perspective of the game. It features multiple 18-hole courses, 3-D animation, trees and sandtraps, and three levels of play. The program also provides for computerized scoring, a handicap system, and requires the player to make strategic decisions involving the choice of club, distance, and many other variables.

A joystick is required. The ST version of *Leader Board* retails for $39.95.

Access Software, Inc., 2561 S. 1560 W., Woods Cross, UT 84087.

Circle Reader Service Number 177.

RAM-Resident IBM Writing Tool

Micro Logic has released a RAM-resident productivity tool for the IBM-PC and compatibles. *Tornado Notes* lets you process random information using a system of parallel text processing. You can enter text into logical modules and then change, reorganize, and code the information as you wish. *Tornado Notes* has a flexible search capability and includes a pile-of-paper simulator, forms capability, note-joining function, two-keystrok duplication feature, and importing and exporting of both files and screens. There is a built-in editor as well as a helpful icon-based user interface.

Tornado Notes runs on the IBM-PC and compatibles with PC-DOS (MS-DOS) 2.0 or later and uses 50K of RAM, plus space for notes. It does not use bit graphics and supports most 80-character monochrome and color displays. The software is not copy-protected.

Tornado Notes costs $49.95, which includes a collection of reference notes and a 30-day money-back guarantee.

Micro Logic Corp., P.O. Box 174, 100 2nd St., Hackensack, NJ 07602.

Circle Reader Service Number 178.

Idea Processor For Amiga

Flow is an idea processor that takes full advantage of many of the Amiga's features, including multi-tasking, pull-down menus, windows, and the mouse.

The program's primary use is in organizing and arranging ideas in preparation for writing papers, articles, or books; or for presentations, planning, and decision-making. It can also be used to store and rapidly find important dates and appointments, or to save factual information in an orderly fashion. Suggested retail price is $99.95.

New Horizons Software, P.O. Box 43167, Austin, TX 78745.

Circle Reader Service Number 179.

BASIC Programming On The Apple

Thirty-five lessons in *Ace Programmer* cover the fundamentals of Apple BASIC programming on the Apple-II series computers. This new program from MindPlay instructs users, gives examples, and then offers students a chance to practice with 70 additional *playspace* assignments. The package includes recordkeeping, options to create additional playspace assignments, and a guidebook.

Ace Programmer is available on level I for grades 2 through 6 and level II for grades 7 through adult. Backup and lab packs are also available. Suggested retail price is $39.95.

MindPlay, Methods & Solutions, Inc., 82 Montvale Ave., Stoneham, MA 02180.

Circle Reader Service Number 180.

Hard Disk Drive For Commodore 64

The Data Chief is a hard disk drive system with floppy disk included for the Commodore 64, available in a 10-megabyte or 20-megabyte version. Produced by InConTrol, Inc., each system comes with a 170K floppy drive, a 135-watt power supply, a hard disk drive, and controller/driver cards, all housed in a metal case.

A second hard disk can be added without an additional driver card and, with an expansion kit that will be available this fall, three hard disks can be installed in the system. The Model HFD-60 is a 10-megabyte system

www.commodore.ca

($895); the Model HFD-120 is a 20-megabyte system ($995).

InConTrol, Inc., 103 Baughman's Ln., Ste. 301, Frederick, MD 21701.

Circle Reader Service Number 181.

ST Versions Of Popular Text/Graphics Adventures

Spinnaker has announced that several titles in its popular Telarium series will now be available for Atari ST computers. The games include *Nine Princes Of Amber,* a game of negotiation, politics, and alliances in which you play a prince fighting for the throne of the one true perfect world (written by Roger Zelazny); *Amazon,* where as a special agent for a high-tech research firm you must travel to the dangerous, unexplored Amazon (written by Michael Crichton); and *Perry Mason: The Case Of The Mandarin Murder,* in which you play the role of world-famous criminal lawyer Perry Mason.

The ST versions of each program retail for $49.95.

Spinnaker Software, One Kendall Sq., Cambridge, MA 02139.

Circle Reader Service Number 182.

Commodore 16 And Plus/4 Programs

Two entertainment programs and a home finance package for the Commodore 16 and Plus/4 computers have been introduced by Robinson Software Associates.

Bounty Hunter is a text adventure set in the Old West; *Grave Robbers* is a graphic treasure-hunting adventure; and *Savings & Loan* is a home finance program that calculates principal, interest payments, amortization on loans, and various types of savings.

Each program sells for $9.95, plus $1.50 postage.

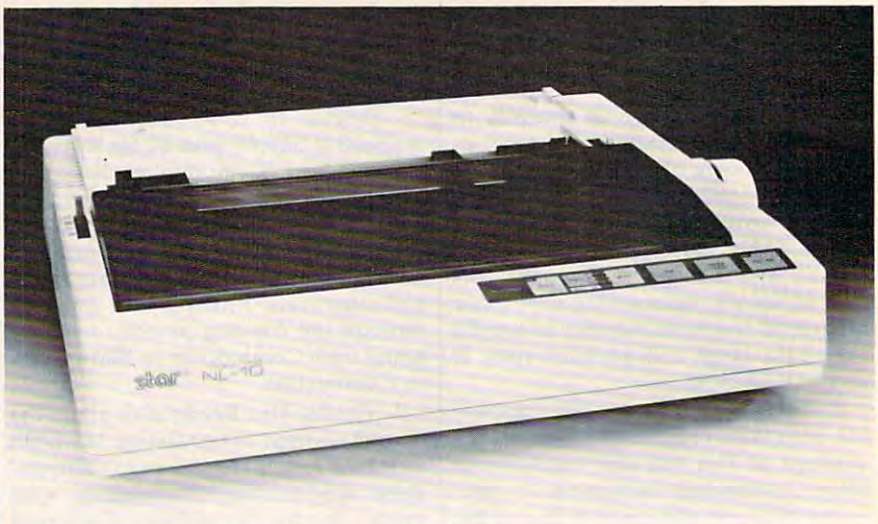
Robinson Software Associates (RSA), 50 South Valley Road B2, Paoli, PA 19301.

Circle Reader Service Number 183.

Star Micronics Printer

Star Micronics has introduced the NL-10, a 9-wire dot matrix desktop printer for professional, small office, and home use. The NL-10 prints high-speed draft quality at 120 cps and near letter quality at 30 cps. It offers eleven format and print functions, including three print pitch selections, type style, print mode, margin settings, and forward and reverse paper feed. The rear tractor feed has a quick tear feature plus an automatic feed. There is an optional automatic single and dual bin cut sheet feeder. Ribbon cartridges snap in easily.

The NL-10 has plug-in interface cartridges for the IBM PC and PC compatibles, Commodore 64/128, standard parallel computers, Apple computers, and an RS-232C serial interface cartridge.



The NL-10 dot matrix printer from Star Micronics is compatible with all major personal computers.

Suggested retail price for the NL-10 with one interface cartridge is $379. The base unit retails for $319 and each cartridge is priced at $60.

Star Micronics, Inc., 200 Park Ave., Ste. 3510, New York, NY 10166.

Circle Reader Service Number 184.

Inexpensive ST Software

Keypunch Software has introduced a line of inexpensive game, educational, and personal productivity programs for the Atari ST. Titles include *Trivia Master, The Gambler, Strategy Games, Cards Cards Cards, Mind Games, Personal Finance Pak, Executive Data Pak,* and *Finance I & II.*

Each program retails for $9.99. Amiga versions are planned for the fall of 1986.

Keypunch Software, 1221 Pioneer Bldg., St. Paul, MN 55101.

Circle Reader Service Number 185.

Macintosh Graphics

Dynamic Graphics has introduced *DeskTop Art* software for the Macintosh, a new line of programs that contains graphics selected and digitized from the company's library of more than 20,000 exclusive illustrations and photos. All images are based on original art, commissioned and purchased by Dynamic Graphics from leading illustrators for its international art services.

Each volume under the *DeskTop Art* name, categorized by subject and style, includes more than 300 illustrations stored on two disks as *MacPaint* documents. Also included in every package is a 24-page how-to guide, a pictorial index to the art, and suggested applications projects. The first two volumes are *Graphics & Symbols* ($66.95), a collection of high-contrast pictograms and symbols; and *Artfolio I* ($74.95), a miscellany of styles and subjects that includes people, familiar objects, and animals.

Dynamic Graphics, Inc., 6000 N. Forest Park Dr., P.O. Box 1901, Peoria, IL 61656-1901.

Circle Reader Service Number 186.

IBM Software From Buttonware

Buttonware has introduced several software packages for the IBM PC and compatibles.

PC-Dial is a communications package that features DOS access for commands or programs, complete support of DOS subdirectories, a built-in mini-editor for editing files online, support of user-defined scripts, smart keys that save up to 12 macros, a help screen, an automatic redial, communication at speeds from 75 bps up to 9600 bps, screen colors, and an on-screen timer. *PC-Dial* requires a serial communications port, a modem, DOS 2.0 or higher, 164K available RAM memory without the mini-editor and 220K of available RAM memory with the mini-editor.

PC-Style analyzes the readability of your writing by computing the percentage of long words, personal words, action verbs, words per sentence, and average syllables per word. This program works with any standard ASCII or *Wordstar* document.

PC-Tickle is a reminder program that helps you keep track of appointments, dates, and meetings. It also has

www.commodore.ca

an option that allows you to keep running totals of your checkbook balance, calorie consumption, and more.

PC-File III is a general purpose database manager program.

PC-File/R has more features than *PC-File III*, including relational database capabilities, integrated letter writing, and mail-merge capabilities.

A word processor, *PC-Type* can perform DOS functions and has keyboard macros as well as help panels to guide you through each process.

The graphics extension to *PC-File III* and *PC-File/R* is *PC-Graph*, which can plot a line graph of a database or a report created with the word processing programs.

PC-Dial, *PC-File III*, and *PC-Graph* each sell for $59.95. *PC-Style* and *PC-Tickle* each sell for $29.95 and *PC-File/R* costs $149.00.

ButtonWare, Inc., P.O. Box 5786, Bellevue, WA 98006.

Circle Reader Service Number 187.

PBS Science Series Offers Free Software

Newton's Apple, the popular PBS science series, will introduce supplementary software to support this fall's series, thanks to a major grant from the Dupont Corporation.

The software series will consist of six Apple programs that deal with the scientific principles covered in the series. For example, as the host relates the laws of probability to the workings of a slot machine, a companion software program brings the lesson to the viewer through computer simulations of coin flipping, dice throwing, and slot machine playing. Additional software will be based on such program themes as mirrors, telescopes, and alcohol's effects on the body.

Newton's Apple software will be available at no cost on major online news and information services, local bulletin boards systems, user groups, and local board of education computer resource centers.

For further information, contact your local Apple user group or call a local FIDO-NET BBS.

Circle Reader Service Number 188.

Writing Aids For Apple II

I Can Write and *Be A Writer* introduce students to word processing as part of a book-building venture which encourages creative writing and helps teach basic grammar and writing skills. Both programs require the use of the Magic Slate, a Sunburst educational aid.

Challenges offered by *I Can Write*, designed for second graders, range from open-ended explorations of personal identity to changing a monster's description with new adjectives or commanding its actions with different verbs. Sudents can easily change or add to each exercise, then print out individual lessons to become part of their own personal writing record. In addition, they can create their own books of original stories, poems, letters, and drawings.

In *Be A Writer*, designed for third graders, students explore the narrative, descriptive, and explanatory styles of writing with imaginative characters like Ruby Robot and Giant George.

Both programs, available for Apple II computers, consist of 25 lessons each, and retail for $40.

Sunburst Communications, Inc., 39 Washington Ave., Pleasantville, NY 10570.

Circle Reader Service Number 189.

Statistical Baseball Game

SubLogic has introduced *Pure-Stat Baseball*, a statistical baseball simulation game originally being released for the Commodore 64, with later versions planned for the Apple II and IBM computers.

Pure-Stat Baseball contains every

DISKS 50¢ • PRINTERS • commodore 64 EDUCATOR

☑ LIFETIME WARRANTY
☑ TYVEK SLEEVES • LABELS
WRITE PROTECTS • PACKAGED

FACTORY NEW — 1st QUALITY

	50-99	100-999	1000+
GENERIC SS/DD	.60	.55	.50
BASF DS/DD	1.00	.95	.90

Verbatim®

	50-99	100-999	1000+
SS/DD	1.00	.95	.90
DS/DD	1.50	1.40	1.30

BY COMMODORE AMIGA™ GIVES YOU A CREATIVE EDGE
NEW LOW PRICE CALL!

M.C.S.
MicroComputer Services
800-433-7756
In Michigan (313) 427-0251
INFO & CUSTOMER SERVICE—(313) 685-7766
HOURS: MON-SAT 10:00 A.M.-6:00 P.M.
12864 Farmington Rd., Livonia, MI 48150

Canon PJ-1080A
COLOR INK JET
$249.95
LIMITED TIME OFFER

GoldStar
13" COLOR MONITOR
$119.95
NEW with cables

COMMODORE 1541
NEW — $139.95
Limited Quantity

NEW! star NX-10
$239.95
N.L.Q. • SHEET FEEDER
REAR TRACTOR/FRICTION
5K BUFFER

SEIKOSHA SP-1000
COMMODORE READY
$179.95
NEAR LETTER QUALITY
FRICTION & TRACTOR
100 CPS • 1.5K BUFFER

COMREX CR-220
$79.95
COMMODORE READY
FROM EPSON
50 CPS • TRACTOR FEED

We Bought 'em All
FAR BELOW DEALER COST

RETAIL 499.95

REGULAR DEALER COST 325.00

- 100% C-64 Compatible
- Built in Hi-Res Green Monitor
- Heavy duty power supply and sturdy case
- All units completely refurbished with full 90 day warranty

$199.95
SPECIAL QUANTITY DISCOUNTS

MC/VISA/C.O.D.
Dealer Inquiries Invited
All prices discounted for cash or check, add 3% for MC/VISA. Shipping: Printers $10.00, Educator $20.00, Disks $4.00 per 100, (West Coast — add $2.00 per order). Add $2.00 for C.O.D. Reduced shipping for large quantities. Prices and availability subject to change without notice. ALL MERCHANDISE CARRIES MANUFACTURERS WARRANTY.

www.commodore.ca

major-league team from the 1985 season, along with eight classic teams from the past. The game, which is for one or two players, lets you trade team players, draft new players, or create your own teams. There are three stadiums to choose from on the game disk, or you can purchase an optional disk with every major league stadium in the U.S.

The emphasis throughout the game is on statistical realism. You select the team you want to manage, then pick the team you want to play against. Choose starting lineups, pitchers, make player substitutions, and call plays. Each player acts and moves individually on every play. The game maintains a complete statistical record as well.

The Commodore 64 version sells for $49.95. Versions for the Apple II and IBM PC computers will be released at a later date.

SubLogic Corp., 713 Edgebrook Dr., Champaign, IL 61820.

Circle Reader Service Number 190.

ST Cookbook On A Disk

Micro Cookbook, from FTL, consists of more than 150 recipes, and is an authoritative source of cooking tips and nutritional information designed to make you a better cook. It's a time-saving meal planner for organizing every menu detail. You pick the menu, and *Micro Cookbook* creates a shopping list of all the ingredients you'll need.

Available for the Atari ST, *Micro Cookbook* retails for $49.95.

FTL, 6160 Lusk Blvd., C206, San Diego, CA 92191.

Circle Reader Service Number 191.

Apple, IBM, Commodore PlayWriter Programs

Woodbury Software has announced the availability of two new programs in the company's PlayWriter series for the Apple II, Commodore 64, and IBM PC/PCjr computers. Each title in the series helps young authors write, edit, print, illustrate, and produce hardcover novels.

MYSTERY! and *Castles & Creatures,* the newest additions, are aimed at users age seven and above, including adults. In *MYSTERY!,* you write your detective novel by choosing and describing your sleuth, determining the method and motive of the murder, and creating your own cast of characters. In *Castles & Creatures,* you build your own adventure in a world of fantasy and imagination. Your environment is filled with dragons, knights, sorcerers, and royalty.

Each PlayWriter title is priced at $39.95 and includes a software story disk, color stickers, full-page illustrations, a hardcover book jacket, special paper, and easy to use instructions. Earlier PlayWriter titles include *Tales of Me* and *Adventures In Space.*

Woodbury Software, 127 White Oak Ln., CN 1001, Old Bridge, NJ 08857.

Circle Reader Service Number 192.

Commodore Music Software Guide

Commodore 64 & 128 Music Software Guide, by noted computer music consultant Lolita Walker-Gilkes, is a comprehensive music software guide that ranges from advice on how to use the Commodore for music to detailed explanations of individual software programs and their target audiences. The text presents descriptions, age groups, and prices, and breaks the information into sections on theory, eartraining, fingerings, composition, entertainment, and graphics. A separate section is devoted to MIDI (Musical Instrument Digital Interface), and appendices include vendor addresses, periodicals, and books that can further help users.

The guide sells for $11.95.

Unsinn Publications, P.O. Box 672, Drexel Hill, PA 19026.

Circle Reader Service Number 193.

Telecomputing Package

A new hardware and software package from Kinesis Corporation allows up to 23 simultaneous callers. *POPnet* lets users carry on private or open conversations with other users, take part in any of the two-player games, including chess, checkers, backgammon, and othello, or drop into one of the multiplayer games such as poker, liar, star trader, and house-o-fun. There are also mail and bulletin board areas.

POPnet is set up for operation as a business, complete with accounting software. Typical charges to a user is 75 cents an hour. Contact Kinesis Corp. for price.

Kinesis Corp., 3000 Citrus Circle, Suite 212, Walnut Creek, CA 94598.

Circle Reader Service Number 194.

Apple II, IBM Grammar Program

Grammar Gremlins, a comprehensive grammar program for elementary students, is the newest release from Davidson & Associates, for the Apple II+, IIe, and IIc at a suggested retail price of $49.95. An IBM version will be released in September.

Grammar Gremlins presents grammar rules with over 700 practice examples and sentences. The program covers abbreviations, subject/verb agreement, capitalization, contractions, parts of speech, plurals, possessives, punctuation, and sentence structure. Its features include an easy-to-use editor, animation, color, optional sound effects, record-keeping, and print-out capabilities.

Davidson & Associates, Inc., 3135 Kashiwa St., Torrance, CA 90505.

Circle Reader Service Number 195.

Commodore 64 Music

Free Spirit Software, publishers of the classical music disk, *Music of the Masters,* has announced a second classical music disk for the Commodore 64, *Music of the Masters, Vol. II.*

The program contains 40 compositions by composers such as Mozart, Bach, Beethoven, Brahms, and others. Instrument simulations include piano, harpsichord, violin, flute, guitar, and clarinet. Screen commentary on the composers is included.

Music of the Masters, Vol. II, has a price of $9.95. Both volumes may be purchased for $16.95. No shipping and handling charges.

Free Spirit Software, Inc., 5836 S. Mozart, Chicago, IL 60629.

Circle Reader Service Number 196.

Commodore Bulletin Board

Blue Board from SOTA Computing Systems is a bulletin board system for the Commodore 64 that supports over 200 online messages (of up to 1,023 characters), up to 220 users, and more than 25 sysop-definable sub-boards.

Written entirely in machine language, the system includes remote SYSOP access, a private sysop sub-board, and unlimited session connect time. *Blue Board* also includes *Scribbles,* which are mini sub-boards for messages of up to 80 characters (for opinion forums, voting, chess games, etc.). The system can be reconfigured by the sysop.

Blue Board requires a Commodore 64 or 128 with one disk drive (1541 or equivalent), and a 300-baud auto-answer modem (Commodore 1650 or equivalent). The suggested retail price is $69.95 (U.S. funds).

SOTA Computing Systems, Ltd., 213-1080 Broughton St., Vancouver, British Columbia, Canada V6G 2A8.

Circle Reader Service Number 197. ©

www.commodore.ca

ATARI 130XE

ATARI 130XE Super Computer Package

130XE Computer — 1027 Printer
1050 Disk Drive — Atariwriter +

Call for individual & super package price

ATARI PRINTER INTERFACES

Uprint A 54.95
MPP 1150 ..... 54.95

Supra 1000E Modem **44.95**
Atari XM-301 Modem 39.95

ATARI 130-XE SUPER PRINTER PACKAGES

NX-10 Printer & U-Print A 299
Panasonic 1091 & U-Print A 299

Super Printer Packages have no extra shipping charges or credit card surcharges when shipped in Continental USA

ATARI 130XE SOFTWARE

BRODERBUND

Print Shop 28.95
Karateka 20.95
Print Shop Graph. I, II, or III ... 19.95
Print Shop Comp. 27.95

INFOCOM

See Commodore 64 section for items and prices

ELECTRONIC ARTS

Archon II 24.95
Archon 19.95
Seven Cit. of Gold 24.95
Skyfox 24.95
Pinball Const. 19.95
One on One 24.95
Super Boulder Dash .. 19.95
Chessmaster 2000 ... 27.95
Racing Destruction ... 24.95
Ultima III 34.95
T-down Football 23.95

MICROPROSE

Silent Service 23.95
Gunship 23.95
Accrojet 23.95
F-15 Strike Eagle 23.95
Kennedy Approach ... 23.95
Conflict/Vietnam 27.95

SSI

See Commodore 64 section for items and prices

MISCELLANEOUS 130XE

Mind Pursuit 18.95
Never-Ending Story .. 18.95
Fooblitzky 27.95
Syncalc 32.95
Typesetter 24.95
Ultima III 34.95
Ultima IV 41.95
Beachead II 27.95
Raid Over Moscow ... 23.95
Fight Night 19.95
Hardball 19.95
Flight Simulator II ... 34.95
Alternate Reality 24.95
Fleet System II 49.95
Page Designer 21.95
Megafont II 17.95
Rubber Stamp 21.95
Halley Project 23.95
Synfile 32.95
Beachead II 23.95
Music Studio 23.95
Wizard's Crown 27.95
Gettysburg 39.95
Island Caper 23.95
Basic XE 49.95
Action 47.95
MAC65XL 47.95
Paper Clip/Spell 39.95

ATARI ST

Atari 1040ST-RGB System ..... Call
Atari 1040ST-Monochrome System .. Call
Atari 520ST-RGB System ..... Call
Atari 520ST-Monochrome System .. Call
SF314DS/DD Disk Drive 209

We warranty all 520ST computers purchased from ComputAbility for ninety days.

MISCELLANEOUS ST

Gato 34.95
Kings Quest II 33.95
ST Talk 17.95
H&D Base 64.95
Typesetter ST 24.95
Word Invaders 24.95
Mean 18 Golf 34.95
Financial Cookbook ... 34.95
Brataccus 33.95
Michtron Utilities 39.95
Black Cauldron 27.95
Printmaster ST 24.95
P.C. Intercom 89.95
Final Word 94.95
Hex 27.95
Mudpies 27.95
Sundog 24.95
Flipside 27.95
Softspool 27.95
VIP Professional 119.95
Ultima II 39.95
Perry Mason 33.95
Degas 27.95
Farenheit 451 ..... 33.95
Personal Pascal 49.95
Art Gallery I 19.95
Compubridge 19.95
Major Motion 27.95
Pawn 29.95
DFT 34.95
Universe II 49.95
Macrodesk 20.95
Rubber Stamp 24.95
Kissed 34.95
Cards 27.95
Rouge 27.95
Mastertype 27.95
Easy Record 54.95
Swiftcalc ST 59.95
Data Manager ST 59.95
Little Comp. People ... 34.95
Philon ..... Call
Wordwriter ST ... 59.95
Amazon 33.95
DOS Shell 27.95
Kissed 34.95
9 Princess/Amber 33.95
Hacker 29.95
Dragonworld 33.95
Treasure Island 27.95
Wizard of Oz 27.95
Borrowed Time 33.95
Mi-Term 34.95
Regent 2 w/Gem 64.95
Regent Spell 31.95
Regent Base 64.95
Goldrunner 27.95
Time Bandit 27.95
Zoomracks 49.95
Easy Draw 99.95
Mindshadow 33.95
Phantasie 27.95
Hippopotamus ..... Call
Supra Hard Drive ..... Call
Supra 1200 ST Modem .. 159
QMI 1200 ST Modem ... 159
PC Board Designer .... Call
Infocom ..... See IBM
Apshai Trilogy 27.95
N-Vision 27.95
DB Man 69.95
Small Bus. Pkg 84.95
Cornerman 34.95
ALT 34.95
M-Copy 54.95
Winter Games 27.95
Winnie The Pooh 19.95
Silent Service 27.95
Flight Simulator II 34.95
Music Studio 39.95
Phantasie 27.95
1 Megabyte Upgrade ... 175
Extended Warranty .... Call
Computer Baseball ... 27.95
Chessmaster 2000 .... 32.95
Strip Poker 27.95

AMIGA

Call for Hardware and Add-on Peripherals prices

AMIGA SOFTWARE

Hacker 29.95
Mindshadow 29.95
Mastertype 27.95
VIP Professional 139.95
Analyze 69.95
On-line 49.95
Artic Fox 29.95
Adventure Const 29.95
Deluxe Video ..... Call
Deluxe Paint 69.95
Infocom ..... See IBM
Monkey Business 19.95
Rouge 27.95
Apshai Trilogy 27.95
Delta Patrol 19.95
Aegis Draw 134.95
Little Comp. People ... 34.95
Instant Music 34.95
Mean 18 ..... 34.95
Leader Board 27.95
Maxicom 39.95
Maxidesk 49.95
Maxiplan 119.95
One on One 29.95
7 Cities/Gold 29.95
Skyfox 29.95
Marble Madness 29.95
Return/Atlantis 29.95
Archon 29.95
Aegis Animator 99.95
Deluxe Print 69.95
Music Studio 39.95
Borrowed Time 29.95
Financial Cookbook ... 34.95
Scribble 69.95
Halley's Project 29.95
Kid Talk 39.95
Speller Bee 39.95
Gizmo 34.95
DB Man 69.95

APPLE

SOFTWARE

BRODERBUND

Print Shop 39.95
Print Shop Graphics I, II, or III 17.95
Print Shop Comp 27.95
Karateka 21.95

ELECTRONIC ARTS

Bard's Tale 29.95
Auto-Duel 34.95
Skyfox 27.95
Lords of Conquest ... 27.95
Ultima IV 39.95
Moebius 39.95
Amnesia ..... Call

EPYX

Winter Games 24.95
Summer Games II 24.95

INFOCOM

See IBM section for items and prices.

MICROPROSE

See Atari 130XE section for items and prices.

SIR-TECH

Wizardry/Diam 23.95
Wizardry/Legacy 27.95
Wizardry/Proving 33.95

SSI

See Commodore 64 section for items & prices.

APPLE MISCELLANEOUS

Gamemaker 34.95
Hardball 24.95
Sundog 27.95
Newsroom 39.95
Clip Art Vol. I 20.95
Clip Art Vol. II 27.95
Gato 27.95
Kung Fu Master 25.95
Karate Champ 25.95
Strip Poker 23.95
Math Blaster 34.95
Fight Night 24.95
Phantasie II 27.95
Rambo 27.95
Amer. Challenge 27.95
Crossword Magic 34.95

IBM PC

Corona PC-400 Compatible ..... Call
Corona Portable PC Compatible ... Call

IBM PC SOFTWARE

BRODERBUND

Print Shop 39.95
Print Shop Graph I ... 27.95
Bank Street Writer ... 49.95
Ancient Art of War ... 29.95

MICROPROSE

F-15 Strike Eagle 23.95
Kennedy Approach .. 27.95
Acrojet 27.95
Silent Service 27.95

IBM MISCELLANEOUS

Mean 18 ..... 34.95
Gato 27.95
Wizardry 39.95
Strip Poker 27.95
Jet 34.95
Newsroom 39.95
Superbowl Sunday .. 24.95
Home Pak 34.95
Alter Ego 34.95
Hacker 29.95
Borrowed Time 27.95
Isgur Portfolio 164.95
Typing Tutor 34.95

INFOCOM

Deadline 34.95
Starcross 34.95
Zork I 27.95
Zork II or III 29.95
Witness 27.95
Suspended 34.95
Planetfall 27.95
Sorcerer 29.95
Seastalker 27.95
Cutthroats 27.95
Hitchiker 27.95
Suspect 29.95
Wishbringer 27.95
Infidel 29.95
Enchanter 27.95
Spellbreaker 34.95
Mind Forever 34.95
Ballyhoo 27.95

SIERRA

King's Quest 34.95
King's Quest II 34.95
Ultima II 39.95

COMMODORE

COMMODORE 128

C-128 Computer ..... Call
1571 Disk Drive ..... Call
1902 Monitor ..... Call
1670 Modem ..... Call
1350 Mouse 42.95
1750 512K Expander ... Call

COMMODORE 128 SOFTWARE

Swiftcalc w/Side 49.95
Wordwriter + Spell ... 49.95
Data Manager II 49.95
Fleet System III 54.95
Mach 128 ..... 34.95
Superbase 128 ..... 69.95
Pocket Writer 128 .... 32.95
Pocket Planner 128 ... 32.95
Superscript 128 ..... 59.95
Perfect Writer 49.95
Sylvia Porter-128 .... 49.95
Perfect Filer 49.95
Viziwrite 128 ..... Call
Vizistar 128 ..... Call
Pocket Filer 128 ..... 32.95
Partner 128 ..... 39.95

COMMODORE 64

NEW 64C Computer .. Call
C-64 Computer ..... Call
1541 Disk Drive ..... Call
1660 Modem 49.95
1670 Modem ..... Call
1802 Monitor ..... Call

COMMODORE 64/128 SUPER PRINTER PKGS.

NX-10 & Xetec Supergraphic 299
Panasonic 1091 & Xetec Supergraphic 309
Legend 1080 & Xetec Supergraphic 269

Super Printer Packages have no added shipping or charge card surcharges when shipped in Continental USA

While Supplies Last
B.I. 80 Column Card 59.95

XETEC Super Graphic 69.95
Cardco G-Wiz 54.95

COMMODORE 64 SOFTWARE

ACCESS

Mach V-Cart 21.95
Leader Board 27.95
Tenth Frane 27.95

SSI

Battle/Antietam 32.95
Panzer Grenider 24.95
USAAF 37.95
Kampgruppe 37.95
Broadside 24.95
Carrier Force 37.95
Comp. Ambush 37.95
Field of Fire 24.95
Gemstone Warrior ... 21.95
Imp. Galactum 24.95
Computer Baseball 24.95
Comp. Quarterback ... 24.95
Wizards Crown 27.95
Gettysburg 39.95
Phantasie 24.95
Mech Brigade 39.95

SSI (NO ATARI)

Rings of Zilfin 27.95
Phantasie II 27.95
Battle Group 39.95
Roadwar 2000 ..... 27.95

MICROPROSE

See Atari 130XE section for items and prices.

ABACUS SOFTWARE

Call for Items and Prices

We stock hundreds of programs for the Apple, Atari, C-64 and IBM. If you don't see it here, don't hesitate to call.

INFOCOM

Zork I 24.95
Zork II, or III 27.95
Deadline 29.95
Starcross 29.95
Witness 24.95
Planetfall 24.95
Hitchiker 24.95
Enchanter 24.95
Cutthroats 24.95
Sorcerer 24.95
Spellbreaker 29.95
Ballyhoo 27.95

ELECTRONIC ARTS

Adv. Construction 29.95
Mail Order Monster ... 24.95
Racing Destruction ... 24.95
Ultima IV 41.95
Bard's Tale 27.95
Lords of Conquest ... 27.95
Chessmaster 2000 .... 27.95
Ultimate Wizard 24.95
Super Boulderdash ... 19.95
Mind Mirror 24.95
Auto Duel 34.95
Ogre 27.95

See Atari 130XE section for rest of items & prices.

EPYX

Winter Games 24.95
Apshai Trilogy 24.95
Fast Load-Cart 24.95
Vorpal Utility 22.95
Multiplan 44.95
Movie Monster 24.95
World Karate 19.95
Super Cycle 24.95
Champ. Wrestling 24.95

MISCELLANEOUS COMMODORE 64

Freeze Frame 34.95
Print Shop 28.95
Cal-Kit 34.95
Superbase 64 ..... 47.95
Karateka 20.95
Hacker 20.95
Gamemaker 27.95
Ultima II 37.95
Karate Champ 25.95
Sticks of Death 20.95
Kung Fu Master 25.95
Paper Clip/Spell 54.95
Consultant 41.95
Spy vs. Spy Vol. II ... 23.95
Internat'l Hockey 19.95
Prt Shop Compan. 27.95
Prt Shop Graphics 19.95
Gato 20.95
Jet 29.95
Fleet System II 44.95
Printmaster 24.95
Newsroom 34.95
Fontmaster II 34.95
Sports Lib. Vol. I 19.95
Geos 39.95
Hidden Assets ..... Call
Adv. Music System ... 54.95
Spitfire 40 ..... 23.95
Fight Night 19.95
Hardball 19.95
2 on 2 Basketball 23.95
Murder/Mississippi ... 23.95

GENERAL HARDWARE

star MICRONICS INC
THE POWER BEHIND THE PRINTED WORD.

NX-10 ..... Call
SG-10 ..... Call
SG-15 369
SD-10 339
SD-15 449
SR-10 489
SR-15 ..... Call
NL-10 ..... Call
NL-10C ..... Call

PRINTERS

Panasonic 1091 239
Legend 808 169
Legend 1080 209
Powertype 309
Juki ..... Call
Epson ..... Call
Panasonic 1080 215

PRINTER BUFFERS

Microfazer ..... From 169
U-Buff 16K 79.95
U-Buff 64K 99.95

MODEMS

Volksmodem 1200 189
Prometheus 1200 299
Maxwell 1200 ..... Call
Maxwell 2400 ..... Call
Prometheus 2400 ..... Call

MONITORS

NAP Amber 89.95
Commodore 1802 ..... Call
Goldstar 13" Color 129
Teknika RGB ..... Call
Magnovox RBG ..... Call
Commodore 1902 ..... Call

— EST. 1982 —

ComputAbility™

P.O. Box 17882, Milwaukee, WI 53217
ORDER LINES OPEN
Mon-Fri. 11 a.m. - 7 p.m. CST
Sat. 12 p.m. - 5 p.m. CST

NO SURCHARGE FOR MASTERCARD & VISA

To Order Call Toll Free
800-558-0003

For Technical Info., Order Inquiries, or for Wisc. Orders
414-351-2007

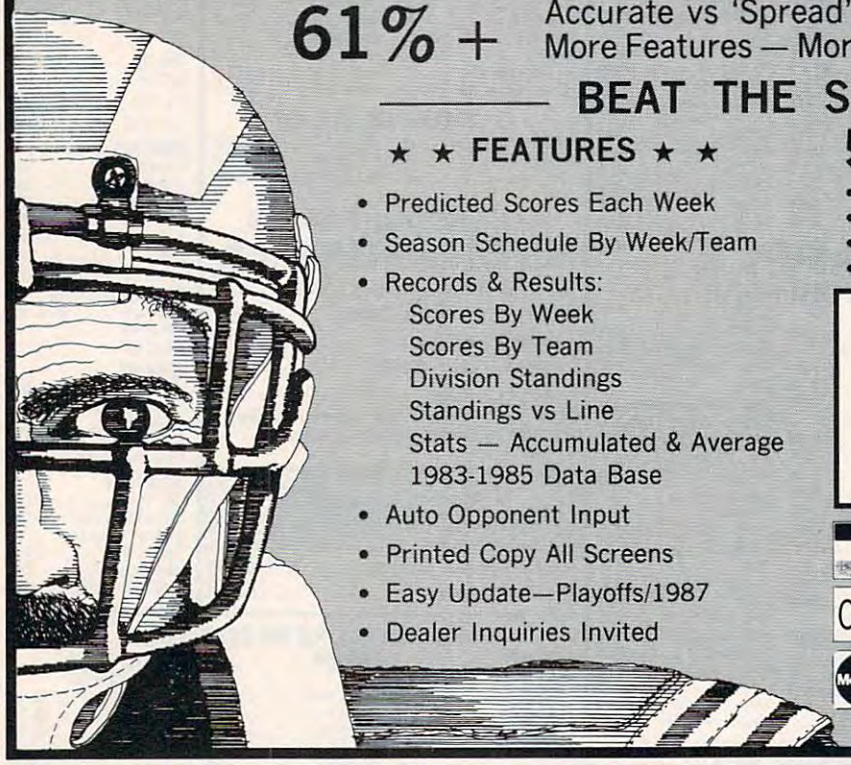
ORDERING INFORMATION: Please **specify system.** For fast delivery send cashier's check or money order. Personal and company checks allow 14 business days to clear. School P.O.'s welcome. **C.O.D. charges are $3.00** In Continental U.S.A. include $3.00 for software orders, 4% shipping for hardware, minimum $4.00. Master Card and Visa orders please include card #, expiration date and signature. WI residents please include 5% sales tax. HI, AK, FPO, APO, Puerto Rico and Canadian orders, please add 5% shipping, **minimum $5.00.** All other **foreign orders add 15% shipping, minimum $10.00.** All orders shipped outside the Continental U.S.A. are shipped first class insured U.S. mail. If foreign shipping charges exceed the minimum amount, you will be charged the additional amount to get your package to you quickly and safely. All goods are new and include factory warranty. Due to our low prices all sales are final. **All defective returns must have a return authorization number.** Please call (414) 351-2007 to obtain an R.A.# or your return will not be accepted. Priced and availability subject to change without notice.

...re.ca

PIK'EM 86

★ ★ ★ ★

A Complete Pro Football Prediction Program For The 1986 NFL SEASON



61% + Accurate vs 'Spread' Since 1981
More Features — More Information In 1986 To .....

BEAT THE SPREAD

★ ★ FEATURES ★ ★

- Predicted Scores Each Week
- Season Schedule By Week/Team
- Records & Results:
  - Scores By Week
  - Scores By Team
  - Division Standings
  - Standings vs Line
  - Stats — Accumulated & Average
  - 1983-1985 Data Base
- Auto Opponent Input
- Printed Copy All Screens
- Easy Update—Playoffs/1987
- Dealer Inquiries Invited

54.95 INCLUDES DISK, DOCUMENTATION SHIPPING & HANDLING

- Apple II — IIc — IIe
- Commodore 64 — 128
- IBM PC, Tandy & Compatibles
- TRS-80 MIII/IV

Stats Needed To Run Program Available In Local Newspapers
Or
We Will Furnish Stats By Mail Or Modem All 20 Weeks — Season Price . . . 40.00

Program Comes Updated Thru Current Week Of Season . . . No Extra Charge

VISA
C.O.D.
MasterCard

ORDERS SHIPPED IN 2 DAYS
PHONE LINES OPEN 24 HRS.

TOLL FREE — 800-722-2277
TEXAS COLL. — 214-586-8212

MARATHON SOFTWARE DEPT. C
P. O. BOX 1349
JACKSONVILLE, TEXAS 75766

TOLL FREE & COLLECT FOR ORDERS ONLY

THE LOWEST PRICES | THE BEST SERVICE

ELECTRONIC ONE*

PHONE LINES OPEN | 10-6 E.S.T. M-F

CALL (614) 864-9994 • P.O. Box 13428 • COLUMBUS, OHIO 43213

COMMODORE HARDWARE

C128 COMPUTER	249.99
C64 COMPUTER	139.99
1541 COMPUTER	179.99
1571 DISK DRIVE	229.99
1702 MONITOR	179.99
1902A RGB MONITOR	269.99
MPS. 1000 PRINTER	239.99
1350 MOUSE	39.99
1200 BAUD MODEM	149.99

PRINTERS

STAR 10X	169.99
STAR SG 10C	229.99
STAR NX 10	239.99
PANASONIC 1080	199.99
PANASONIC 1091	229.99
EPSON LX80	229.99
LX80 TRACTOR	24.99
SEIKOSHA	179.99

MISC. HARDWARE

G-WIZ INTERFACE	46.99
CARDCO-G INTERFACE	37.99
TYMAC INTERFACE	49.99
P.P.I. INTERFACE	29.99
XETEC JR.	36.99
XETEC SR. (8k BUFF)	56.99
TOTAL COMM. MODEM	29.99

MONITORS

14" THOMPSON COLOR	139.99
13" SAKATA COLOR	139.99
12" SAMUNG GREEN	49.99

commodore

DISKS

SONY S/S D/D	7.99
BASF S/S D/D	7.99
PERCISION D/D D/D	8.99
DISK NOTCHER	2.99
FLIP & FILE (50)	6.99

JOYSTICKS

THE BOSS	11.99
THE BAT	16.99
KRAFT	7.99
SPECTRO VIDEO 1	4.99
SPECTRO VIDEO 2	4.99

SUPER SUMMER SOFTWARE SALE

JUKE BOX	2.99	GORTEK MICRO CHIPS	99¢
STORY MACHINE	2.99	JUICE	99¢
ALPHABET ZOO	2.99	THE FACTORY	99¢
UP FOR GRABS	2.99	ATTACK MUTANT CAMELS	99¢
DELTA DRAWING	2.99	BRAVO	1.99
ADVENTURE CREATOR	3.99	KID GRID	1.99
COSMIC LIFE	3.99	TURTLE TOYLAND	1.99
LOGIC LEVELS	3.99	ALF COVER CAVES	2.99
FACE MAKER	3.99	TRAINS	2.99
SWIFTAX (1983)	3.99	SNOOPER TROOPS	3.99
SNAKE MAN	3.99	HEY DIDDLE DIDDLE	3.99
DANCE FANTASY	4.99	CONGO BONGO	3.99
SEA HORSE	4.99	POOR MAN	3.99
DUCKS AHOY	4.99	TROLL'S TALE	3.99
WEBSTER WORD GAME	4.99	SPACE RESCUE	3.99
LINKING LOGIC	4.99	JUNO FIRST	3.99
TYPE ATTACK	4.99	LEARNING W/LEEPER	3.99
BIG BIRD	4.99	JAW BREAKER II	3.99
SERPENTINE	4.99	DAVID MIDNIGHT MAGIC	3.99
MISSING LINKS	4.99	BUSINESS SYSTEMS	4.99
AZTEC	4.99	PUZZLE PANIA	4.99

ALL QUANTITIES ARE LIMITED
SALE PRICES END SEPTEMBER 30
OR WHILE SUPPLIES LAST.

Q-BERT	4.99
BEAM RIDER	4.99
PITFALL	4.99
ROBOTS OF DAWN	4.99
HERO	4.99
HES GAMES	4.99
FROGGER	4.99
SLIDES, HOME FILE	4.99
MR. ROBOT	4.99
DIG DUG	4.99
CENTIPEDE	4.99
ROBOTRON	4.99
CHOPLIFTER	6.99
MIRAGE WORD PROCESSOR	7.99
ACCOUNTS PAYABLE	7.99
SIMONS BASIC	7.99
GHOSTBUSTERS	9.99
READING	9.99
BARRONS S.A.T.	19.99

VIC 20 SOFTWARE 1.99 EACH

- DEMON ATTACK
- FAST EDDIE
- ATLANTIS
- POLE POSITION
- CENTIPEDE
- GALAXIAN
- DONKEY KONG
- BATTLE ZONE
- DEFENDER
- ROBOTRON
- MOON PATROL
- MS. PAC MAN
- KRAZY ATTACKS
- JUNGLE HUNT
- TURMOIL

HOW TO ORDER: CASHIER CHECK, MONEY ORDER, MASTERCARD* OR VISA* (ADD 4% FOR CHARGE CARDS) . . . NO PERSONAL CHECKS . . . NO C.O.D.'s . . . SHIPPED U.P.S. . . . ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.
SHIPPING: ADD $3.00 ON ALL ORDERS UNDER $100.00 . . . ADD $5.00 ON ALL ORDERS OVER $100.00. ACTUAL FREIGHT CHARGED ON MULTIPLE ORDERS.
INTERNATIONAL: ACTUAL FREIGHT CHARGED ON ALL ORDERS OUTSIDE THE CONTINENTAL UNITED STATES INCLUDING A.P.O.
POLICIES: NO RETURNS WITHOUT A RETURN AUTHORIZATION . . . NO RETURNS UNLESS DEFECTIVE. ALL DEFECTIVES WILL BE EXCHANGED . . . NO EXCEPTIONS.

ELECTRONIC ONE
CALL: **(614) 864-9994**

WRITE: P.O. Box 13428
Columbus, Ohio 43213

www.commodore.ca

ABBY'S DISCOUNT SOFTWARE

COMMODORE AMIGA

256 K. Color Amiga System	CALL
256 K. Amiga	CALL
A1010 3½" Drive	CALL
A1050 256 K. Expansion	CALL

ATARI ST

520 ST Color System	CALL
520 ST Monochrome System	CALL
SF 314 Drive	CALL
SF 354 Drive	CALL

ATARI 8-BIT

800XL Computer	$ 69
130 XE Computer	$129
1050 Drive	$129
1027 Printer	$ 99
1020 Printer	$ 24
XM 301 Modem	$ 39

COMMODORE 8-BIT

D64C Computer	$179
D1541C Drive	$199
C-128 Computer	CALL
VIC-1571 Drive	CALL
VIC-1581 Drive	CALL
512K RAM Expansion	$179

CALL ON THESE AND OTHER PRODUCTS
WE CARRY A COMPLETE LINE OF SOFTWARE AND HARDWARE INCLUDING PRINTERS

TOP HITS

ATARI SOFTWARE ST

Home Planetarium	$ 24
Joust	$ 24
CP/M Emulator	$ 39
2 Key Accounting	CALL
Little Computer People	$ 39
Championship Golf	CALL
Degas	$ 29
Music Studio	$ 37
Leader Board Golf	CALL
Financial Cookbook	$ 29
Fortran	$129
Jet	CALL
Flight Simulator II	$ 39
Pascal	$129
"C" Compiler	$129
Cobol	$259
Print Master	$ 29
Art Gallery	$ 24

ATARI SOFTWARE XL/XE

Battle of Antietam	$30
USAAF	$35
M.U.L.E.	$17
Movie Maker	$39
One On One	$24
Seven Cities of Gold	$24
Silent Service	$27
F-15 Strike Eagle	$25
Music Studio	$27
Printshop Companion	$21
Temple of Apshai Trilogy	$26
Flight Simulator II	$39
Scenery Disk (For Above)	$16
Karateka	$24
Nam	$29
Super Bowl Sunday	$22
Atari Basic (R)	$ 5
Print Shop	$35
Graphic Library I, II & III	ea. $18

COMMODORE SOFTWARE AMIGA

Artic Fox	$30
Sky Fox	$29
Deluxe Paint	$65
Deluxe Print	$65
Aegis Draw	CALL
Aegis Animator	$99
Music Studio	$39
One On One	$29
On Line	$49
Analyze	$69
Amiga Assembler	CALL
BBS	$65
Lattice "C"	CALL
Amiga Pascal	CALL
Scribble	$65

COMMODORE SOFTWARE 64/128

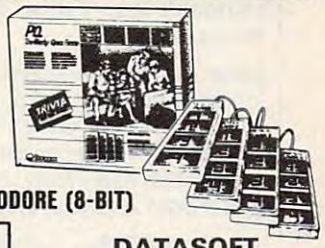
Mastertronics Title As Low As	$7.95
All Abacus Title	CALL
Football	$29
Printship	$35
Printshop Companion	$28
Leader Board Golf	$28
Tournament Disk (For Above)	$14
Print Master	$27
Newsroom	$39
Fontmaster II	$31
Fast Hack'em	$31
Snapshot	$39
Tenth Frame	CALL
Merlin 64/128	CALL
Bard's Tale	$28
Lords of Conquest	$29
Sky Fox	$27
USAAF	$35
Gunship	$25
Silent Service	$25

ATARI POWER PACKS

REPLACEMENT TRANSFORMER FOR 800/400, 810, 1050, 1200XL, 1020 ..... $4.95

EARLY BIRD CHRISTMAS SPECIALS

SUNCOM
P.Q. PARTY QUIZ
ONLY
$14.95



ATARI OR COMMODORE (8-BIT)

RIBBONS

Atari 1025 (Black)	$2.50
Atari 1025 (Color)	$3.50
Panasonic 1091 (Black)	$8.50
Okimate 10 (Color)	$6.00
Star Gemini 10 (Black)	$2.50
Star Gemini 10 (Color)	$3.50
Star Powertype	$6.00
Epson MX/RX/FX-80	$6.00
Commodore 1525 (Black)	$7.50
Commodore 1526 (Black)	$7.00
Commodore MPS 801	$7.50
Commodore MPS 802	$7.00
Commodore MPS 803	$9.00

BULK DISKS

100 Quality DSDD 5¼"	ea. $ .69
100 Quality SSDD 5¼"	ea. $ .59
Less Than 100 DSDD 5¼"	ea. $ .79
Less Than 100 SSDD 5¼"	ea. $ .69
SONY DSDD 3½"	ea. $2.05

DATASOFT

Commodore 64/128

O'Riley Mine (D/C)	$5.95
Dallas Quest (D)	$5.95
Mancopter (D)	$5.95

ATARI XL/XE

Pooyan (D/C)	$5.95
Moon Shuttle (D/C)	$5.95

ATARI, INC.

ATARI XL/XE

Juggle's Rainbow (C)	$2.99
Juggle's House (C)	$2.99
States & Capitals (C)	$1.99
My First Alphabet (D)	$2.99

TIMEWORKS

COMMODORE 64/128

Money Manager (D/C)	$5.95
Electronic Checkbook (D/C)	$5.95
Data Manager (D/C)	$5.95

ATARISOFT

APPLE

Defender (D)	$2.99
Dig Dug (D)	$2.99
Robotron (D)	$2.99
Pac Man (D)	$2.99
Centipede (D)	$2.99
Donkey Kong (D)	$2.99

ALL TITLES ON DISK UNLESS MARKED (R) FOR ROM CARTRIDGE

Order Line
1-800-282-0333
ORDERS ONLY! Sales Personnel Do Not Have Information on Previous Orders or Product Specs.

WE CHECK FOR STOLEN VISA & MASTERCARD
M-F 10 a.m.-8 p.m.; Sat. 10-3 ET
37 S. Broad Street, Fairborn, OH 45324

Customer Service & Ohio Residents
1-513-879-9699

AD #CP-096

VISA

SOFTWARE ONLY — Prepaid orders over $50 receive free shipping via UPS in continental U.S. Please add $2 orders under $50. HARDWARE and all orders requiring shipment via U.S. Post Office are subject to additional freight charges. Add $5 for COD orders. VISA/MasterCard orders add $2 service charge. Ohio residents add 5.5% sales tax. Personal checks require a three-week waiting period. No waiting when paid by credit card, certified check or money order. All items subject to availability and price change. PLEASE CITE AD NUMBER WHEN ORDERING. ALL RETURNS MUST BE ACCOMPANIED BY AN AUTHORIZATION NUMBER.

MasterCard

$5 TALKING DISK

OVER 100 WORDS in vocabularies that you can put into your own programs! No extra hardware required. Sample programs include:

- Talking four-function calculator — choose English, Spanish, or German.
- Talking keyboard — letters and punctuation in English.
- Demonstration of voice editing.

The $5 Talking Disk is available for Commodore 64, 128, Atari 800, 800XL, 130XE, and Apple II+ (64K), IIe, and IIc.

If you want to make your own vocabularies, in any language or accent, then you must have a VOICE MASTER for processing speech input. VOICE MASTER lets you do much more: YOU CAN RECOGNIZE SPOKEN COMMANDS and WRITE MUSIC AS YOU HUM! And affordable too — under $90 including the headset and microphone.

Send $5 for the talking disk. Prepaid orders only. Includes postage. ($7 outside USA, Canada, and Mexico.) Information on VOICE MASTER will accompany your disk. Or you can call or write for VOICE MASTER information separately. Please specify computer make and model with your order.

COVOX INC.
675 Conger St., Dept. C!
Eugene, OR 97402
Telephone (503) 342-1271

FACTORY AUTHORIZED

COMMODORE REPAIR CENTER

1-800-772-7289
IN ILLINOIS (312) 879-2888

C64 Repair (cpu only)	42.95*	AMIGA Repair	CALL
1541 Repair	79.95*	C64 Power Supply	34.95
1541 Alignment only	29.95*	CBM & AMIGA PARTS	
C128 Repair (cpu only)	79.95*	Call (312) 879-2350	

*Includes parts, labor & UPS return shipping. APO/FPO or Air Freight add $10.00

CALL BEFORE SHIPPING, VISA, MASTERCARD OR MONEY ORDER
24-48 Hrs. Turnaround (Subject to parts availability)
Diagnosis fee of $25.00 for any unit altered or with no defects.

SAVE YOURSELF SOME MONEY

Due to our vast experience in repairing 64s we have found that the power supply is a major cause of board failures. By inserting our device between the power supply and computer over 63% of our customer's repairs would have been avoided. For only $19.95 our C64 Over Voltage Sensor will continuously monitor your power supply output. If an overvoltage occurs the Over Voltage Sensor will prevent damage to your 64.

64 OVER VOLTAGE SENSOR $19.95

TEKTONICS PLUS, INC.
150 HOUSTON STREET
BATAVIA, IL 60510

CLIP AND SAVE

Commodore Compatible and only. . . $139.00

FSD-1 5¼"Disk Drive
Directly replaces the Commodore 1541 disk drive.

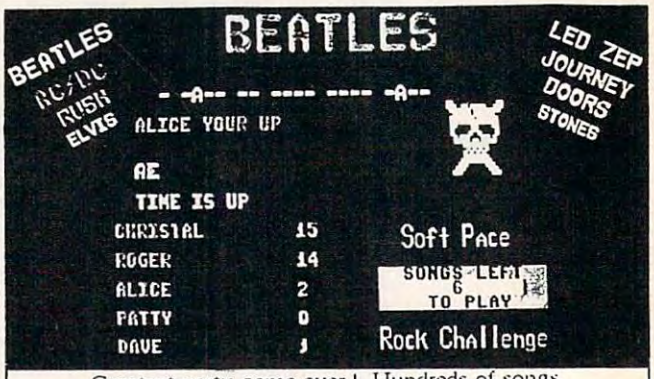
Check these Features

- Runs all C-64 Software — Including heavy copyright protected software
- Full 6 month warranty — your assurance of quality
- Heavy duty construction — to run whisper quiet and smooth year after year
- Built in 24 watts solid state power supply — runs cool and efficient always
- Vented metal chassis — eliminates most radio-frequency interference
- Dual serial ports with chaining option for expandability
- External device number switches — for use as second disk drive
- Save and replace capability
- Positive lever locking system — to eliminate "Pop out" problem
- Standard 5¼" SSSD Diskette, 175K storage capacity, 310 RPM running speed, 90 Sec. format time, 1200 BPS data transfer — same as the 1541
- Compatible with C-128 in C-64 mode

To Order Call Toll Free 1-800-356-5178

Visa & MasterCard welcome. Credit Card orders shipped in 24 hrs. Allow $8.00 shipping and handling. Send mail order with payment to:

ECI
Emerald Component International Dept. N
541 Willamette Street
Eugene, OR 97401
Tel. 503-683-1154



Greatest party game ever! Hundreds of songs in one of the most challenging and fun games out for the Commodore. No two games ever alike! Up to 5 players at a time.

With Rock Challenge Group Editor you can add your favorite group's titles and save them to your own data disk. Later when the group comes out with more songs just add them to your data disk.

Example: You choose to play the Beatles with 35 songs to play. The program chooses one of the over 100 songs and places as a series of dashes. Player 1 guesses a letter in the song, if there he wins a point and continues his turn till he guesses wrong or solves the song for a 5 point bonus.

FAST MACHINE CODE PROGRAM

Only $14.95 + $1.50 Postage

Send check or money order to:
SoftPace Software Co.
P.O. BOX 788
Brea, CA. 92622-0788

VISA
Visa or Mastercard call:
(800) 225-6207
In California call:
(714) 524-0343
MasterCard

www.commodore.ca

Classified

COMPUTE! Classified is a low-cost way to tell over 350,000 microcomputer owners about your product or service.

Rates: $25 per line, minimum of four lines. Any or all of the first line set in capital letters at no charge. Add $15 per line for boldface words, or $50 for the entire ad set in boldface (any number of lines.) Inquire about display rates.

Terms: Prepayment is required. Check, money order, American Express, Visa, or MasterCard is accepted. Make checks payable to COMPUTE! Publications.

Form: Ads are subject to publisher's approval and must be either typed or legibly printed. One line equals 40 letters and spaces between words. Please underline words to be set in boldface.

General Information: Advertisers using post office box numbers in their ads must supply permanent address and telephone numbers. Ad will appear in next available issue after receipt.

Closing: 10th of the third month preceding cover date (e.g., June issue closes March 10th). Send order and remittance to: Harry Blair, Classified Manager, COMPUTE!, P.O. Box 5406, Greensboro, NC 27403. To place an ad by phone, call Harry Blair at (919) 275-9809.

Notice: COMPUTE! Publications cannot be responsible for offers or claims of advertisers, but will attempt to screen out misleading or questionable copy.

SOFTWARE

FREE SOFTWARE for C64, C128, IBM, & CPM. Send SASE for info (specify computer) to:
PUBLIC DOMAIN USERS GROUP
PO Box 1442-A1, Orange Park, FL 32067

DISCOUNT SOFTWARE: Amiga/Apple/Atari/C64-128/IBM PC-PCjr/TRS-80/Timex/Sinclair. Free Catalog: WMJ DATA SYSTEMS, 4 Butterfly Dr., Hauppauge, NY 11788

COMMODORE: TRY BEFORE YOU BUY. Best selling games, utilities, educational, classics and new releases. 100's of titles. Visa/MC. Free brochure. RENT-A-DISC, Frederick Bldg. #345, Huntington, WV 25701 (304) 529-3232

BRIDGE GAME PROGRAM $39.95 demo disk $5. 1 to 4 players for IBM, Apple, TI99, TRS80, C64, 128, +4, 16, VIC. Authors John & Lynda Allan, Box 313, Azilda, Ontario, Canada P0M 1B0

ATARI 8 BIT: FULL FUNCTION BUSINESS DBMS. Any drive(s)/upgrades. GL/AR/AP/Inv/Mail/W/P. 9000 records/disk. MICROMOD, 1635-A Holden, Orlando, FL 32809 (305)857-6014

$$ WIN WITH THOROUGHBRED HARNESS & Greyhound handicapping software...$29.95, enhanced...$49.95. For most computers. Free info. Software Exchange, Box 5382 CP, W. Bloomfield, MI 48033. Call: (313) 626-7208

FREE APPLE SOFTWARE
Over 1000 Public Domain Programs on 50 diskettes. $5 each plus $1 shipping per order. Send $1 for catalog (refundable with order.)
C&H ENTERPRISES
PO Box 29243, Memphis, TN 38127

Update & Analyze your income and expenses with INCOME ANALYSIS. Menus, hardcopies, totals, averages, percentages, summaries, fast-edit, sound & more. A MUST for part-time employees! Atari 48K Disk only $12.95. DATA LOGIC, POB 52193, Livonia, MI 48152

THE PICKS-86. PRO FOOTBALL PICKING GAME! Compete against your friends. Computer keeps track of stats. Send only $12. Epic Software, Box 1153, West Hanover, MA 02339. Apple II family. 1 disk drive+printer. Send SASE for more information.

PRO FOOTBALL ANALYST. Beat the spread! Only 5 min./wk & local newspaper is all it takes to find hidden overlays in the betting line. Winning season guaranteed! IBM/C64/TI99-$34.95 (+ $4.55 s/h) ORDER NOW! 1-800-341-1950 Ext. 77. Mail Orders: RIDGE, 170 Broadway #201-C, NYC, NY 10038. Catalog.

LOTTO PICKER. Improve your chances for those Million Dollar Jackpots! Picks LOTTO, WIN-4 and Daily Numbers. All USA & CAN. games incl'd. Expandable! IBM/C64/TI99-$29.95. Order Now! 1-800-341-1950 Ext. 77. Mail Orders: Ridge, 170 Broadway #201-C, NY, NY 10038. Catalog.

PRINT YOUR OWN BUSINESS STATIONERY
Use your dot-matrix printer and this Business Papers Kit to make personalized invoices, letterheads, business cards, memos, etc. from plain paper. Try before you buy. Send $7.50 to: Honor-System Software, Box 338, Medinah, IL 60157. Specify Apple II or C64.

SELL YOUR PROGRAMS to Software Publishers. Software for the Apple, Atari, Commodore, IBM, TI, TRS-80, Zenith, Osborne, Kaypro, others. Directory $5.95. I.W., Box 40581, Pas., CA 91104

TI-99/4A QUALITY SOFTWARE for Business, Home and Entertainment ** Bonus Software Offer!!** Send for FREE catalog to MICRO-BIZ HAWAII, BOX 1108, PEARL CITY, HI 96782

HARDWARE

Clone Kits, Modems, Hard Drive Kits, Disk Drives, Diskettes, Printers, Memory & ICs Distributor Pricing to End Users and Dealers. Free Shipping. For Catalog Call 1-800-833-2600, In Ohio (513) 531-8866

MISCELLANEOUS

IBM PCjr REPORT: THE NATIONAL NEWSLETTER. PCjr-specific articles, reviews, Public Domain from across the nation. $18/yr. PCjr CLUB, POB 95067, Schaumburg, IL 60195

100% ERROR FREE DISKETTES

MFR. LIFETIME WARRANTY

With Hub Rings, Write Protect Tabs, Tyvec Envelopes, User ID Labels - In Factory/Sealed Poly Packs

(YOU GET EVERYTHING BUT THE BOX) PRICES ARE PER DISK

5¼"			3½"	
SSDD	DSDD	DSHD96TPI	SS	DS
.47	.52	1.69	1.39	1.60

SUPER DISCOUNTS ON ORDERS OF 500 OR MORE

IN STOCK ITEMS SHIPPED IN 24 HOURS

Minimum order: $25.00. **Shipping and Handling:** $4.00 per 100 diskettes. Continental U.S.A. APO/PFO, add $8.00 per 100 diskettes. Foreign order, please call. Reduced shipping charge for larger quantities. C.O.D. add $4.00. Cash/certified check. MI residents add 4% sales tax. Prices subject to change without notice. HOURS: 8:30 AM - 6:00 PM Eastern Time. C.O.D.

Precision Data Products
P.O. Box 8367, Grand Rapids, MI 49518
(616) 452-3457 • Michigan 1-800-632-2468
Outside Michigan 1-800-258-0028

DISK SALE!

PREMIUM QUALITY! LIFETIME WARRANTY!

Guaranteed 100% error free, money-back satisfaction guarantee! Made by top USA makers, not "seconds". We buy millions from the factory. We can't print the maker, but you'll recognize them as among the highest quality, premium diskettes made! Order BULK (N-pak) for no sleeve or box, BOXED IN TENS (D-pak) or BOXED IN 25's (J-pak) with label, sleeve, box and tabs. *Order D-pak, add 2¢ per disk to boxed prices.*

FROM 33¢

Prices are per disk	BULK					BOXED				
	100	500	1K	5K	10K	25	100	500	1K	5K
For the Apple II, II+, IIe, IIc #UDA	45c	42c	39c	36c	33c	58c	53c	50c	47c	44c
SS/DD for single side computers #UD1	50c	47c	44c	41c	38c	63c	58c	55c	52c	49c
DS/DD for IBM-PC and compatibles #UD2	55c	52c	49c	46c	43c	68c	63c	60c	57c	54c
DS/Hi-Density for IBM-AT #UAT	1.75	1.71	1.68	1.65	1.60	1.90	1.83	1.79	1.76	1.73
3½", single side for Mac #UD3	1.49	1.44	1.41	1.39	1.37	1.59	1.49	1.44	1.41	1.39
3½", double side for Mac & Amiga #UD5	1.95	1.91	1.88	1.84	1.79	1.99	1.95	1.91	1.88	1.84
5¼" SLEEVES, 24# white wove #SLV	5c	4.5c	4c	3.8c	3.3c	SPECIFY SUFFIX 'A' 'J' 'D' WHEN ORDERING DISKS!				
5¼" SLEEVES, white Tyvek #TYV	7c	6c	5.5c	5.2c	5c					

MORE GREAT PRICES!

LIBRARY DISK STORAGE CASES, clear plastic #F10 99¢ea, 10 for $9.50
FLIP-TOP DISK FILES, holds 70 disks, smoked plastic #F70 $8.88
UNI-NOTCH DISKETTE NOTCHER, accesses 2nd side of disk #NN1 $7.77
COMPUTER MAILING LABELS, std 5 lines x 3.5" #LAB $19 box of 5000
HEAD CLEANER KIT, 1 cleaner disk & solvent, 15 uses! #HCK $4.95
DB25 GENDER CHANGERS, all pins wired, choose M/M (=MMGC) or F/F (FFGC) $7.77
RIBBONS FOR OKIDATA 80/81/82/82A/83/83A/92/93 =PR180 $2.15ea 12/$23.65

HOW TO ORDER: Pay by MC-Visa-Amex-COD, or send check with order. Min order $20, add $3 for UPS shipping +$2 if COD (no extra charge for credit cards). We can ship open account to schools, min school purchase order $100, FOB Unitech. All orders must include daytime phone and STREET address. MONEY BACK 30-DAY SATISFACTION GUARANTEE! SEND FOR FREE CATALOG LISTING 100'S OF COMPUTER BARGAINS!

UNITECH 20-U HURLEY STREET CAMBRIDGE, MA 02141-2176 IN MASS (617)"UNITECH"

(800)343-0472 MasterCard VISA AMERICAN EXPRESS

www.commodore.ca

Advertisers Index

LOTTO CIPHER

GET THE BEST ODDS ON ANY LOTTERY
SIX NUMBER - PICK FOUR - DAILY GAME

- PRODUCES FOUR COMBINATIONS OF NUMBERS TO CHOOSE FROM.
- ANY AMOUNT OF BALLS AND NUMBERS CAN BE PROGRAMMED.
- PRINTS OUT PAST LOTTO NUMBERS DRAWN, PAST COMPUTER PICKS, AND NUMBER DRAW FREQUENCY LIST.
- COMPLETE NUMBER DATA BASE.

$29.95 C-64 DISK

Window Magic

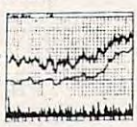
SUPER HI-RESOLUTION DRAWING IN MULTI OR MONO COLOR

• POLYGON SHAPES - EXPAND, SHRINK AND ROTATE, THEN STAMP ANYWHERE • ZOOM - EXPANDS A WINDOW TO DOUBLE SIZE • MIRROR, FLIP, AND SCROLLING WINDOWS • COPY • CLONE COLOR ATTRIBUTES • ZOOM PLOT - DRAW ON AN EXPANDED WINDOW AND YOUR DRAWING AT THE SAME TIME • SAVE AND LOAD YOUR WINDOWS ON DISK • PRINTS ON STANDARD DOT MATRICS PRINTER • FILL • LINES • DRAW • TYPE LETTERS AND GRAPHICS • COLOR SQUARES

$24.95 C-64 DISK

STOCK BROKER

PROFITS GUARANTEED OR YOUR MONEY BACK



BUYING GOOD QUALITY, VOLATILE ISSUES AND USING THE TRADING SYSTEM WILL HAVE YOU FULLY INVESTED AT THE LOWEST PRICES AND CONVERTING TO CASH AS THE STOCK NEARS ITS PEAK.
- TECHNICAL TRADING THAT WORKS.
- BAR GRAPH PRINT-OUTS.
- RECORD UP TO 144 STOCKS ON A DISK.

$39.95 C-64 DISK

ABANDON SHIP.
S.O.S.

HI-RES ARCADE STYLE GAME THAT REQUIRES STRATEGY AND JOYSTICK SKILLS. THERE ARE 52 ROOMS IN THE HMS BLACK. THE BRIDGE, ENGINE ROOM, ARMORY, AND SUPPLY ROOM ARE THE MOST IMPORTANT TO PROTECT.
GIVE MY REGARDS TO DAVEY JONES.

$21.50 C-64 DISK

ACORN OF INDIANA, INC.
2721 OHIO STREET
MICHIGAN CITY, IN 46360
219-879-2284

SHIPPING AND HANDLING, ADD $1.50 - C.O.D.'S ACCEPTED
VISA AND MASTER CARD ORDERS ADD 4%
INDIANA RESIDENTS ADD 5% SALES TAX

CONVERSE WITH YOUR COMPUTER

AT LAST! A FULL IMPLEMENTATION of the original ELIZA program is now available to run on your personal computer!

Created at MIT in 1966, ELIZA has become the world's most celebrated artificial intelligence demonstration program. ELIZA is a non-directive psychotherapist who analyzes each statement as you type it in and then responds with her own comment or question—and her remarks are often amazingly appropriate!

Designed to run on a large mainframe, ELIZA has never before been available to personal computer users except in greatly stripped down versions lacking the sophistication which made the original program so fascinating.

Now, our new personal computer version possessing the **FULL** power and range of expression of the original is being offered at the introductory price of only $45. And to let you find out how she does it (or teach her to do more) we have included the complete **SOURCE PROGRAM** (written in BASIC) at no extra cost.

Order your copy of ELIZA today and you'll never again wonder how to respond when you hear someone say, "Okay, let's see what this computer of yours can actually do!"

READ WHAT THE EXPERTS SAY ABOUT OUR VERSION OF ELIZA:

"Much more than a mere game...You'll be impressed with ELIZA...A convincing demonstration of Artificial Intelligence."
—PC MAGAZINE

"Delightful entertainment...An ideal medium for showing off your system."
—MICROCOMPUTING MAGAZINE

"ELIZA is an astounding piece of software...A fascinating program to use and study."
—BARON'S MICROCOMPUTER REPORTS

"ELIZA is a great way to introduce your friends to computers...A very funny party game."
—PETER A. McWILLIAMS

"ELIZA is an exceptional program, one that's fun to use, shows off your machine, and has great historical interest."
—POPULAR COMPUTING MAGAZINE

"This version of ELIZA is the best we have seen. As a party game, it is unmatched."
—HOME APPLICATIONS FOR THE C-64

ELIZA IS AVAILABLE IN THE FOLLOWING FORMATS:
- IBM PC, PCjr., PC-XT and all compatibles.
- All Apple II computers (II, II Plus, IIe, IIc)
- Apple Macintosh (Microsoft BASIC required)
- Commodore 64 (specify disk or cassette)
- 5¼ inch or 8 inch disk for all CP/M systems

All versions are $45 and include a six page users manual.
Please add $2.00 shipping and handling to all orders
(California residents please add 6½% sales tax)

ARTIFICIAL INTELLIGENCE RESEARCH GROUP
921 North La Jolla Avenue, Dept. M
Los Angeles, CA 90046
(213) 656-7368 (213) 654-2214
MC, VISA and checks accepted

Free Spirit Software, Inc.

DATAFILER 128 - Database program for the C128* in 128 mode. Store, sort, recall by up to 20 fields. Store up to 5000 name and address records on single disk! Also includes special options for mailing labels, program library & film library. Disk - $24.95

The Great War - WWI strategy game for the C128* in 128 mode. Armies of 16 countries in conflict. Military strategy conditioned by terrain, weather, lines of supply, political consideration, troops, weaponry. For advanced wargamers. Disk - $19.95

BASICally SIMPLE 128 - How to use all C128* commands & functions in Basic programs. C128* only. Disk - $19.95

Music of the Masters - One hour of classical music on disk for the C64*. Mozart, Beethoven, Handel & many more. Disk - $9.95

Music of the Masters, Volume II - More great classical music on the disk for the C64*. Minuets, waltzes, sonatinas & more. Disk - $9.95

SPECIAL OFFER! Order both volumes of Music of the Masters for only $16.95!

FREE SHIPPING & HANDLING. Illinois residents add 7% sales tax. Send check or money order to:

Free Spirit Software, Inc.
5836 S. Mozart
Chicago, IL 60629

*Registered trademarks of Commodore International, Ltd.

www.commodore.ca

COMPUTE!'s Disk

SPECIAL INTRODUCTORY OFFER

YES! I want to save time and money. Please enter my quarterly subscription to the following COMPUTE! Disk:

☐ Commodore ☐ Apple ☐ Atari ☐ IBM

☐ Save 33% off the single issue price. 1 year subscription, $39.95

☐ Save even more! 2 year subscription, $69.95

All *Disk* orders must be prepaid.

☐ Payment enclosed (check or money order)
☐ Charge ☐ MasterCard ☐ Visa

Acct. No. _____ Exp. Date _____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

(Outside U.S. and Canada, add $9.00 per year for shipping and handling.)

Save 33%

S

www.commodore.ca

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

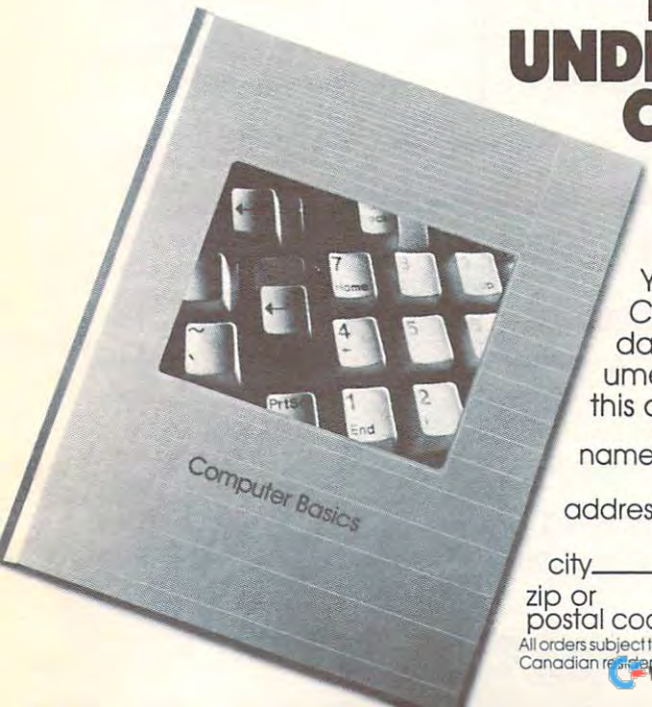
BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 7551 DES MOINES, IA

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE!'s DISK
P.O. BOX 10036
DES MOINES, IA 50347

www.commodore.ca



TRY UNDERSTANDING COMPUTERS FOR 10 DAYS FREE.

YES, I would like to examine *Computer Basics* free for 10 days. Also send me future volumes under terms described in this ad. D1A3Y9

name_____

address_____

city_____ state or province_____

zip or postal code_____

TIME LIFE BOOKS

All orders subject to approval. Price subject to change. Canadian residents mail in envelope.

www.commodore.ca

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 85407 CHICAGO ILLINOIS

POSTAGE WILL BE PAID BY ADDRESSEE

TIME
LIFE
BOOKS

TIME & LIFE BUILDING
CHICAGO, ILLINOIS 60672-2058

www.commodore.ca

COMPUTE!'s FREE Reader Information Service

Use these cards to request FREE information about the products advertised in this issue. Clearly print or type your full name and address. Only one card should be used per person. Circle the numbers that correspond to the key number appearing in the advertisers index.

Send in the card and the advertisers will receive your inquiry. Although every effort is made to insure that only advertisers wishing to provide product information have reader service numbers, COMPUTE! cannot be responsible if advertisers do not provide literature to readers.

Please use these cards *only* for subscribing or for requesting product information. Editorial and customer service inquiries should be addressed to: COMPUTE!, P.O. Box 5406, Greensboro, NC 27403. Check the expiration date on the card to insure proper handling.

Use these cards and this address only for COMPUTE!'s Reader Information Service. Do not send with payment in any form.

COMPUTE!

101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117
118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134
135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151
152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168
169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185
186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202
203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219
220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236
237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253

Please let us know. Do you own: plan to buy:

- ☐ 270 Apple _____ ☐ 271
- ☐ 272 Atari _____ ☐ 273
- ☐ 274 Commodore _____ ☐ 275
- ☐ 276 IBM _____ ☐ 277
- ☐ 278 TI-99/4A _____ ☐ 279
- ☐ 280 Other _____ (specify model) ☐ 281

Please print or type name and address.
Limit one card per person.

Name _____

Address _____

City _____

State/Province _____ Zip _____

Country _____

Phone _____

Please Include ZIP Code

Expiration Date 10/31/86

CO986

SUBSCRIBE TO COMPUTE!

For Fastest Service, Call Our **Toll-Free** US Order Line
800-247-5470
In IA call 1-800-532-1272

☐ $24.00 One Year US Subscription
☐ $45.00 Two Year US Subscription

Name _____

Address _____

City _____ State _____ Zip _____

☐ Payment Enclosed ☐ Bill me
Charge my: ☐ VISA ☐ MasterCard ☐ American Express
Account No. _____ Expires ____/____

Your subscription will begin with the next available issue. Please allow 4-6 weeks for delivery of first issue. Subscription prices subject to change at any time. Outside the U.S.A. please add $6 for each subscription.

www.commodore.ca

Place
Stamp
Here

COMPUTE! Reader Service
P.O. Box 2141
Radnor, PA 19089

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 7478 DES MOINES, IOWA

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE!
PO BOX 10954
DES MOINES, IOWA 50347

www.commodore.ca

WE TOP APPLE AND COMMODORE BEAUTIFULLY

Thomson offers a whole new world of graphics capabilities for your Commodore or Apple IIC or IIE computers. And Thomson offers you more than the competition.

Thomson monitors offer these advantages:

- Compatible with IBM,® Apple,® Commodore,® Atari™ and others
- The choice of monochrome or color monitors with TV-grade to high resolution text and graphics
- Monochrome text-editing mode for color monitors
- Alternate use as cable or VCR monitor
- Broad range of the features you need at the prices you want

Because of its versatility and compatibility, you can still use your Thomson monitor if you switch computers; you'll never outgrow the capabilities of a Thomson monitor.

Who is Thomson? Thomson is a six billion dollar multi-national company. Unlike our competition, we design and manufacture our own monitors; so the quality you get is constant and superb.

Your Apple or Commodore computer is a great body. Choose a Thomson monitor, and give it a beautiful face.

For the name of the Thomson dealer nearest you, call 1-800-325-0464. In California call 1-213-568-1002. (Monday-Friday, 9 a.m. to 5:00 p.m. PST)

THOMSON

A SIGHT FOR SORE EYES.™

© 1986 Thomson Consumer Products Corporation

5731 W. Slauson Avenue, Suite 111, Culver City, CA 90230

Thomson is a trademark of Thomson S.A. Apple is a registered trademark of Apple Computer, Inc. Commodore is a registered trademark of Commodore Electronics Limited. Atari is a trademark of Atari, Inc. IBM is a registered trademark of International Business Machines Corp.

www.commodore.ca

From Origin comes the long-awaited sequel to the award-winning Ultima™ III

Ultima IV

Quest of the Avatar

A state-of-the-art fantasy role-playing game of unprecedented magnitude by Lord British™.

Prepare yourself for a grand adventure: Ultima™ IV, sixteen times larger than Ultima III, is a milestone in computer gaming—one that challenges your physical and mental skills while testing the true fabric of your character.

Enter Britannia, kingdom of Lord British. Journey through terrain of infinite proportions, conversing with characters on hundreds of topics. Unravel the mysteries of a superior magic system. At each turn beware of daemons, dragons and long-dead wizards haunting the most tranquil of places. Encounters with parties of mixed enemy types test your strategic abilities. Shrewd use of terrain can lead to victory against seemingly impossible odds.

Survive this multi-quest fantasy, then begin the final conflict, your quest of the Avatar. The ultimate challenge—the self—awaits....

ORIGIN SYSTEMS INC. 340 HARVEY ROAD, MANCHESTER, NH 03103 (603) 644-3360

ULTIMA™ III sends you on an incredible fantasy role-playing journey through monster-plagued Sosaria in search of the elusive Exodus.

MOEBIUS™ takes you through the elemental planes of a colorful Oriental world of fantasy and adventure in search of the Orb of Celestial Harmony.

AUTODUEL™ is a futuristic, fast-paced strategy role-playing game where the right of way goes to the biggest guns.

OGRE™ is a strategy game fought on the nuclear battlefield of tomorrow as an inhuman juggernaut Cybertank battles conventional forces.

Ultima and Lord British are trademarks of Richard Garriott/Moebius is a trademark of Greg Malone/AutoDuel and Ogre are trademarks of Steve Jackson/Apple is a trademark of Apple Computer Inc/Previous Ultimas are not needed to enjoy Ultima IV

Authors wanted. Call us today.

www.commodore.ca