

Buyer's Guide: Taking Over the Universe with Your C64
How to Build a Lie Detector

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COMMODORE

microcomputers

Software Reviews:

TRANSFORMER

ALTER EGO

LORDS OF CONQUEST

THE BARD'S TALE

THE EIDOLON

SPELL OF DESTRUCTION

CHAMPIONSHIP GOLF

at Pebble Beach

Free Type-in Programs:

SPEEDREAD

BIORHYTHM

LOAN CALCULATOR

MINITERM 128

MAGIC LANTERN 128



Good news!

If you want to get the most out of your Commodore 128 or 64, we have goods news for you. The Pocket 128 and 64 Series of Software both offer you serious, professional quality software packages that are easy to use and inexpensive.

How easy?

Pocket 128 or 64 Software is so easy, you're ready to start using it as soon as it's loaded into memory. Even if you've never been in front of a computer before, you'll be up and running in thirty minutes. In fact, you probably won't ever need the reference guide... 'help' is available at the touch of a key. That's how easy.

How serious?

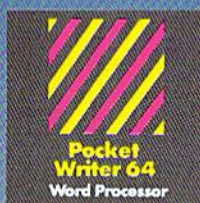
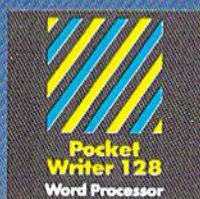
Pocket 128 or 64 packages have all the power you're ever likely to need. They have all of the features you'd expect in top-of-the-line software, and then some. The good news is that Pocket 128 or 64 Software Packages are priced way down there... where you can afford them. Fast, powerful, easy to learn and inexpensive. Say, that is good news!

All for one and one for all

Pocket 128 or 64 Software Packages offer you something else you might not expect... integration. You can combine the output of Pocket Writer, Pocket Filer and Pocket Planner into one piece of work. You can create a finished document with graphs, then send individually addressed copies.

The bottom line is Solutions

The word solutions is our middle name and bottom line. When you purchase Pocket 128 or 64 software, you can count on it to solve your problems.



For information write to:

Digital Solutions
37 Mountain View, Unit 9
422 Howard Ave., Suite 9
Cupertino, CA 95014
Telephone (415) 310-8722

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TMVisicalc is a registered trademark of Software Arts

Pocket Writer 128 or 64 Word Processing

What you see is what you get

With Pocket Writer 128 or 64, there's no more guessing what text will look like when you print it. What you see is what you get... on screen and in print. There are no fancy codes to memorize, no broken words at the end of a line.

Easy to learn and sophisticated. Pocket Writer 128 or 64 offers standard word processing features plus...

- on-screen formatting and wordwrap
- on-screen **boldface**, **underlines** and **italics**
- no complicated format commands to clutter text
- on-screen help at all levels
- spelling-checker lets you add words to your dictionary
- 40 or 80 columns on screen
- files compatible with PaperClipTM or other word processors

Pocket Planner 128 or 64 Computerized Spreadsheet

Make fast work of budgeting and forecasting

Pocket Planner 128 or 64 software lets you make fast work of all your bookkeeping chores. Cheque books, household accounts, business forecasting and bookkeeping are just some of the jobs that Pocket Planner 128 or 64 packages make easier. You can even create four different kinds of graphs.

Accurate, sophisticated and easy to use. Pocket Planner 128 or 64 offers standard spreadsheet features plus...

- accuracy up to 16 digits, about twice as many as most spreadsheets for the Commodore 128 or 64
- sideways printing available on dot matrix printers, for oversized spreadsheets that won't fit on standard paper
- **on-screen help** at all levels
- compatible with VisicalcTM files
- 80 column on-screen option for the Commodore 64 in addition to the standard 40 columns
- graphics include **bar**, **stacked bar**, **line** and **pie** graphs that can also be used in word processing files
- **smart evaluation** of formulae for accurate complex matrices

Pocket Filer 128 or 64 Database Manager

Database management made easy

With Pocket Filer 128 or 64, you can organize mailing lists, addresses, inventories, telephone numbers, recipes and other information in an easily accessible form. Use it with Pocket Writer 128 or 64 (or other word processors) to construct individually customized form letters.

Pocket Filer 128 or 64 packages are fast, sophisticated and truly easy to use. In addition to standard database features they offer...

- use up to 255 fields per record (2,000 characters per record)
- sorts by up to 9 criteria, can save 9 different sorts
- print **labels** in multiple columns
- flexible report formatting including **headers** and **footers**
- optional password protection including **limited access viewing** or **updating**
- on-screen help at all levels
- print from any record to any record
- arithmetic and trigonometric functions in **reports** using up to 16 digit accuracy

Solutions!



**Pocket
Writer 64**
Word Processor

PW 128/64 Dictionary
also available at \$14.95 (U.S.)



**Pocket
Writer 128**
Word Processor

MAIL ORDERS:

CRYSTAL COMPUTER INC.
In Michigan 1-517-224-7667
Outside Michigan 1-800-245-7316

CANADIAN DEALER ENQUIRIES:

INGRAM CANADA LTD.
1-416-738-1700



**Pocket
Planner 64**
Spread Sheet



**Pocket
Filer 64**
Database



**Pocket
Filer 128**
Database

Only The Name Is New

The professional, full-featured software line from Digital Solutions is now called Pocket Software.
Pocket Writer 128/64.
Pocket Filer 128/64.
Pocket Planner 128/64.
The names are new, but this super software is still the same.

From now on, when you hear the word Pocket, it means software that's full-featured, handy and easy to use.

Pocket Software at prices that won't pick your pocket.



**Pocket
Planner 128**
Spread Sheet

Best-selling software for Your Commodore 128 or 64

You want the very best software you can find for your Commodore 128 or 64, right?

You want integrated software — word processing, database and spreadsheet applications — at a sensible price. But, you also want top-of-the-line features. Well, our Pocket 128/64 software goes one better.

With Pocket 128 or 64, you'll find all the features you can imagine... and then some. And Pocket 128/64 is so easy to use, you won't even need the reference guide. On-screen and in memory instructions will have you up and running in less than 30 minutes, even if you've never used a computer before.

The price? It's as low as you'd expect for a line of software called 'Pocket'. Suggested Retail Price for the 64 software is \$39.95 (U.S.) and \$49.95 (U.S.) for the 128. Any of the 64 products may be upgraded to their 128 version for \$15.00 (U.S.) + \$3.00 shipping and handling. (Available to registered owners from Digital Solutions Inc. only.)

Pocket Writer 128 or 64, Pocket Planner 128 or 64 and Pocket Filer 128 or 64... **Solutions** at sensible prices from Digital Solutions Inc.

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Pocket Writer 128 and 64 are now available in French.

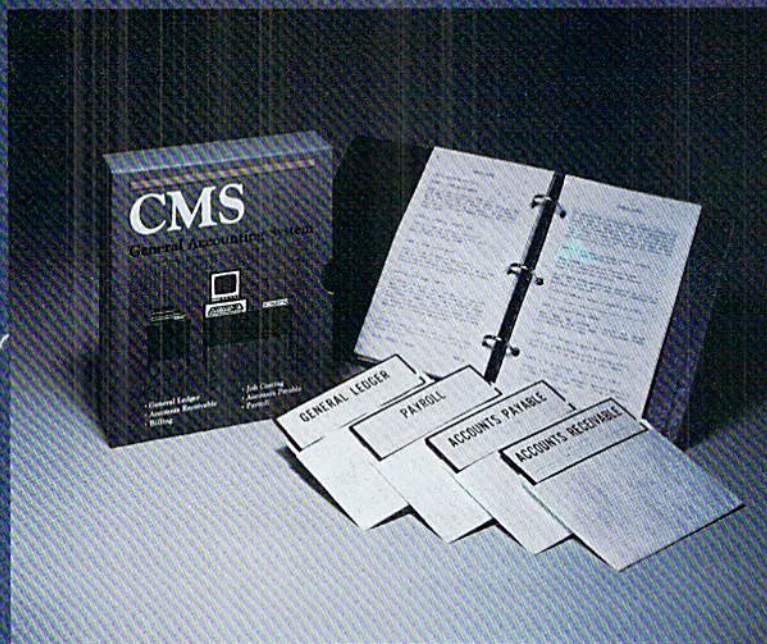
It's Absolutely Shocking!!!

After all these years, **CMS Software Systems** is still the only company providing professional quality accounting software for the complete line of Commodore business computers.

Whether you own an 8032, 8096, SuperPET, B-128, C-64, or the new C-128, we have a professionally written, fully integrated Accounting System designed especially for you.

Introduced in 1979, the **CMS Accounting System** was the first Accounting System available for Commodore computers. Not satisfied with just being first, we have continued to update, expand, and improve until today, the **CMS Accounting System** is widely recognized as one of the finest Accounting Systems available for any computer.

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CMS Software Systems, Inc. • 2204 Camp David • Mesquite, TX 75149

Commodore

microcomputers

DEPARTMENTS

LETTERS 5

NEWS 10

SOFTWARE REVIEWS

The Eidolon reviewed by John Jermaine 18

Artwox Program Exchange reviewed by Mark Catone 20

Alter Ego reviewed by Rick Teverbaugh 24

Transformer reviewed by Ervin Bobo 26

Scribble! reviewed by Ervin Bobo 28

Star Fleet I reviewed by Rick Teverbaugh 30

Brown Bag Software reviewed by Donald Graham 34

Championship Golf at Pebble Beach

reviewed by Gary V. Fields 36

Lords of Conquest reviewed by Mark Catone 40

The Bard's Tale reviewed by Shay Addams 42

ACE reviewed by Gary V. Fields 44

Spell of Destruction reviewed by Mark Catone 46

ADVENTURE ROAD

Ultima: The Lost Episode by Shay Addams 49

TIPS & TRICKS

Compiled by Louis F. Sander 52

GAME PROGRAMS

Guess the Number—Amaze Your Friends
by Michael J. Keryan 62

SILICON VALLEY INSIDER

From Alegria to World Games by Matthew Leeds 64

TELECOMMUNICATIONS

Vestor by Bob Guerra 78

Q-Link Update by QuantumLink 79

TECHNICAL TIPS

How to Build a Lie Detector
by Richard F. Daley and Sally J. Daley 80

Return from the Scratch Zone
by Cyndie Merten and Amy Mountcastle 82

COMPUTER TUTOR

Game Design, Part 4: Moon Base by Robert Alonso 84

Let's C Now, Part 1 by Paul Higginbottom 88

64 USERS ONLY

Speedread by Jerry E. Goff 90

Biorythm by Robert B. Kupfer 94

Loan Calculator by W.O. Nelson 98

The Investor by Sanford Morris 100

FEATURES

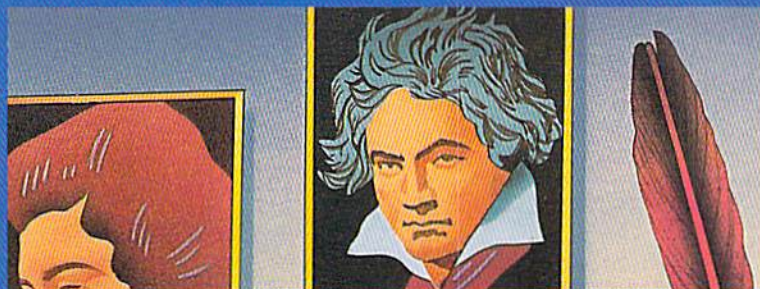


BUYER'S GUIDE TO TAKING OVER THE UNIVERSE 66

With the boot of a disk, you too can carve an empire out of the stars. Here are five programs for your Commodore 64 that offer distinct variations. by Shay Addams

INSIDE AMIGA SOFTWARE DEVELOPMENT 70

Learn what goes on behind the scenes at a leading developer of Amiga software. Experience the up's and down's of designing software for a new operating system. by Matthew Leeds



DELUXE MUSIC CONSTRUCTION SET 72

Use your Amiga to compose and score music with Deluxe Music Construction Set, just one of a series of programs from Electronic Arts. by Peggy Herrington

128 USERS ONLY

Magic Lantern by Bruce Joeger 104

Minitem by Michael LaPaglia 110

Sprite Puzzle by Jerry Sturdivant 112

USER GROUPS 115

HOW TO ENTER PROGRAMS 118

MAGAZINE ENTRY PROGRAMS 120

ADVERTISERS' INDEX 128

PICASSO'S REVENGE

The Birth Of A New Artist

For the Commodore 64/128

Painters beware! Picasso's Revenge, the new light pen graphics package from

Progressive Peripherals & Software, may put you out of work. That's because Picasso's Revenge can turn everyone into a world class artist in less than 5 minutes.

It's all in the code. Picasso's Revenge has the art skills you need to create your own

beautiful drawings, sketches, graphs and more. Since Picasso's Revenge is completely menu driven, all you need is an idea. Use the light pen to select the menu driven drawing commands and you're on your way to creating your own designs.

The variable brush width, five level focus and "airbrush" spray mode gives you total control over your artwork.

Computer literacy not required! Once loaded, Picasso's Revenge prompts you with the

options needed to prepare first class graphics. Automatically draw circles, triangles and squares. Use the light pen we've included with the program as a paint brush to create your own stunning artwork right on your computer screen.

There are even 35 pre-defined textures for drawing and filling in areas you define. There are no complicated commands to learn with Picasso's Revenge.

Achieve stunning results. There's a handy "zoom" in for detail work, pixel by pixel. The variable brush width, five level focus and "airbrush" spray mode give you total control over your artwork.

So much in one package, but Picasso's Revenge is really two packages in one. Picasso's

Revenge graphics package with light pen lets you create your own designs and print them out on most dot matrix printers in nine shades of gray.

Picasso's print utility lets you convert and reformat pictures created with most other graphics packages to Picasso's Revenge format. That includes drawings created with Koala Pad, Microillustrator and Paint Magic to name a few. Now you can add finishing touches to your old drawings and print them out on most dot matrix printers.

Picasso's Revenge has the art skills you need to create your own beautiful drawings, sketches, graphs and much drawings, sketches, graphs and more.

So what are you waiting for? Picasso's Revenge is now available at your favorite

dealer. You can see for yourself how well Picasso's Revenge and the Commodore 64/128 combine to produce stunning graphics. Your friends will be calling you "Picasso" after they see what you have created.

Only Picasso's Revenge transforms your Commodore 64/128 into an in house art

department. Now anyone in your home or office can be an artist capable of producing great graphics and drawings. Five minutes with the manual is all it takes. Just think what it can do for you!

For more information about Picasso's Revenge, please call or write us. Now available at your local dealer for only \$59.99.

Picasso's Revenge and many other innovative products are now available at your dealer, or directly from Progressive Peripherals & Software.

WHEN
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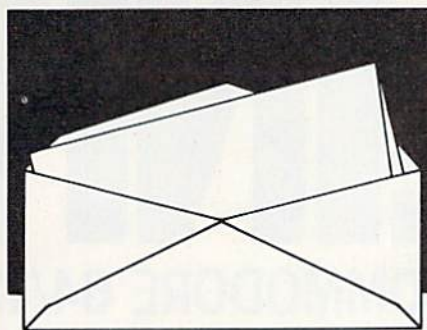
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ABC Membership applied for.

LETTERS



Magazine Entry Program and Fast Load

To the Editor:

I own a Commodore 64 and use Epyx's *Fast Load*. Recently, I typed in the Magazine Entry Program and discovered something that can be very helpful.

I typed in the program and saved it. Then I decided to check to see if it worked. To my surprise, when I hit the RETURN key, my test line was not taken into memory. I listed the program and checked it against the listing in the magazine. Everything was OK. After a few hours of trying to find out what was wrong, I took a break.

When I tried again, I decided to deactivate *Fast Load*. To my surprise, I found that the Magazine Entry Program worked and let me enter programs from the magazine. It was my guess that *Fast Load* resides in memory around the area that the Magazine Entry Program does.

Robert Asmus
Temple City, California

Robot Maker

To the Editor:

I purchased the May/June, 1986, issue of *Commodore Microcomputers* and found the article Robot Maker by John E. Conway. The article converted the Battle Iron Claw from Radio Shack into a computer-controlled vehicle.

I tried to order the required material from Radio Shack, but was told that the Battle Iron Claw was no longer being sold. I was wondering if you could direct me to where I might be able to buy one.

Jemabl Hurd
Clearfield, Pennsylvania

Radio Shack's Battle Iron Claw is indeed available, and can be found in the 1986 Radio Shack Catalog. If your local Radio Shack cannot order it for you, contact Tandy Corporation at 300 One Tandy Center, Fort Worth, Texas 76102.

BobsTerm Pro 128

The Complete Professional Telecommunications Package For The Commodore 128

Letdown by software that makes big promises but fails to deliver? **BobsTerm Pro 128**, a new telecommunications software package written by Bob Lentini, won't let you down. At last, a convenient and easy to use telecommunications program that goes beyond the competition.

When Bob contacted Progressive Peripherals with his idea for a software package that combined the best features of all the other telecommunications packages, we listened carefully. It was a great idea, but this program would have to be smart too.

Everything in one place! **BobsTerm Pro 128** is 100% Hayes compatible and uses all the standard Hayes commands. It has present parameters for nearly all popular modems. Just load **BobsTerm Pro 128**, and select your favorite modem. It's that simple! No other program can do it all...**BobsTerm Pro 128** is the best!

You can upload and download data in practically all protocol you'll ever encounter, including Punter and XMODEM. It even offers adjustments and escape routes to handle some of the RS-232 limitations of the Commodore 128. That's smart!

You'll love the convenience of directly reading and writing to double sided CP/M disks!

Never before has one package done so much, so easily. In only five minutes you'll be running this easy to learn program, without the users manual. The fully menu driven window overlay screens make operation of **BobsTerm Pro 128** a snap.

Especially powerful are **BobsTerm Pro's 128** abilities with CP/M disks. You'll love the convenience of directly reading and writing to double sided CP/M disks. You can even upload or download directly to CP/M disks using XMODEM protocol. This lets you tap into all the CP/M bulletin boards systems.

Turn your computer into a mini-BBS! **BobsTerm Pro 128** has special features that welcome callers with custom, creative greetings

you design. You include special security features to keep unwanted callers from gaining access to your system with passwords you create.

Incredible Editing Power! **BobsTerm Pro 128** has a huge 60K buffer. You can view all transfers on your screen as they occur. Sixteen easy to use commands permit full screen editing of the entire buffer contents. No other program has a built-in editor for a buffer this large. You now have full control over all your files. Only **BobsTerm Pro 128** gives you this kind of power.

BobsTerm Pro 128 is the only telecommunications package you'll ever want!

Never before has one program done so much, so easily. **BobsTerm Pro** is fully compatible with CBMMSD dual drives and the SFD 1001. You can fully program function keys and answer back strings. Create your own marco commands, too. These are real time savers.

Indecisive? **BobsTerm Pro 128** is the last telecommunications package you'll ever want. It has so many powerful features that we couldn't even begin to include them all here. For more information about **BobsTerm Pro 128**, please call or write us. Now available at your favorite dealer for only \$79.95.

BobsTerm Pro 128 and many other innovative products are now available at your favorite dealer, or directly from Progressive Peripherals & Software. **BobsTerm Pro** is also available for the Commodore 64.



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CONVERTS YOUR COMMODORE 64/128 INTO A HEALTH AND FITNESS SYSTEM.

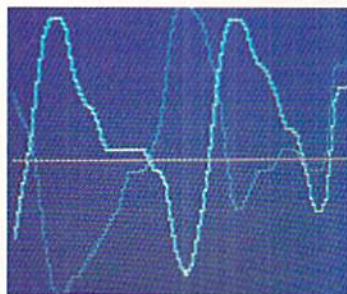


**Sports Training—
A More
Competitive
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No matter what the sport, we have become a nation conscious of performing to win. We spend hours training, practicing, competing. Bodylink gives you the individual attention of the best pro—anytime you desire for as long as you wish—and at no extra cost. The Bodylink System provides instantaneous feedback on the exact manner in which your muscles are performing, enabling you to correct your swing or refine your pitch while still in motion. Bodylink allows a true two-way conversation between you and your body, giving you the winning edge.

MUSCLE COORDINATION PACKAGE—\$139.95

This package includes Bodylink, Standard EMG Sensor and Lead Set, Head-Band, three electrodes and two software cartridges containing several programs.



**Reducing Stress.
A Healthier and
More Productive
You**

Medical authorities now consider stress a major health risk which may result in migraines, ulcers, back pain and heart attacks. With Bodylink you have within reach a powerful stress reduction system. Bodylink allows you to focus on physical signs of stress such as muscle tension and skin temperature. By using this feedback, Bodylink quickly and effectively teaches you to reduce stress for a healthier and happier life.

STRESS REDUCTION PACKAGE—\$209.95

This package includes Bodylink, Biofeedback EMG Sensor and Lead Set, Head-Band, three Electrodes, Biofeedback Temperature Sensor, and two software cartridges containing several programs.



Bicycle not included

**Getting in Shape...Easier...
Safer...More Effectively**

Home exercise now becomes exciting and more effective. With Bodylink you can be sure you are exercising for maximum benefit. While using the aerobic exercise package, Bodylink monitors your heart rate and helps you determine the ideal level you need for aerobic gain. With the isometric muscle exerciser and training package, Bodylink guides you to do muscle developing exercises correctly and effectively. Bodylink motivates you to work harder if you are not reaching your target level, or helps you slow down if you are working too hard.

AEROBIC EXERCISE PACKAGE—\$199.95

This package includes Bodylink, Standard EMG Sensor and Lead Set, Leg-Band, Pulse Rate Sensor, and two software cartridges containing several programs.

ISOMETRIC MUSCLE EXERCISE & TRAINING PACKAGE—\$139.95

This package includes Bodylink, COMET, and two software cartridges containing several programs.

BODYLINK is a peripheral that plugs into the cartridge slot of the Commodore 64/128 computer. *Knowledge of computers or computer programming is NOT necessary to use BODYLINK.* You don't even need a disk drive to save your data. Various sensors are used to record internal signals from your body and relay them to BODYLINK. You simply place the sensor against the part of your body to be monitored and watch the result on your TV screen.

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LETTERS

SELF DESTRUCT

Modem/300 File Translator

To the Editor:

I have used Bob Nadler's improved file translation program published in the September/October, 1985, issue of your magazine. It performed as stated, but the need to type 12 five-digit numbers to delete the translator after each run seemed a bit tedious. I have eliminated this extra typing by adding two lines to the translator program which cause it to self-destruct upon completion.

Load and run the translator program which I renamed SEQTRANSLATOR. At the prompt, enter your file name. The sequential file will be loaded and translated to a program that can be saved and run as a normal BASIC program.

When translation is complete, the last two lines in SEQTRANSLATOR cause all its line numbers to be printed to the screen, followed by the appropriate number of returns to delete itself. The words "All Finished" also appear. The translated file may now be treated as a BASIC program.

Maurice Boyd
Ontario, Canada

SEQTRANSLATOR

```

60100 REM FILE TRANSLATOR
60101 REM TRANSLATES A SEQ FILE INTO
        A PROGRAM FILE
60102 PRINT "[CLEAR]":PRINT:PRINT
60103 INPUT "FILENAME";N$:OPEN 1,8,8,"0
        :"+N$
60104 GET#1,C$:C$=CHR$(ASC(C$+CHR$(0))
        AND 127):IF ASC(C$)<>13 THEN
        60104
60105 POKE 152,1:PRINT "[CLEAR,DOWN2]";
        :S=6:GET#1,C$:C$=CHR$(ASC
        (C$+CHR$(0))AND 127)
60106 IF C$=CHR$(10)THEN 60110
60107 FOR L=1 TO 50:NEXT:PRINT C$;
        :IF C$=CHR$(13)THEN 60109
60108 GET#1,C$:C$=CHR$(ASC(C$+CHR$(0))
        AND 127):IF ST=0 THEN 60107
60109 IF ST=0 THEN 60111
60110 CLOSE 1:PRINT:PRINT:GOTO 60112
60111 FOR I=631 TO 633:POKE I,13:NEXT
        :POKE 198,3:PRINT "[HOME,DOWN4]
        GOTO60105 [HOME]";:END
60112 PRINT "[CLEAR,DOWN3]"
        :FOR M=60100 TO 60113:PRINT M
        :NEXT
60113 POKE 198,14:FOR K=1 TO 14
        :POKE 630+K,13:NEXT K
        :PRINT "[HOME]":PRINT "ALL
        FINISHED":END
    
```

END

HELLO

Chat with your friends
on your Commodore computer
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Talk isn't cheap, it's free for one hour. Sign up now for QuantumLink™, the new telecommunications service for Commodore 64® and Commodore 128™ computers, and with your free hour get a free month of fun and information when you pay for one month of service (\$9.95).

You must have a modem and disk drive to use QuantumLink. If you don't have a modem, pick one up at a retail outlet. Then hook up your modem and call QuantumLink on your computer (not your telephone).

1-800-833-9400 **QUANTUMLINK™**
THE COMMODORE CONNECTION

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Flight Simulator II Scenery Disks

The Challenge of Accomplished Flight

With a realism comparable to (and in some ways even surpassing) \$100,000 aircraft flight simulators, Flight Simulator II includes full flight instrumentation and avionics, and provides a full-color out-the-window view. Instruments are arranged in the format standard to modern aircraft. All the radios needed for IFR flight are included. Front, rear, left, right, and diagonal views let you look in any direction. Program features are clearly documented in a 96-page Pilot's Operating Handbook.

For training in proper flight techniques, Flight Simulator II includes another 96-page instruction manual, compiled by two professional flight instructors with over 8,000 hours flight time and 12,000 hours of aviation teaching experience. You'll learn correct FAA-recommended flight procedures, from basic aircraft control through instrument approaches. To reward your accomplishments, the manual even includes a section on aerobatic maneuvers.

The Realism and Beauty of Flight

Go sight-seeing over detailed, realistic United States scenery. High-speed graphic drivers provide an animated out-the-window view in either day, dusk, or night flying modes.

Flight Simulator II features over 80 airports in four different scenery areas: New York, Chicago, Seattle, and Los Angeles. Six additional Scenery Disks covering the entire Western half of the United States are now available in IBM and C64/128 disk formats.

Apple and Atari versions will be released soon. Each disk covers a geographical region of the country in detail, and is very reasonably priced.

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Certificate Maker

Springboard Software has released **Certificate Maker**, a program that creates certificates for home, school and business. **Certificate Maker** provides more than 200 pre-designed certificates, awards, diplomas and licenses in categories like sports, academic achievement, families, children, religion and business. Awards range from certificates such as "Outstanding Contribution," "Certificate of Music Proficiency," "Tennis Award," "Most Valuable Member" and "Community Service Award" to the "Procrastination Award" and "Party Animal Award." Each certificate can be personalized. The user selects a certificate, chooses a border, enters a personalized message using one of a variety of typefaces and sizes, fills in the signature and date line, and prints out the certificate. More than three dozen gold foil seals and colorful stickers are included. **Certificate Maker** retails for \$49.95. (Springboard Software, 7808 CreekrIDGE Circle, Minneapolis, MN 55435)



Lord of the Flies

CBS Interactive Learning has released The Novel Approach: **Lord of the Flies**, the first title in The Novel Approach software series for the Commodore 64/128. Each program in the series focuses on a literary classic frequently studied in junior and senior high school. Four additional Novel Approach titles are planned: **Animal Farm** by George Orwell, **A Tale of Two Cities** by Charles Dickens, **The Call of the Wild** by Jack London, and **Romeo and Juliet** by William Shakespeare.

Included in each program is a reference guide called the Book Scanner. It provides background information on each book, a profile of the author, and an annotated bibliography of related books.

The Novel Approach: **Lord of the Flies** comes with a program guide, teacher's guide and back-up disk. It retails for \$59.95. (CBS Interactive Learning, One Fawcett Place, Greenwich, CT 06836)



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Add-on Memory for Amiga

Access Associates has introduced **Alegra**, a memory expansion unit that adds 512K bytes of external memory to the Amiga. The use of semi-custom logic and a unique printed circuit design allow for future expansion to 2MB by replacing memory and configuration devices. Suggested retail price is \$379. (Access Associates, 491 Aldo Avenue, Santa Clara, CA 95054)

New Software Source

Waldenbooks, the world's largest bookseller, announces the launch of Walden software—A Center for Learning. Waldensoftware will offer educational and home productivity software. They will carry software programs for the Commodore 64/128 in nine categories, including languages, reading, math, science, and art and music. (Waldenbooks, 201 High Ridge Road, Stamford, CT 06904)



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Multi-Baud Modem

For modem users who need lower baud rates for compatibility but higher rates for cost-effective data transfers, Fastcomm Data has introduced a modem series that transmits data at all speeds—300, 1200, 2400 and 9600 baud.

Available as internal, external and rackmount models, the Fastcomm modem family also includes modems that operate exclusively at 9600 and 2400/1200/300 baud. These modems can be updated later with a Fastsnap board that "snaps" on additional speeds.

Fastcomm modems are compatible with other 300, 1200 or 2400 modems, and at 9600 bps, the modem's Ensured Data Integrity (EDI) protocol checks and corrects, ensuring error-free transmissions. These modems operate over both regular dial-up or two-wire leased telephone lines.

Fastcomm Data is an Electronic Vaults Inc. company, the manufacturer who introduced the first 9600-baud asynch dial-up modem. The Fastcomm modem series retails for around \$1,000. (Fastcomm Data, 12347-E Sunrise Valley Drive, Reston, VA 22091)

ACE for the Plus/4

Cascade Games has released the Plus/4 version of Britain's top-selling flight simulator, **ACE** (see the review in this issue). The conversion contains all of the features of the original Commodore 64 version, including speech, landing and take-off, enemy tanks, aircraft, helicopters, ships and a unique refueling sequence. It retails for \$29.95. (Cascade Games, 1-3 Haywra Crescent, Harrogate, North Yorkshire, HG1 5BG, England. Spinnaker is marketing the 64 version.)



Sequel to Hacker

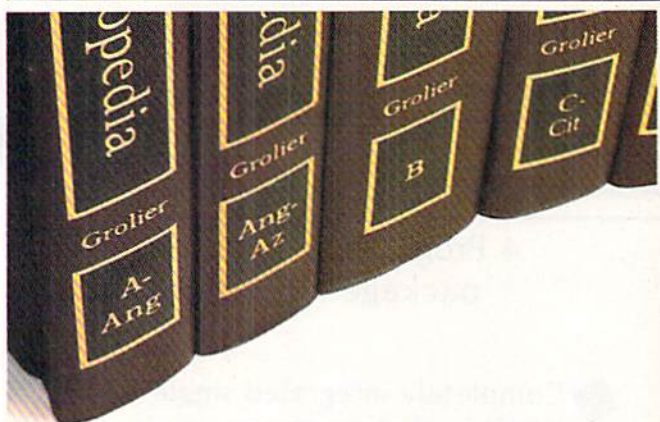
Activision has released **Hacker II: The Doomsday Papers** for the Commodore 64/128, a program based on the adventures of **Hacker**.

In **Hacker**, the player is confronted with a simulated computer malfunction that has caused the accidental break-in of a private computer system. You are given no rules and no clues. In **Hacker II**, a diabolical plot exists to destroy the United States. This scheme has been uncovered by the government, and you must collect details on the project, known only as "The Doomsday Papers." Again there are no rules or clues. It retails for \$34.95. (Activision, 2350 Bayshore Frontage Road, Mountain View, CA 94043)

RGBI Conversion System

DigiTek has introduced the **RGBI Conversion System**, a way to convert your composite monitor to a full-color RGBI. The system requires no software or use of computer memory, and allows full use of the 128's color resolution and speed.

The conversion system is a hardware add-on and requires minor assembly. All components necessary for assembly are included. It is available for \$49.95 plus \$3.50 for postage and handling. (DigiTek Inc., 10415 N. Florida Avenue, Suite 410, Tampa, FL 33612)



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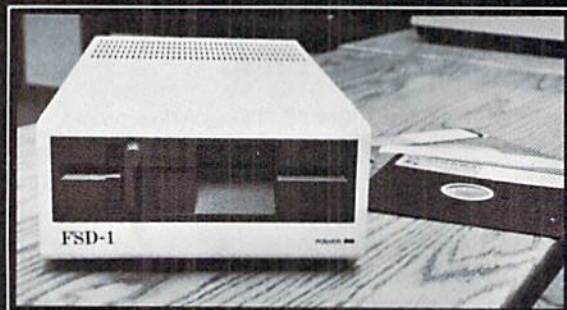
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NEWS

Celebrity Cookbook

Merrill, Ward & Associates has released **Celebrity Cookbook**, a program for the Commodore 64 that features personal recipes of celebrities. Recipes range from Sophia Loren's Whitefish Seville and Frank Sinatra's Meat Balls, to Paul Newman's Graham Cracker Cake, and Bob Hope's mother's Lemon Pie. **Celebrity Cookbook** also features a special section detailing the diets of celebrities.

Celebrity Cookbook includes a wine and bar guide, a recipe filer, a gourmet slideshow, party tips, and a quiz for dinner guests. The program retails for \$19.95. (Merrill, Ward & Associates, 1625 S. Sunrise Way, Palm Springs, CA 92024)

128 Data Base

Mid-Kansas Computers has released **Record Master**, a data base that is compatible with data disks created on earlier versions of **Flex File** and **Practifile** for other Commodore computers. It handles up to 10,000 records with up to 40 fields per record. **Record Master** sorts files alphabetically or numerically, calculates files with subtotals and averages, creates sequential files for merging with most word processors, arranges and prints fields, sorts on multiple keys and selects data using over nine conditionals, and organizes data into reports. It retails for \$49.95. (Mid-Kansas Computers, P.O. Box 506, Newton, KS 67114)

Communications Package for the Amiga

Felsina Software announces the release of **A-Talk**, a communications and terminal program for the Amiga. **A-Talk** has integrated communication tools to collect, control and transmit data. It supports the error-checking protocols Kermit and Xmodem, and has a voice option. **A-Talk** retails for \$49.95. (Felsina Software, 3175 South Hoover Street, Suite 275, Los Angeles, CA 90007).

Outwit International Thieves

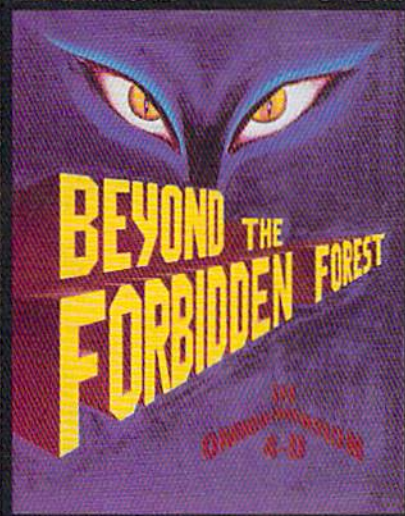
Broderbund Software has released **Where in the World is Carmen Sandiego?** for the Commodore 64/128, a game where players learn world geography and research skills as they attempt to outwit a gang of international thieves headed by Carmen Sandiego. The goal is to recover stolen national treasures by using the clues provided. The 1986 edition of **The World Almanac and Book of Facts**, a paper-bound 928-page book included with the program, helps players decipher clues. Suggested retail price is \$34.95. (Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101)

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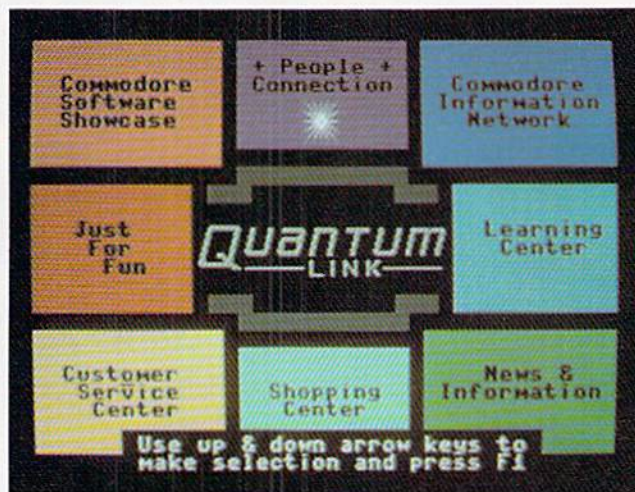
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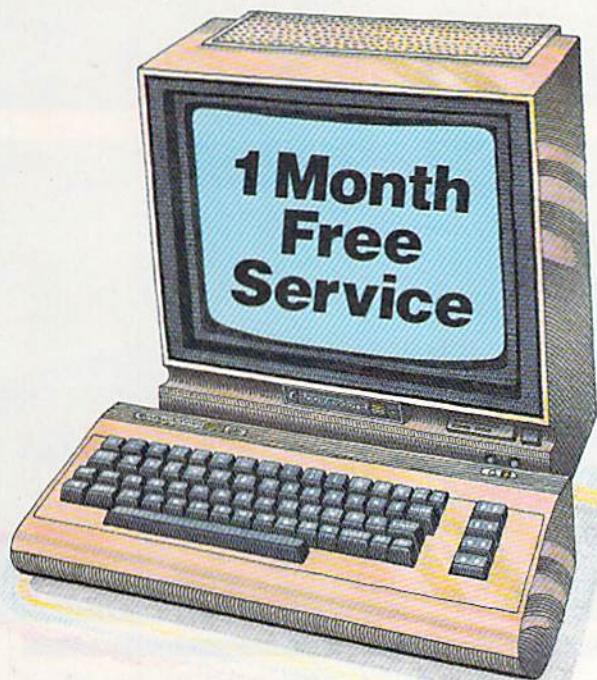
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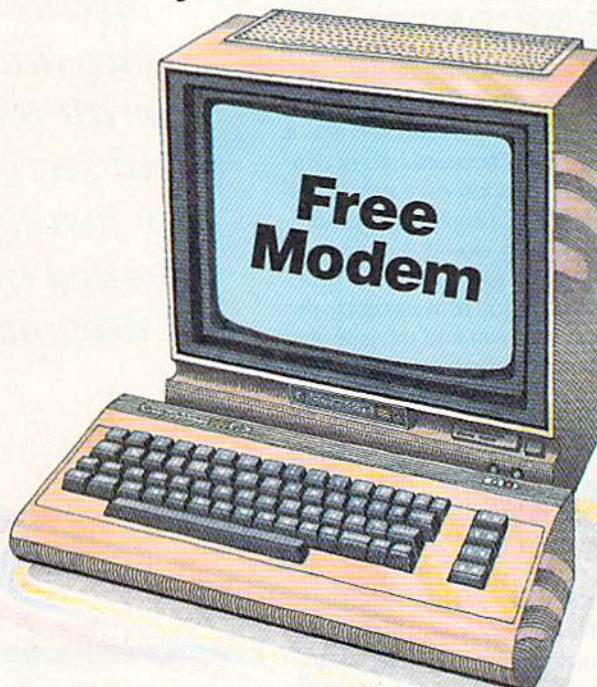
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The Eidolon

Computer: Commodore 64
Publisher: Lucasfilm Games
 P.O. Box 2009
 San Rafael, CA 94912

Medium: Disk
Price: Not available

More than a century ago, Dr. Josef Agon was a highly respected scientist and inventor. Shut away from the world behind the iron gates of his Victorian mansion, Dr. Agon was known to be doing advanced studies on the human mind. But the true nature of these experiments remained a mystery. Some scientists believed the good doctor was a genius, while others accused him of tampering with the dark forces of the occult. One day, Dr. Agon simply disappeared. His relatives quickly closed the mansion and locked the iron gate for the last time.

One evening as you're walking by the old Agon mansion, you find the gate ajar. Your curiosity gets the best of you, and you decide to see if the old structure is really haunted. One thing leads to another, and you find yourself exploring the mansion. At the end of a hallway, you discover a secret passageway. A distant glow draws you to a descending stairway which hasn't been used for over 100 years. It leads to Dr. Agon's laboratory. Descending the stairway, you find a room filled with dusty old equipment. A large mirror emits the glow that dominates the chamber. Facing it is a machine—a time machine?

You find Dr. Agon's leather diary and begin reading the daily entries written by the doctor, sharing his many discoveries and adventures within the lost realm. Was the man totally mad or could an alternate universe really exist? There's only one way to find out. It doesn't take much tinkering to activate Dr. Agon's time machine, and you're off. This is where the game begins.

The Eidolon contains seven levels of caverns, with a very special eighth level for the advanced player. Each level consists of a network of subterranean chambers. You're seated behind the control panel of Dr. Agon's machine, looking forward through the windshield.

The left meter records how close you are to the resident dragon of that level, while the right one displays your power

*Explore a
 mystical
 world to
 discover
 once and
 for all the
 great secret
 so fiercely
 guarded by
 dragons.*



reserves. Your remaining time of play is displayed on the clock. Also on the clock are four triangles representing the points on a compass. As you travel through the caverns, triangles will light to show direction. This especially helps if you want to explore the caves in some kind of order.

There are four colored fireball indicators, one of which is always flashing. A final visual indicator on the lower left corner of the panel contains three colored diamonds. Whenever you terminate a creature and capture the resulting power jewel, the diamond of that color will light up on the panel.

The graphics of *The Eidolon* are unique. Programmers at Lucasfilm Games have perfected a graphics editor which generates figures on the computer in much the same manner that cartoon characters are created. Cartoonists draw small pieces of a character on sheets of

celluloid. These "cels" are then placed one on top of another to form a figure that can be easily manipulated to run, walk, or wave its hand. In *The Eidolon*, the results of this method of producing graphics is fantastic. Each creature has a distinctive appearance, and in some instances, multiple facial expressions.

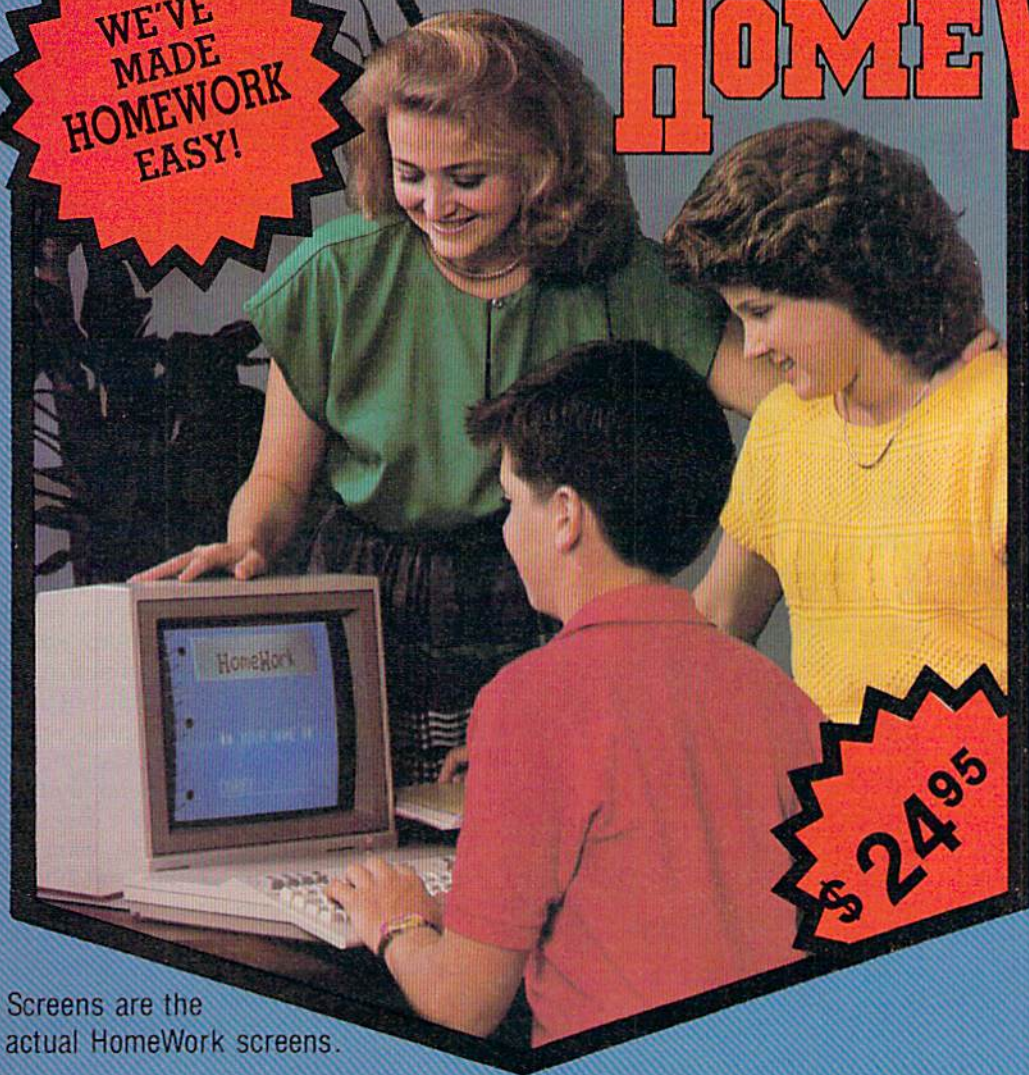
The Eidolon also uses fractals to generate the landscape. For those of you who aren't familiar with the term fractal, it's a new approach to creating graphics that allows the programmer to store vast amounts of data in a relatively small space. The complexity of *The Eidolon's* cavern network illustrates this nicely.

The sound effects of *The Eidolon* work well with the graphics, but I expected to find more. Low-key music generates an atmosphere of mystery and suspense as the program loads in. As you begin exploring, your computer sounds

Continued on pg. 127

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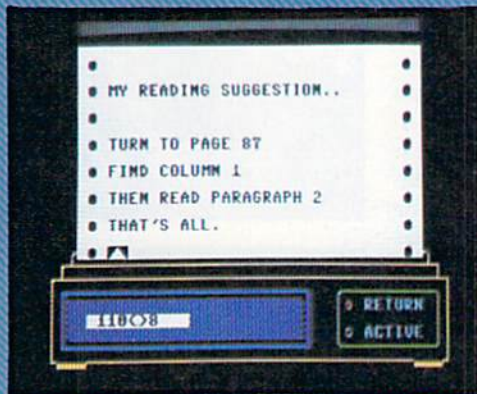
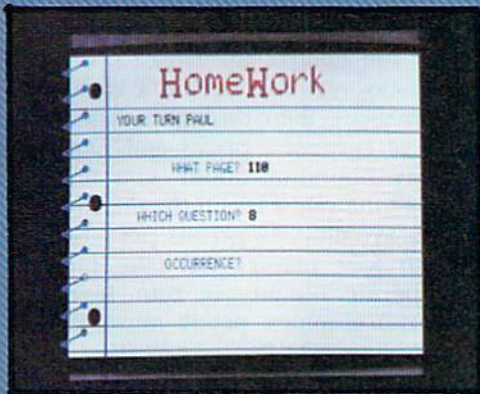
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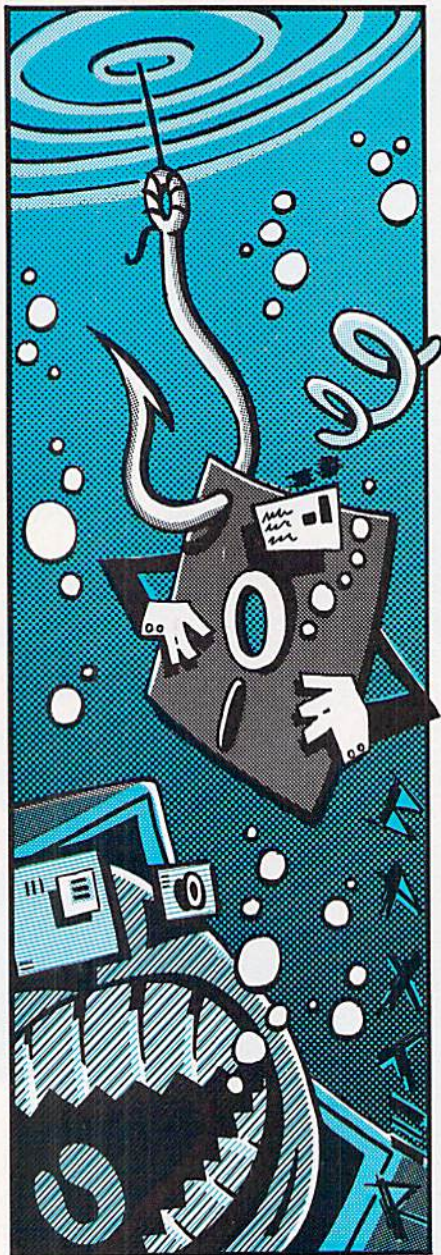
Price: \$9.95 each

Every program in the Artworx Program Exchange retails for under ten dollars. But that's just the bait. The hooks are the games themselves. These are not outdated contests being used to make a quick buck. In this series, Artworx took no shortcuts: They maintained their high standards of design, and any concessions were made, not in the programs, but in packaging.

Each program comes encased in a disposable plastic holder. The cover art is plain, and the documentation is short and simple. But the contests don't need any adornment. Boot up your disk, and what you see is what you get. And what you get is a certified entertainment bargain. Here is a quick review of the starting line-up.

Pro Boxing goes head-to-head against friend or computer in a realistic slugfest. Viewing the bout from an expensive ringside seat, you manipulate your joystick to determine which of the eight offensive thrusts or defensive guards to use as you jockey your fighter into position. Heads jolt, legs buckle and crowds cheer to the beat of pounding fists. Between rounds, each player is given a statistical and visual rundown of his boxer's condition. And at the end of the match, if neither contestant has done any involuntary canvas-kissing, three judges will give their unbiased decision of the final outcome. With crisp graphics, responsive controls, and relentless action, *Pro Boxing* is a technical knockout.

For those who prefer their swings to be a little less damaging, *Hole in One Golf* delivers a most definitive golf game. Forget the fact that you are granted unlimited use of the Fairport



The Artworx Program Exchange is recreational software that is not only professional in design and varied in scope, but low in price.

Country Club's 18-hole course, complete with trees, bunkers, water traps and rough. Never mind that you have total control over club selection, strength of swing, desired direction,

top-spin, back-spin, hook and slice. Don't even consider that up to eight hackers can participate without ever having to track down a lost ball or pencil in a score card.

This program gets my vote for outstanding achievement because it includes the option of course construction. With *Hole in One Golf*, you can become the creator of an unlimited number of personalized links, using different combinations of 227 types of fairway and hazard sections. It even comes with an on-disk tutor to help simplify the task of building your first 18-holer. It's complete, it's authentic, and it's available for the price of a single greens fee.

Cavefighter deposits you on a hollowed mountainside and dares you to traverse an expansive underground obstacle course that stretches across 31 caverns. Armed with nothing but a single-shot pistol and your impressive leaping ability, it's you against the grotto's lethal natural elements and an assortment of beasts. All the caves are similarly structured, but by using different alignments of the available hazards, each subterranean lair becomes an individual puzzle requiring a particular strategy for completion. Before the challenge you can allot yourself up to 99 "lives" per game. Take them all, you'll need them.

Just as tough, but with more whimsical overtones, is *Jumpin' Jimmy*. Here you control the famed boxing kangaroo, hopping out on a humorous treasure hunt through a fanciful land of surprises, prizes and perils. Agilely bounding about, you must pick all the valuables off the play field while avoiding dangerous predators. Up to four players can take turns competing on any of four levels. Colorful graphics, peppy music and comical sound effects keep the play amusing.

But just in case you become adept enough to survive the four levels, this program also comes complete with its own construction editor—allowing you to personally design an unlimited number of additional layouts.

Starbase Defense supplies hazards from the heavens as you guard six cities from an unending onslaught of bombs. Moving a crosshair about the screen, you must aim and destroy

Continued on pg. 21

SOFTWARE REVIEWS/ARTWORX PROGRAM EXCHANGE

Continued from pg. 20

these missiles before they reach their target. Accuracy plays an important role here, as earthbound projectiles can only be eliminated with an exacting blast into an unprotected seam. Every shot drains your limited energy reserve, so I advise selective firing. Experienced arcaders may find this game's premise too familiar and its play too redundant to warrant interest. But for the younger members of the audience, this program's outstanding graphics and ease of use will make it an appealing challenge.

For the all-text fans, *Baker Street Detective* tests your deductive and reasoning ability by pitting you against Sherlock Holmes. Given a map of 19th-century London and a directory of the city's people and places, aspiring sleuths must solve two separate cases. Resolving the crimes is really not an interactive affair, but more a matter of carefully sifting through the clues. Your final score will depend on how long it takes to unravel the mystery in addition to how well you do on a series of ques-

tions used to determine the validity of your solution. The tales are intricate and involving, and this game will keep you coming back for more.

Equally attractive is *Zodiac*. No minced words here, just riveting animated action wrapped around a rather sizable maze search. The background story is one of powerful masters of black magic who have scattered 12 mystical signs of the zodiac throughout the corridors of time, sending the world into eternal confusion. Your job is to destroy the demons, collect the symbols, and return them to the time vault. Behind this is a high-powered shootout against swarms of demonic nasties in a labyrinth containing close to 400 locations. You will need a quick mind and a quicker trigger finger to gather these astrological treasures.

Hotel Alien books you a reservation in one of the most innovative graphic contests to come along in a long time. The challenge involves a search for a sweet old desk clerk known as Grandma. She vanished

shortly after a bizarre group of space beings rented several of the inn's suites. You're off on a room-to-room search after reading an alarming letter penned by the victim just before her disappearance.

The screen display is a compilation of four windows: a first-person perspective, an overhead map, a location-specifier, and a message board. As you case the inn for clues, you will have to partake in many games-within-a-game to uncover bits of important information. Reflexes and reasoning will be gauged in tests that display depth and creativity. Once you start roaming the halls of this hotel, you'll never want to check out.

With the diversity and innovation packaged into the Program Exchange's initial releases, there is bound to be something of interest for everyone. And the cut-rate prices make Artworx's offerings even more appealing. If this line is successful, it may pave the way for some more esoteric software that might otherwise have never made it to the shelves. **C**

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expect of a high-end personal computer, all made possible with GEOS. It's so simple—but then, so was fire. Once it caught on.

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OPERATING SYSTEM: Because GEOS orchestrates every function so that they all work together systematically, even symphonically.

Some basics. Icons are graphic images which represent files or utilities. Each is different, and all are easy to recognize and easy to use.

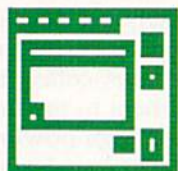
A menu is just that: a list of functions available for selection. When a menu appears, move the pointer to any item you wish. Click. Click. You're on your way.

A pointer is used to select and activate items. To move the pointer, roll the mouse or trackball or rotate the joystick. Once on target, click once to select; click a second time to activate.

Fonts are a new way of looking at text. Choose from 5 different fonts (with more on the way). Try *Duinnelle*, or Roma, **bold**, or *italics*, even underline and outline. Need to fit more words on a line? Pick a smaller point size, like University 6 point, and get over one hundred characters per line.

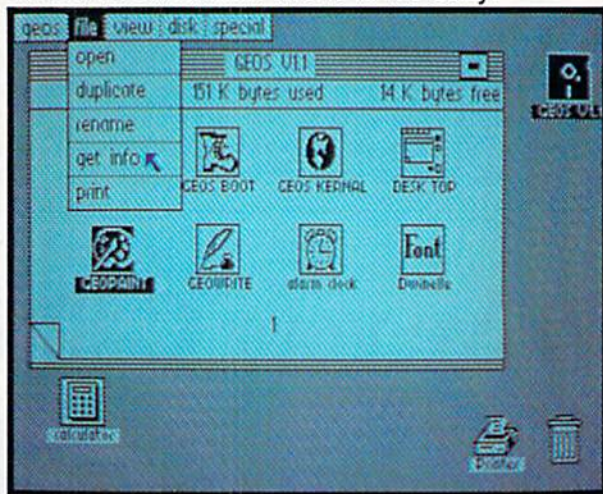
All this and fast too. Because the integrated diskTurbo software improves 1541 disk drive performance 5 to 7 times. That's right. On both reads and writes.

GEOS can be divided into 4 areas: two functional aspects (deskTop and Desk Accessories), and two major applications (geoPaint and geoWrite).



deskTop. deskTop is a graphic interface, making file organization and management easy. As always, you call the shots. Load a disk.

Files appear as icons on the disk notepad; to flip through, point at the folded corner and click. Prefer a file appear on a different sheet? Move it. It's easy.



Create a new document or re-name an existing one. Want to copy a file onto the same or a different disk? Fine. Forgotten what a file contains? Select "get info" from the file menu. A description of that file's contents appears. Finished with a file? Print it. Save it. Or drop it in the trash and have done with it. Your call.

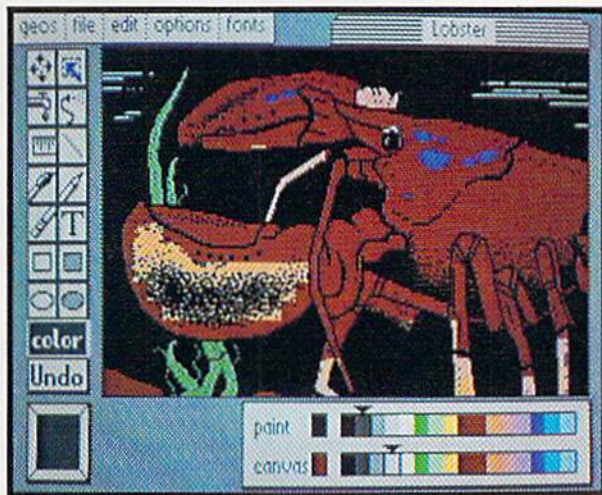


geoPaint. A full-featured, color graphics workshop at your fingertips. The pointer operates any one of the fourteen graphic tools and shapes in the drawing menu.

Create masterpieces on the Drawing Window. By turns, use a pencil, an airbrush or a paint brush, each with a character all its own. Draw straight lines, squares, rectangles or circles. Fill in with any of the 32 patterns. Switch to pixel-mode, where each dot in a selected section is magnified many times its size for easy manipulation.

own two Machines.

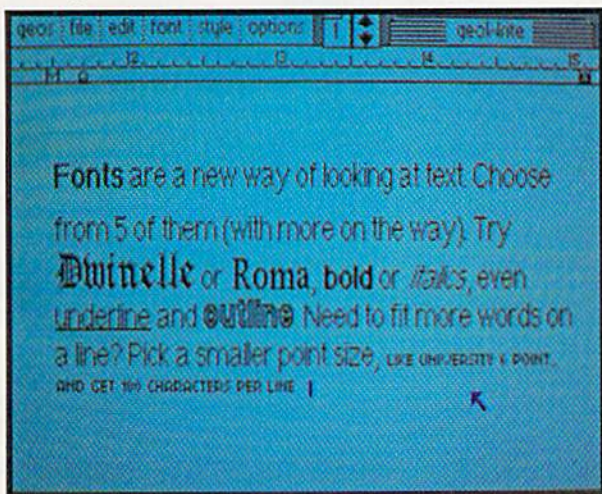
personal computer GEOS™ unlocks.



Second thoughts? Erase what you don't want. Or "UNDO" your last act. (If only life could imitate art!)

Add text if you like, in different fonts, styles and point sizes. Even change its position or layout at will.

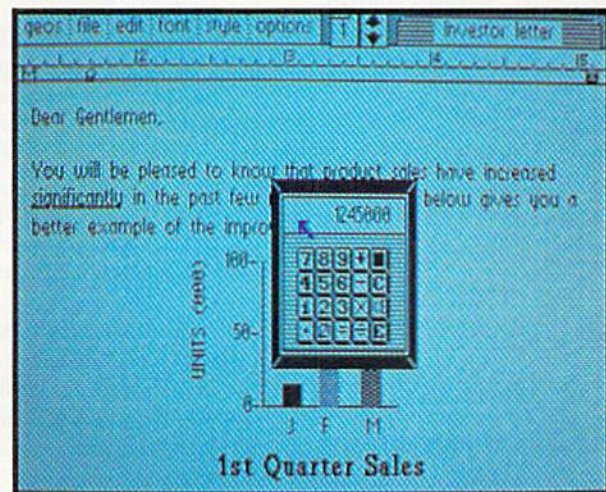
Move or copy any part of your creation. Once done, you can include your artwork in another document—a letter home perhaps. (Won't Mother be pleased?) GEOS makes it easy.



geoWrite. An easy to use, "what you see is what you get" word processor. Create documents. Insert, copy, move or delete text as you wish. Choose from 5 different fonts in many different styles and point sizes. Preview your page exactly as it will

appear off the printer. Typists will appreciate tabs, word-wrap and page breaks.

Documents may contain up to 64 pages. What's more, you can move to any page instantly. If you like, you can cut selected text from one section and move or copy it to another. Add graphics from geoPaint. It's a cinch.



Desk Accessories. Handy programs you can use while in any GEOS application.

These include an alarm clock, a notepad for reminders, a four-function calculator, and photo and text albums which store pictures and phrases you may then paste into applications. The Preference Manager even lets you establish parameters for everything from mouse speed to the date and time—even background color. Civilized options, every one.

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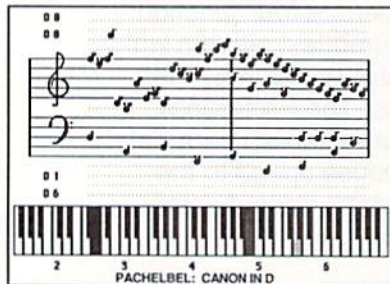
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SOFTWARE REVIEWS

REVIEWED BY RICK TEVERBAUGH

Alter Ego

Computer: Commodore 64
Publisher: Activision
2350 Bayshore Frontage
Road
Mountain View, CA 94043

Medium: Disk
Price: \$49.95

No, life doesn't give any second chances. But now, *Alter Ego* will give you enough "what ifs" to keep you occupied for some time.

In *Alter Ego*, you create a character. You can let the program do it for you randomly, or you can answer a series of questions and customize your own.

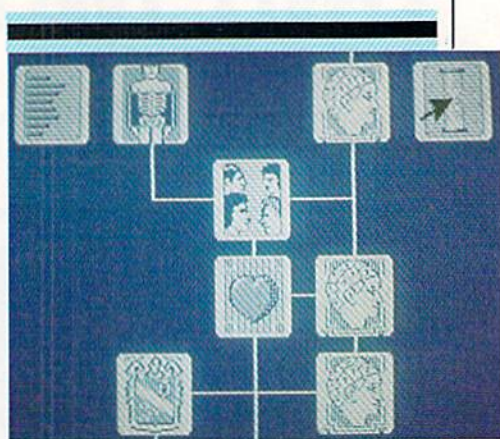
There are two versions of the game: male and female. It isn't necessary for a male to play only the male version. In fact, it might let you see things in a different perspective to give the opposite sex a try.

Your character has seven life stages: birth and infancy, childhood, adolescence, young adulthood, adulthood, middle adulthood and old age. You can start the game at any stage, though you really get involved with the character only if you start at the beginning.

There are many kinds of decisions you must make about the life you are about to lead: social, intellectual, emotional, physical, familial, and vocational. You make decisions about high school, risks, relationships, work, college, major purchases, marriage, and family. The older you get, the more varied these choices become.

Whatever choices are made, the program keeps track of your progress in calmness, confidence, expressiveness, family ties, gentleness, happiness, thoughtfulness and trustworthiness. It monitors your intellectual, physical, social and vocational growth. At any time, you can call up a numerical evaluation in any of these areas. You can also get a general text summation at the end of any life stage.

The game is a veritable gold mine for teachers. Not only do the students feel like they are playing a game, but they can experiment with things like drugs and only the on-screen persona will pay the price. For those susceptible to peer pressure, you can take that path and see



Create the character you want to be, then live out your alter ego's life from birth to old age.

where it leads.

Since the program is very good about keeping you in character, it isn't possible to bounce all over the spectrum of choices at random. If you've been a real nervous sort up to this point, the program isn't likely to let you suddenly be brave enough to climb out on a ledge at the top of the building to rescue a child. You're more likely to call the police than do it yourself.

As entertainment, *Alter Ego* is limited. It is fun, especially the first few times you play, to take new paths and try to change the character of the person you've become. However, this uncovers a weakness in the program. Most areas tend to repeat each time you play. Each time through you might make different choices, depending upon your character, but after three or four times around, you may recognize a lot of the situations and know where each decision will lead.

The program is basically a text representation, aside from some easy-to-recognize symbols to help make life choices. This means that there are no graphics or sound.

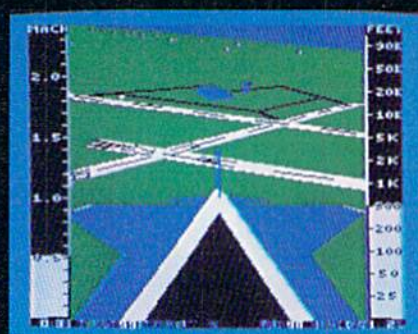
However, *Alter Ego* is a refreshing step in a new direction. It was written by a psychologist who interviewed hundreds of men and women to see what experiences most shared. As a first step, it does falter, but it is still one of the more interesting programs of the year.



F-16 Dogfight with Enemy MIG-23 Fighters



F-18 on the Deck of a Nimitz-Class Aircraft Carrier (Control Tower View)



F-16 High-G Pullout over Detailed Wargame Scenery (Rear View)

Jet

From the author of Flight Simulator II comes a new dimension in realism. Jet simulates two fast and maneuverable supersonic jet fighters, a land-based F-16 or a carrier-based F-18. The simulator includes modern electronic flight instrumentation and the most advanced weaponry available. Jet's simulation sophistication, combined with excellent visual attitude references, makes it truly enjoyable to fly.

Easy aircraft control coupled with ballistic thrust gives you the kind of aerobatic maneuverability only a modern jet fighter can provide. Jet's attitude indicator is easy to read no matter what your orientation. A full-screen out-the-window view helps you get the most out of Jet's excellent flight controls. And that's a major consideration when flying at speeds in excess of 1300 MPH.

With Jet you can fly through either structured or non-structured environments. Engage in a deadly variety of combat missions. Explore the wargame territory, or relax by practicing precision aerobatic maneuvers. Load in scenery from optional United States Scenery Disks. You can even load in scenery off the Flight Simulator II disk.

New high-performance graphic drivers provide beautifully detailed scenery in either day or night-flight modes. You can look forward, left, right, rearward, or straight up out of the cockpit with a single keypress. The Jet simulator even includes a special view-magnification feature that lets you zoom-in to identify objects or details at a distance.

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Transformer

Computer: Amiga
Publisher: Commodore Business Machines
 1200 Wilson Drive
 West Chester, PA 19380
Medium: Disk
Price: \$299 (Disk and 5 1/4-inch drive)

Transformer is probably the most misunderstood, most talked-about, most hoped-for product to be released for a personal computer. And all the talking and misunderstanding occurred long before it was even released.

Now that it is here, let's set the record straight: *Transformer* will not allow you to run everything written for the IBM. That was never the intent. And *Transformer* will not turn your Amiga into an IBM PC.

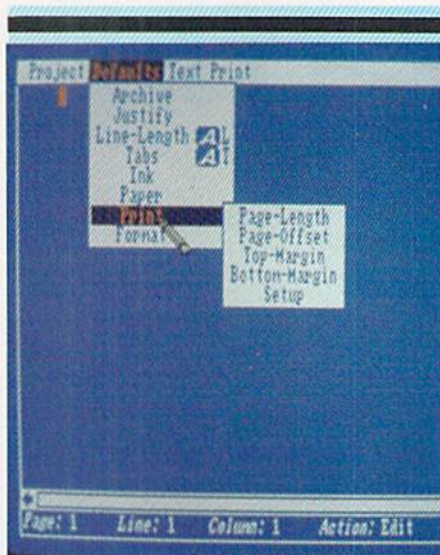
Transformer is a transition piece: Together with a 5 1/4-inch floppy disk drive that can read and write MS-DOS, it lets IBM computer users run many IBM programs on the Amiga.

Though it reached the market somewhat later than scheduled, *Transformer* is a better product for it. It is also more affordable. At its introduction in mid-April, *Transformer* was included with the 5 1/4-inch drive at a price less than half the projected price.

Transformer uses the Amiga's Intuition interface, which means it is a window with icons. It also means that it can be freely copied. Like me, you'll probably want to have several copies, each configured differently. The SetATPrefs icon sets your configuration: name your drives, choose screen colors, and specify attachments to your computer.

One week before *Transformer* came to market, IBM officially unveiled computers that can use 3 1/2-inch floppy drives—and with it they released PC-DOS 3.2, which can read and write to those drives in an 80-track, 720K format, the very format used by Data General in the DG1. So now you can run software made for the DG1. And, during the transition period, it is likely that future software releases for IBM will contain both 5 1/4-inch and 3 1/2-inch floppies.

While not fully IBM compatible, *Transformer* will run the programs on



Together with a 5 1/4-inch floppy disk drive that can read and write MS-DOS, Transformer lets IBM users run many IBM programs on the Amiga.

the Top 20 list. As listed on the package, these include *Lotus 1-2-3* (v1A), *Dbase III* (v1.1), *Multiplan* (v1.2), *Multimate* (v3.3), *Wordperfect* (v4.0), *BPI General Ledger*, *Accounts Receivable* and *Accounts Payable* (vC.13), *Dollars & Sense* (v2.0), *IBM Writing Assistant* (v1.01), *IBM Filing Assistant* (v1.0), *PFS:Report* (vB) and *PFS:File* (vB). Each of these require execution times that are somewhat longer than on the IBM, due to the translation steps necessary.

In my own testing, I was able to run *Bank Street Writer*; *PFS:Write* (DG1 format); *PFS:Write* (MS-DOS format); *Printmaster* (non-graphics mode, MS-DOS); *Turbo Lightning* (MS-DOS); *Sidekick* (MS-DOS); *Managing Your Money* (MS-DOS); *Wordperfect* (DG1 format); *Mathplan Demo* (DG1 format); and a game from Activision called *Alter Ego* (MS-DOS, non-graphic mode). In addition, *Transformer* ran *Turbo Lightning* and *Sidekick* as they were meant to be: as cached programs to be called up only as necessary.

However, speed is a factor here. When I used *Turbo Lightning* with *PFS:Write*, I found that my typing speed of 40 words per minute was faster than the letters could be printed to screen. But I did manage to get *Turbo*, *Sidekick* and *PFS:Write* into the machine simultaneously, a confirmation of just how well *Transformer* emulates the IBM.

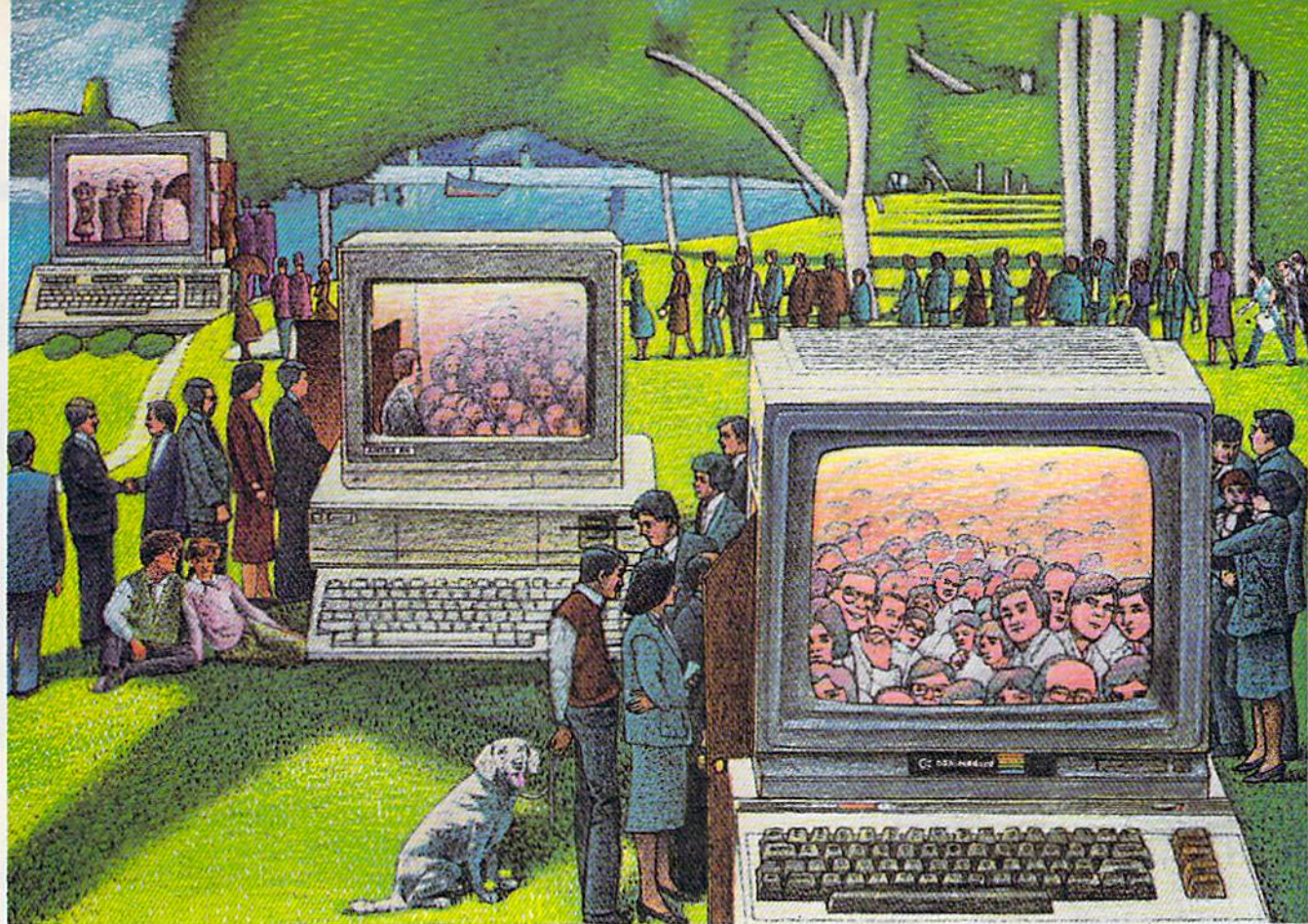
The greatest surprise came when I ran the IBM PC *Advanced Diagnostics* disk. Once you've selected Diagnose from the menu, the program reads your machine down to board level, reports the configuration, and asks for confirmation. It covers three disk drives, 373K of RAM, monochrome card and printer adapter, and asynch adapter. Of the diagnostic tests themselves, only two ran without error. Everything being checked had to do with the monitor. It was rather strange to watch the IBM character set being displayed on the Amiga monitor.

Transformer also allows emulation of the IBM keyboard. A small set of key-covers is included, and though I didn't use them, I found that my instinctive moves in getting around the keyboard were correct. It is designed to appeal to those who have been using IBMs.

Let me note that while IBM's new DOS 3.2 is capable of formatting a 3 1/2-inch disk to 720K, it does this with internal routines to recognize that the IBM computer does indeed have a 3 1/2-inch drive. *Transformer* does not emulate the IBM 3 1/2-inch drive; therefore your floppies formatted with this DOS will be only 360K.

Because *Transformer* completely takes over your Amiga, don't expect to be able to use any of the usual Amiga features such as multi-tasking, screen flipping or mouse control. Nor does *Transformer* emulate IBM sound, though that is certainly a small loss.

In sum, *Transformer* is more than was promised. Users will soon expand the list of software that is compatible. Packaged with the 5 1/4-inch drive, it is an excellent buy at any price and is a worthwhile addition to your Amiga system. Though *Lotus 1-2-3*, *Wordperfect* and the others will likely someday be rewritten for the Amiga, it may be more economical to buy *Transformer* and use the copies you have rather than go to the expense of replacing them when they finally arrive on the market.



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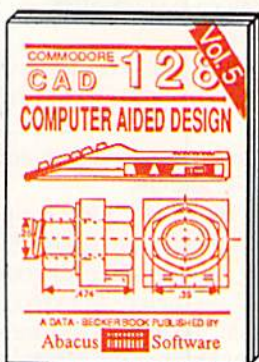
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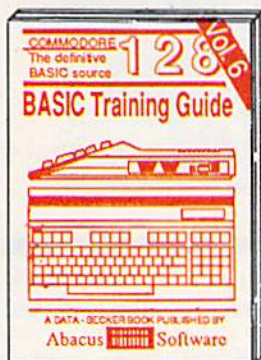
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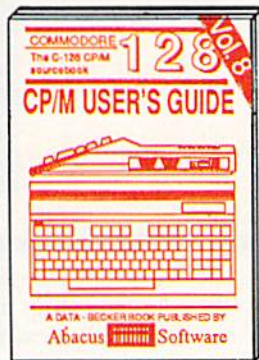
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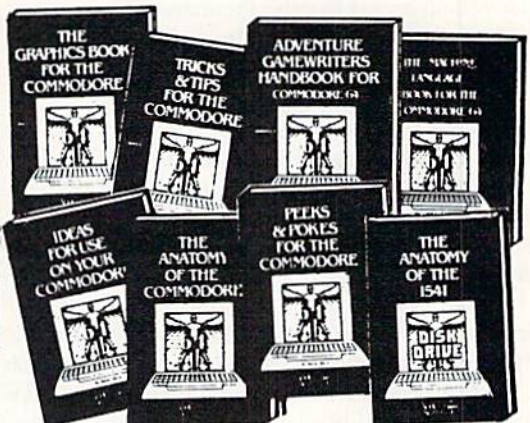
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Star Fleet I

Computer: Commodore 64
Publisher: Interstel Corp.
 (formerly Cygnus)
 P.O. Box 57825
 Webster, TX 77598

Medium: Disk
Price: \$49.95

The United Galactic Alliance is counting on you. Your 500 crewmen depend on you. All that stands in your way are some savage Krellans and some dangerous Zaldrons.

This is *Star Fleet I*, a complex and interesting space battle simulation. There is no Star Trek-like directive here. You're not on merely an exploration mission.

In this game, you must eliminate enemy ships or disable them and tow them back to a starbase in a set time. The program grades you on how you accomplish this, and if you score high enough, you can win an award like the Prentares Ribbon of Commendation. The program keeps a running total of your awards and promotions.

You select a short, medium or long mission, depending on how much time you have. (Should you run out of time, the program has a save game function.) Now sit and wait for a minute or so while the universe is created. During that time, you are treated to music like "Also Sprach Zarathustra," better known as the theme from the movie *2001*.

To learn enough about the program to make some headway in space, you'll need to study the 100-page officer's manual and an 11-page supplement. Unfortunately, the manual was written for the original IBM version of the game, and a supplement contains the revisions for the Commodore version. This makes it slightly confusing. But the game proves to be a bargain at its current price, and worth the inconvenience of the two versions of the manual.

Once you have started your mission, all commands are joystick-driven. There is a primary, secondary and computer menu to handle the 23 options. Response time of the program is good, though that isn't critical since the game isn't played in real time. The pace of the game is a real advantage in the beginning, since it lets you think about each decision and consult the manual before making a decision.

*In
 Star Fleet I,
 you must
 eliminate
 enemy
 ships or
 disable
 them
 and tow
 them
 back to a
 starbase.*

```
STAR FLEET COMMAND-U.G.A. DATE 6780.0
ORDERS FROM Admiral Manager

I Effective immediately, you are
to assume command of the U.G.A.S.
ship [redacted]. After relieving
Captain Keeton, you will proceed
directly to the [redacted] Region.

II You are hereby ordered to seek
out and engage the forces of the
Krellan and Zaldron Empires which
have invaded Alliance territory. In
so doing, you are to deplete the
enemy fleet sufficiently so that our
main fleet can assemble and
defeat them before they can reach
our colonies.

III You must eliminate at least 20
enemy warships within 200 days.

IV There will be 8 starbases
located in your region.
Your mission sequence number
is [redacted].
BON VOYAGE and Good Luck, Admiral!
Standby, It's a long way to your region
```

```
UNO RED MET 0.000
** PHASERS FIRING **
Ship targeted at 4, 4 moved-lock on kept

L.R.S. TAC DISP Quad 2, 0
0 0 XXX 12345678910 Sect 4, 5
101 204 XXX Brng 0
0 100 XXX Powr 1000
Shld 2424 (T)
1000/374
50/1000
S H L D S C *
2 *
3 *
4 *
Command? PHA 10
YES ALL
```

Many of the ship's functions are controlled by the computer, but all have manual overrides. A good example of one job you'll always want the computer to do is raise the shields when you enter a quadrant in which enemy ships are present.

The shields themselves are four separate entities. If your ship is facing the enemy and shield number one is taking too much punishment, you can swing the ship around and let a less damaged shield take the brunt of the attack. If you know you're going into an area that contains some Krellan ships, try to go into just one quadrant. This keeps one side of your ship protected so you'll always have one healthy shield to hide the defenseless side.

Always locate the starbases. This is where you can get the energy replenished that you used for phasers. It is also a safe place to make repairs and get a refill of torpedoes.

If this sounds a bit overwhelming, it is only temporary, because the screen display is logical and contains easy-to-follow

information. You only need to know what the symbols mean and how to use them.

It's a good idea to send in the product registration as soon as you get the game, because registered owners get a free copy of the Officer's Academy Training Manual. It has 68 pages of tidbits and tips. Take my word for it, you'll be a wiser and more successful pilot for the trouble.

Though *Star Fleet I* may be a bit more limited than other space games, I haven't seen any that give so many command choices in such an easy-to-use format. At the touch of the joystick you can use long-range sensors, call for mission status, check in with damage control, fire phasers or torpedoes, use tractor beams, transporters, lay mines, send out long range probes, engage a hyperspace defensive maneuver and activate a self-destruct sequence.

Whether there's an Admiral Kirk, Hans Solo or even a Cirocco "Rocky" Jones inside you, *Star Fleet I* will give you everything you'd like in a believable space battle program. **C**

SUPER SOFTWARE

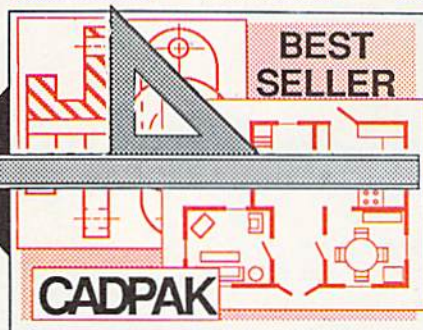
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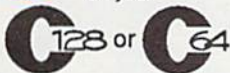
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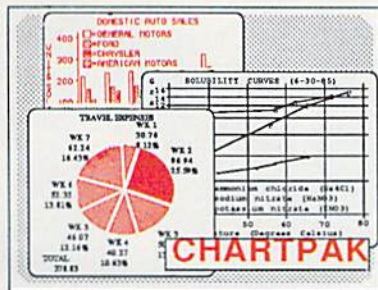
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C-64 \$59.95



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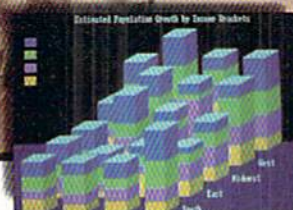
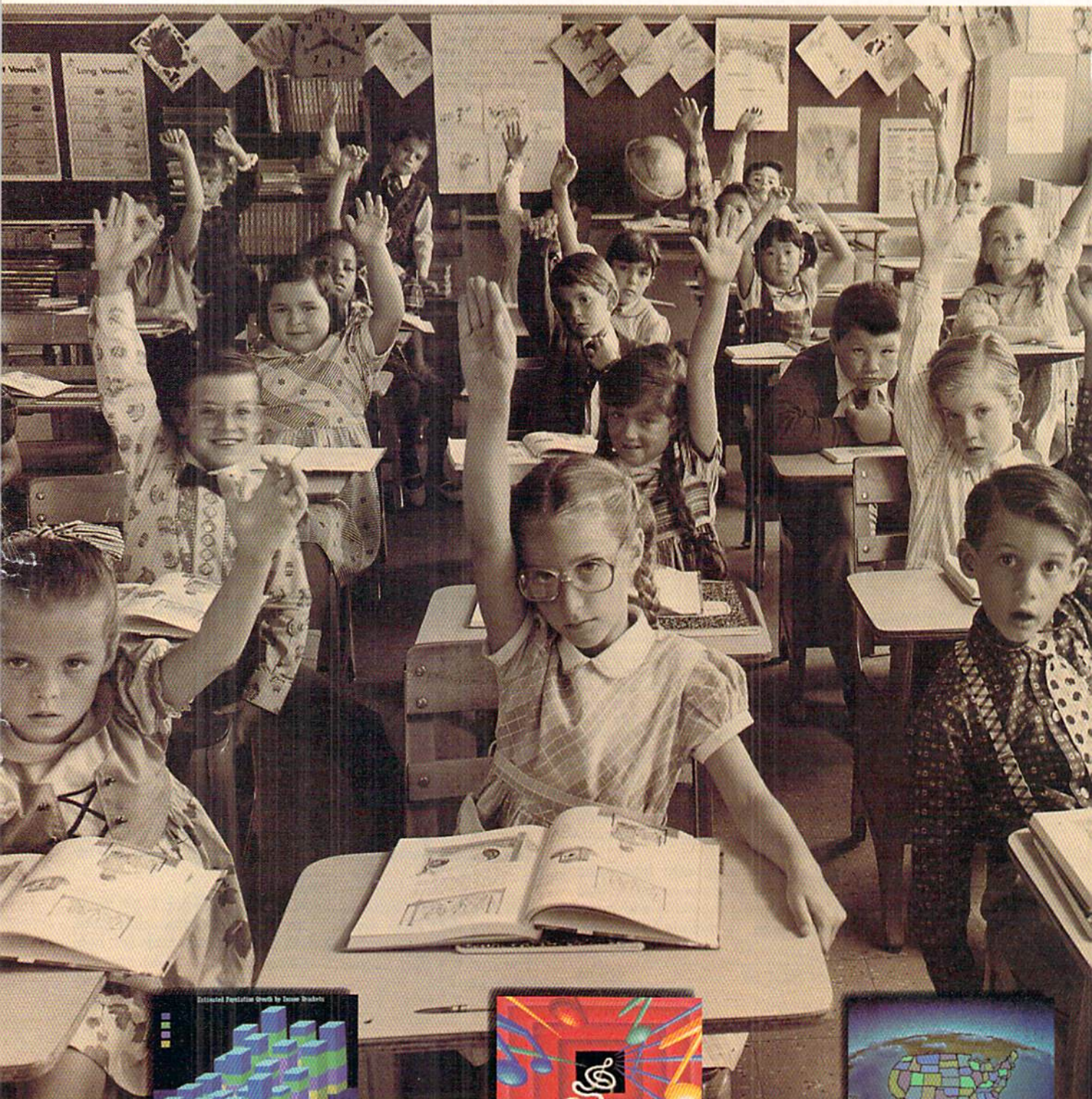
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Amiga will print the cover memo while you're working on a spreadsheet. And there's probably enough power left over to receive a phone message or a stock quote over a modem at the same time.

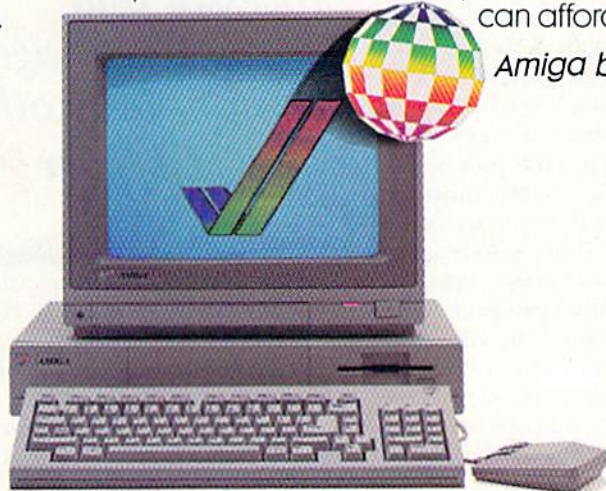
Amiga is IBM-compatible, too. A simple piece of software teaches Amiga to emulate the IBM operating system, so you can run most IBM programs. You'll have instant access to the largest library of business software in the world, including favorites like Lotus® 1,2,3 and dBase®.

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Brown Bag's Integrated Word Processor and Database Manager

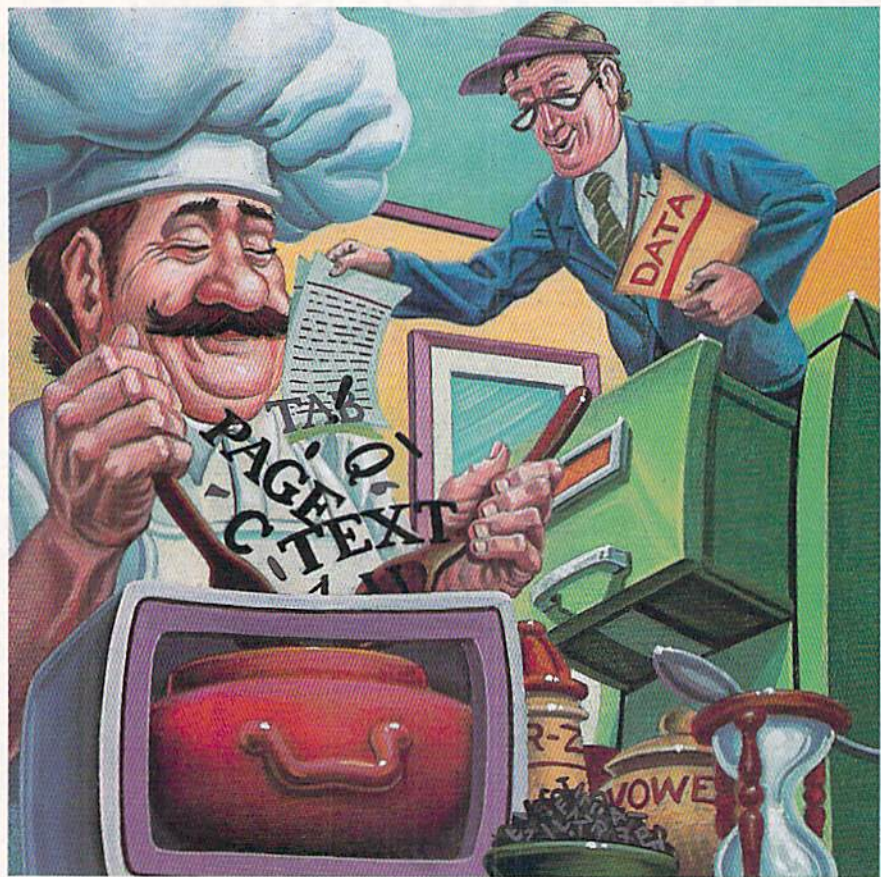
Computer: Commodore 64
Publisher: Software Resource Group
 2105 South Bascom
 Avenue
 Campbell, CA 95008
Medium: Disk
Price: \$59.95

Not only has Brown Bag Software done a good job putting together an effective and easy-to-use word processor, but they have also provided the capability to link those word processor files with the data base of your choice. Of course Brown Bag's software isn't the only software that will do this, but not many others make it as easy.

Brown Bag's Integrated Word Processor and Database Manager commits ideas and thoughts to "electronic paper" quickly and easily. It provides simple means to change or edit that information, and flexibility in printing it out.

Although the program is advertised as menu-driven, it really combines menus with a command mode. A menu is used upon entry into the program, but when it comes to getting things done quickly, the software uses command access. In a menu-driven program, the user selects desired operations from a list or menu of choices. This makes it easy to use in the beginning because your options are always in front of you. However, once you are comfortable with a program, it can get a little cumbersome to always have to go to a menu before you can do something. In a command mode, all you do is press a key to perform an operation.

Brown Bag has combined the best of both worlds in this program. A menu is used upon entry into the program, offering options like load a file, save a file, print a file, and modify your printing for-



Brown Bag's software isn't the only software to integrate a word processor and database manager, but not many others make it as easy to use.

mat. But when it gets down to the nitty-gritty of word processing like centering lines, inserting lines, moving paragraphs, and searching for certain words, the program uses the command mode.

Inserting text is a bit cumbersome because it requires a lot of cut-and-paste operations to get the paragraph straightened out after inserting the desired text. This is a less desirable trait in a word processor, but the only significant drawback

with this one.

As for the database portion of this software, it sports a 20-field maximum and allows a great deal of flexibility in filling these fields. If a particular field needs to be larger than the others, the program permits larger fields in increments of one line. The search function finds a match in any part of the field. Although any field can be used as the key field in the sort routine, it is quite slow considering the fact that all data is in memory.

Any field of a data base can be merged with a text file of the word processor by a simple procedure. It takes the form of a mail-merge operation, which can be used to personalize a letter by inserting any field from your data base. Apparently this is why there is a restriction of one database file per data disk. But the procedure is simple, and that's what counts.

On the whole, the documentation is well written and leaves little to error. One thing, though, that is missing is an explanation on how to print out data from a database file. The data can be printed out through the word processor, but it could be confusing to a beginner. What you do is transfer the data fields


Continued on pg. 35

BROWN BAG

Continued from pg. 34

into a dummy file in the word processor, then perform a merge and print. Up to 20 merges can be made.

The only other area of confusion comes from references in the HELP screen to the ability to insert control characters within the text. I have yet to be able to figure out what these control characters do. No mention was made at all in the manual about this command.

Overall, I would rate this package as adequate with a big plus in the area of user friendliness. It comes packaged in a brown bag (what else?). Unfortunately for the buyer, it isn't easy to back up. Included on the disk are 11 ready-made templates for the database program. 

Features of the Word Processor

- Menu and command modes
- Help key
- Copy lines
- Text buffer (20-line limit)
- Alter system parameters (printer and drive #)
- Left or left and right justification (wherever you want)
- System clock keeps time for you
- Search/Search and replace
- Headers and footers
- Cut and paste for moving text
- Insert/delete character or line at a time
- Center lines
- Merge data from data base
- Tab eight spaces
- Expand or compress current line
- Send or restore current line to/from buffer
- On-screen status line (page, line, column)
- Word wrap
- Works with Epyx's *Fast Load*
- Start printing with any page
- On-screen available memory status
- File status at menu
- On-screen warning before memory is exhausted

Absent Features

- Auto page-numbering
- Easy-to-use spacing commands (single, double space)
- Quick disk directory access
- Access to disk error messages
- Screen and text color options

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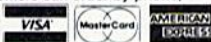
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Championship Golf at Pebble Beach

Computer: Commodore 64
Company: Sportsware
 5234 War Wagon Drive
 San Jose, CA 95136

Medium: Disk
Price: \$24.95

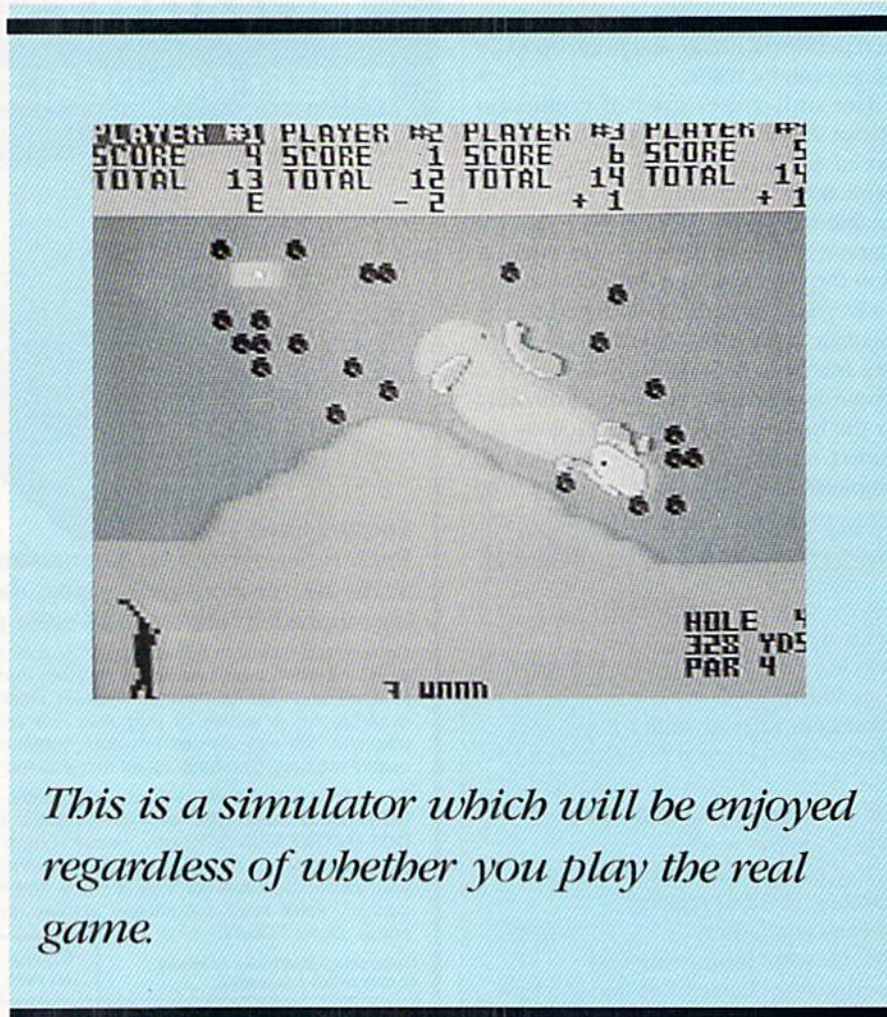
A hush falls on the gallery as you approach your ball on the 17th hole of the world-famous Pebble Beach golf course. A perfect shot will give you a one-stroke lead. But you are in trouble—your ball is just short of the green and in a sand trap. You sigh and reach for a wedge. Be loose, you think to yourself, just get the ball on the green, and don't put it in the ocean. You carefully position your feet and raise the wedge. As you swing forward, your mind is pounding one command—timing, timing, timing. The gallery gasps as the ball sails out of the sand. But luck is not with you today. The ball slices a bit and rolls dead five inches wide of the flag.

Any golfer worth his green fee has had similar experiences. But now you can experience those same frustrations and triumphs at home in Sportsware's golf simulator.

The program simulates the 18 hole at Pebble Beach, California. An aerial view of each hole shows a tee, fairway, roughs, green and sand traps. Each hole corresponds to the same hole in the California course, eight of which are bordered by the Pacific Ocean. In the lower left corner of the display is a silhouette of a golfer and his club. The top of the screen keeps track of which golfer is up and his score.

The game's sound effects are simple but effective. The only sounds you'll hear while playing the course are the sound of a club hitting the ball, then the ball landing, hitting a tree, or plopping into the ocean. If you make or break par on a hole, an unseen gallery will offer a round of applause.

The game accommodates one to four players who can compete as either amateur or professionals. (You'll know you are ready to move up to professional



This is a simulator which will be enjoyed regardless of whether you play the real game.

when you can complete the course in par.) These two divisions let experienced and novice players compete as equals. And because up to four players can play at the same time, players can compete for either individual low score or pairs low score.

There are several keys to winning. First, you must know which club to use and how to swing it. *Championship Golf* comes with one driver, two woods, eight irons, two wedges and three putters. Each can be selected, aimed and swung by using either the joystick or keyboard. I found a combination of both the joystick and the keyboard necessary.

The driver, woods and irons are swung the same way. A skillful golfer can squeeze 260 yards out of a drive and be accurate up to 135 yards with a nine iron. With these 11 clubs, the key to a good swing is direction and timing. First you pick the direction, then time your stroke to match the swing of the silhou-

etted golfer so you hit the ball the same time he does. Anything less than perfect timing will result in less than maximum distance. You can also slice or hook the ball too. Ideally, these curves will be intentional and help you control the ball's flight. Curve control is especially important when you need to hit around a tree to stay on the green.

The two wedges are much easier to control than the woods and irons. Even a novice can pinpoint the flight of the ball using these, but the timing is more critical. If you want the ball to go the maximum distance (75 to 120 yards), push the joystick forward at the top of the swing. If you want the ball to go a lesser distance, swing somewhere between the top and bottom of the on-screen player's swing. It is very important to master the wedges, because less than perfect swings can have your ball leaping off the green from one side to the other all day.

Continued on pg. 37

GOLF

Continued from pg. 36

You can choose one of the three putters (short, medium and long) once you land on the green. Again, the accuracy of the balls is determined by your swing and curve. A good player can putt the full length of the green and make it curve just enough to roll in the cup. A less-than-proficient player may wind up well short or well beyond the hole. So just as in real golf, you are advised to spend some time practicing with each of your clubs.

After the 9th and 18th hole, the program will report each player's score and offer to dump the display to a printer. This is a nice feature if you are a good golfer, but creates embarrassing evidence for the rest of us. My single complaint with *Championship Golf* is its insistence upon honesty. Since the program keeps tabs on each player—there is no way to cheat! How does the program expect me to ever break 100 if I can't fudge my score a bit? The program even refuses to let me move the ball when I'm in the rough and out of sight of any of the other players. Instead, it insists that I play the ball where it landed.

A solo golfer with average abilities should be able to complete the Pebble Beach course in less than 30 minutes. Actual time depends upon how many players are competing and their skill levels. There is no option to save a game in progress.

The ability to compete with other people is what makes *Championship Golf* so much fun. Just like the game it simulates, the real fun of golf is getting to laugh with the other players. As with the real game, you can take it seriously or frivolously.

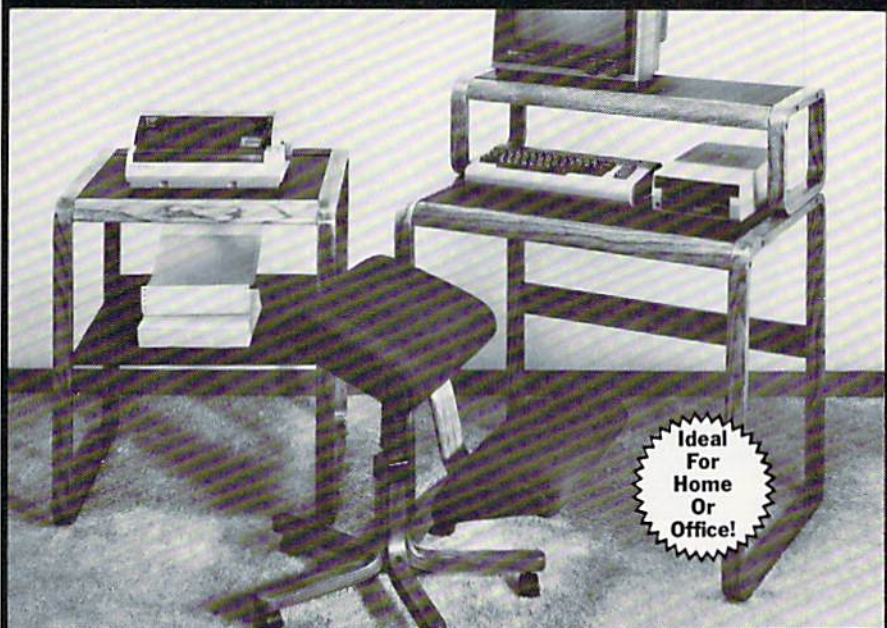
This is a simulator which will be enjoyed regardless of whether you play the real game. The game is a good mix between decision-making and reflexes. To win, you must know what club to use, when to use it, and how to use it. Yet the game is simple enough that even a novice can finish the course.

The game's manual is a trim 22 pages. It includes all the information needed to understand and play the game, as well as tips on controlling each club. If you don't know a nine iron from a putter, you'll appreciate a chart that lists each club and its maximum range. Golf fans will also be interested to know that Sportware offers separate data disks so you can play other

Continued on pg. 128

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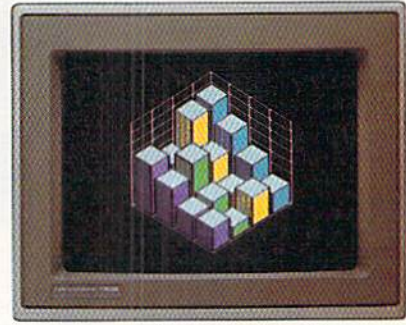
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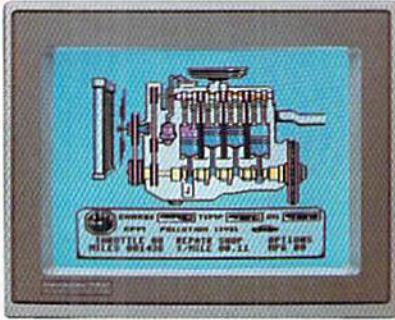
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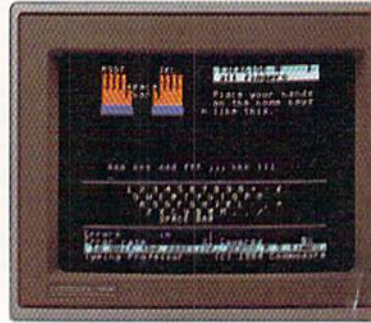
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Lords of Conquest

Computer: Commodore 64
Publisher: Electronic Arts
 1820 Gateway Drive
 San Mateo, CA 94404
Medium: Disk
Price: \$29.99

Having all the power in the world is one thing, but trying to keep it is another. That's the lesson to be learned from Electronic Arts' *Lords of Conquest*, a game that gives you all the land, gold and military force you could ever want, then dares you to hold on to it for more than an hour.

Considering the mayhem that will follow, the contest begins rather innocently. The opening screen is a blank map divided into countries. Players pick land sections one by one to claim ownership. This continues until all the countries have been chosen, transforming the map into a color-coded patchwork of parceled property.

The object of this game is to build cities, and the first player to erect three is the winner. How you go about amassing enough wealth to finance these metropolitan constructions is the guts of the game. In *Lords of Conquest*, land means power, power begets wealth, and wealth buys cities. It's as simple as that. And if you have to expand throughout a country that is already occupied, there's bound to be some conflict. The world is at stake, and with all the dirty dealings, land snatching and ruthless plundering, there's little room for compassion, friendship and fair play.

The action on this territorial battleground takes place in yearly cycles, each year consisting of five phases. The first four phases are used to set up attacks. There is Development, which allows you to access your stockpile to build and position weapons, boats and cities; Production, where all of your resource-producing sites offer their annual yield; Trading, a fascinating stage where each player can participate in some off-screen interpersonal bartering and bribing; and Ship-ment, which allows you to prepare for expected assaults by moving your forces and holdings. Then, with lines drawn and



Lords of Conquest gives you all the land, gold and military force you could ever want, then dares you to hold on to it for more than an hour.

allegiances formed, the conquests begin.

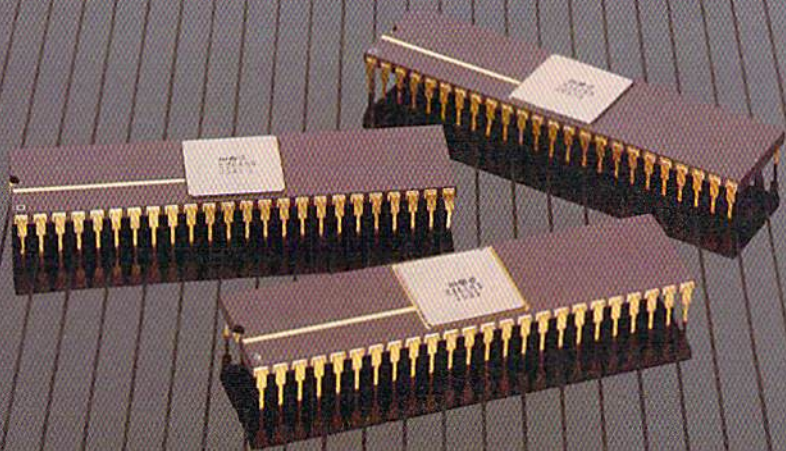
Except for a rare assault by sea, battles can be fought only between neighboring countries. The conflicts are ultimately decided by mathematical formula, with equations based on the number of supporting (bordering) territories held by each side, as well as the weapons, horses, boats and cities they contain. The program will measure the power of each side, match one against the other, throw in an element of chance to keep things interesting, and resolve the conflict according to the odds. If the attacker is successful, he moves into the vacated country and seizes control of its assets. If the conquest is repelled, the invaded land remains unscathed.

The structure, look and play of this program is sure to draw some comparisons to other challenges of similar design. One example is Parker Brothers' classic board game Risk®, a contest that also deals with territorial conflict. But while it's true that you might be able to trace the roots of *Lords of Conquest* back

to this or similar sources, this is by no means a simple board-game-to-computer-screen translation. Electronic Arts has taken some creative steps to actively evolve this familiar game concept by tapping into the advantages offered by a computer, giving its contest accessibility and depth far beyond that of any non-computerized version.

The benefits are probably most evident in the area of board management. Although all the strategic and tactical decisions are made by the players, they are relieved of clerical duties. All the necessary computation involved in the turn-by-turn progression of development, production and battle are handled quickly and flawlessly by an impartial Commodore 64. If you are out to procure some weapons, you are given a rundown of your available resources and current investment options. If a neighboring region catches your aggressive eye, the program, acting as overseer, does all the research and calculating required to set up

Continued on pg. 122



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The Bard's Tale

Computer: Commodore 64
Publisher: Electronic Arts
 1820 Gateway Drive
 San Mateo, CA 94404
Medium: Disk
Price: \$39.95

In *The Bard's Tale*, you do what all good adventurers do in a fantasy role-playing game—you look for the evil wizard. Someone has to rescue the people of Skara Brae from Mangar, the evil wizard who has taken over the town.

Finding him, though, will be harder than killing him, because the town consists of 16 mazes. But unlike most mazes, these aren't all underground. After surviving six or seven levels in the catacombs, you must venture into mazes that are in multilevel buildings. These mazes are lined with devious traps, of course, and while some just maim and kill, others make it almost impossible to draw a useful map.

You view the scene from a first-person perspective, as if you were actually in the maze. The picture appears in a graphics window in the upper-left section of the screen. To the right a text window displays combat reports during battle. The bottom third is devoted to a statistics screen showing your crew's remaining hit points.

When you move forward or turn left or right, animation makes the walls seem to move with a three-dimensional effect that's similar to the mazes depicted in the *Ultima* games. But these graphics are more detailed and richly colored. For example, in the mazes you can see brown wooden doors and scum on the walls of the catacombs. There's even more attention to detail in town: stained glass windows on the temples where you heal wounded characters and an animated bartender who greets you when you drop into his pub for a mug of ale.

In addition to the typical character types (fighters, paladins, rogues, monks and three kinds of magicians), *The Bard's Tale* introduces a new class: the bard. The bard is unique because he can cast six magic spells that no one else knows. He sings a different song to invoke each spell, which won't work unless he has a musical instrument such as a mandolin or a flute. When he casts a spell, you hear

In The Bard's Tale, the player must vanquish Mangar, the evil wizard who has cast an eternal-winter spell.



a brief melody, a special tune for each one. Then he has to return to a pub to "wet his whistle" with a drink or he's unable to cast another spell. That's the source of the game's motto: "When the going gets tough, the Bard goes drinking."

The bard's abilities include magic, sorcery and wizardry. A spellcaster can start as a magician who knows a few magic spells, or a conjurer who knows some sorcery spells. After mastering enough spells in sorcery, a conjurer can change class to become a magician and learn those spells, too. This is the same for the magician. With a shrewd plan, a spellcaster can eventually become an ArchMage who can cast all the spells of each class—85 individual spells.

In combat encounters, one monster representative of the rank of attackers is pictured in the graphics window. Spot animation shows things like groping claws, blinking eyes, and dragons spraying fireballs across the screen. Sometimes you'll face as many as 99 berserkers and 99 mercenaries in the same battle, which gets pretty hairy.

A major encounter can take a long time to resolve, but there's a feature that considerably speeds up the rate of dis-

play of the battle report in the text window. The only problem is that the manufacturer forgot to tell people about it in the manual! All you do is press the right cursor key to speed it up, the left to slow it down. This could cut hours off the time it takes to finish the game.

Everything is done from the keyboard; the function keys aren't used. Efficiently designed menus facilitate activities such as buying equipment. And in battle, you don't have to type in the whole name of a spell, just a four-letter code that is easy to remember, like DRBR for dragon breath.

When you want to review any of your party members' possessions, spells, or other statistics, you punch a number from one to six and his picture fills the window on the top left, followed by a series of stat screens. Menus in these are used for equipping a fighter with a sword he's just bought or found, trading items or gold between characters, and similar actions. There's also a utility feature that lets you copy your characters onto a back-up disk, so if they get killed, you can restore them without spending a fortune at the temple.

I was glad to discover the 22-page manual is full of clues and tips on effec-

Continued on pg. 122

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ACE

Computer: Commodore 64

Publisher: UXB

Spinnaker Software
One Kendall Square
Cambridge, MA 02139

Medium: Disk

Price: \$19.95

ACE (Air Combat Emulator) lets you experience the challenge, thrills and danger of modern warfare at twice the speed of sound in a Mark 2.1 combat jet. And believe me, after you've dueled with a skillful foe at 30,000 feet, you'll be glad it was only that—a simulation.

An enemy fleet has deposited troops, tanks and helicopter gunships on England's southern coast. When the invasion began, the enemy destroyed all but three allied Mark 2.1 combat jets, and you are the sole surviving fighter pilot. Your job is to stop the invasion.

You must destroy the land forces while attacking enemy fighter pilots. Then you must find and sink the invading fleet. Luckily, the Mark 2.1 is the right plane for the mission: It has a top speed of 1,590 knots, can reach an altitude of 70,000 feet, and can carry an impressive array of weapons. Its forward cannon can spit 6,000 rounds per minute and can carry air-to-air, air-to-ground and air-to-ship missiles, as well protective decoy flares. The unanswered question is, "Are you the right pilot for the job?"

ACE gives options like skill levels, targets (aircraft, land forces), weather conditions and choice of daylight or night. These options let you try a different scenario each time you fly, which guarantees the game will never become stale, and lets you match your skills against enemy pilots. The last option will especially be appreciated by novice fliers, because it lets each pilot move on to more dangerous challenges as abilities increase.

ACE's realism earns this simulator high marks. Half of the game's cockpit display is a forward view outside the plane, but a rear-mounted camera displays enemy planes or missiles approaching from behind. Beneath the forward view is the instrument cluster: compass, radar, speed indicator, ammunition status, landing gear indicator, and on-board computer

*The enemy
destroyed
all but
three allied
Mark 2.1
combat jets,
and you
are the sole
surviving
fighter
pilot.*



readout. Each gauge is updated in real time, so when you flip a switch or move the joystick, the response is instantaneous.

During combat, enemy fire may knock out some or all of the gauges, presenting a true-to-life challenge that is every fighter pilot's nightmare. If the rear-view camera is damaged, it will show only static. The same is true of the AWAT (All Weather All Terrain) radar display. Without information from those two displays, your best bet is to turn on the jet's afterburners and head for a friendly airstrip, because unless you are very lucky, your ticket is about to be punched.

The program uses synthesized speech. The British-sounding voice lets you know when enemy missiles are headed your way, when you are approaching stall speed, or when you are running short of altitude. This audio is especially appreciated during a combat situation, since things can get pretty confusing. A voice warning you that you have lost altitude can make all the difference in the world. Unfortunately, the voice doesn't advise you when you have done some-

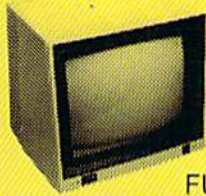
thing stupid, like trying to land with your landing gear up. Because the voice has a British accent, I had to concentrate to understand the messages the first couple of times.

Before you attempt your first flight, you should become familiar with each display on the control panel. Remember, you are flying a super fast attack fighter—it can get you into trouble just as fast as it can get you out. So to survive, you must know the craft so well that reactions are second nature.

Control of the plane is relatively simple. To take off, just throw the throttle wide open, wait until you reach a land speed of 150 knots or so, and ease back on your joystick. As soon as you clear the airstrip, you should retract your landing gear and prepare for your mission. Be sure to check the landing gear indicator to make sure the gear went up. It is critical that you get the landing gear up as quickly as possible, because the drag it creates may cause the jet to somersault and crash.

Continued on pg. 126

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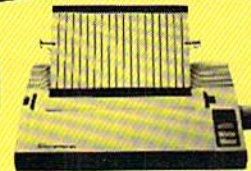
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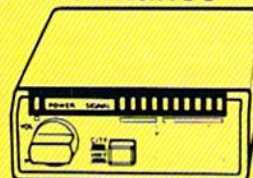


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Spell of Destruction

Computer: Commodore 64
Publisher: Mindscape
 3444 Dundee Road
 Northbrook, IL 60062
Medium: Disk
Price: \$29.95

As Drinn, celebrated novice sorcerer from the Loremaster's Institute on the Plains of Degthal, you stand at the gates of the Castle of Illusions, the final apprentice proving ground for pupils aspiring to be wizards. To be considered for acceptance into the ranks of Mage Master, you must demonstrate your worth by solving the mysteries brewing within this fortress. It's one heck of a final exam.

And so begins Mindscape's *Spell of Destruction*, the kind of graduation prerequisite that would turn most mortal students into voluntary dropouts. To pass this test, you must track and destroy the notorious Prime Elemental, an evil force who waits deep within. Between you and your target stands a gauntlet of demonic guardians, a loyal breed who will be more than happy to inflict whatever pain or punishment it takes to squelch your quest. In a trial as comprehensive as this, only students with prudence, tenacity and a good deal of luck need apply.

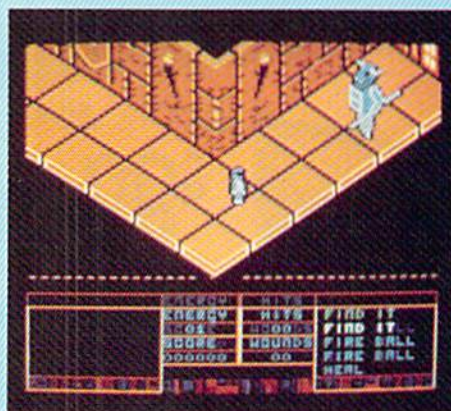
The castle is divided into 71 sections, each composed of up to 15 rooms and passages. Every section is a separate enigma, with a solution to one mandatory to access the next. Armed with a double-edged sword, a pocketful of spells, and a pair of ever-reliable fleet feet, your joystick-controlled Drinn moves from room to room to search for clues, unravel riddles, and confront a wide assortment of castle nasties.

Every chamber holds a different surprise: roaming assailants, structural hazards, and booby-trapped artifacts.

But even when faced with the harsh consequences of these dangers, the excitement of exploring these strange quarters, each carefully designed to be unique in its own way, will keep most players itching to press onward. The lure of the unknown is a powerful attraction indeed.

The game screen is split into two sections, allowing the contestant to view

The road to mastery might be a long one, but it is sure to dazzle your senses, challenge your dexterity, and fully satisfy your craving for adventure.



Drinn's immediate surroundings while simultaneously monitoring your game. The graphics are nothing short of spectacular. The castle backdrop is authentic enough to grab some awards for set design, and the stone walls are constructed of well defined bricks, detailed with streaks from age and fungus. Perpetual torches are periodically positioned as light sources immersing the castle in their yellow hue while realistically flickering from some unseen wind. Secret

doorways magically sparkle, glyphs lay etched in tiled floors, and fresco-style paintings adorn the passageways.

Animation is smooth and accurate, brought to life with the use of three-quarter perspective. Your character, legs pumping and arms swinging, moves around and behind objects, successfully creating a three-dimensional illusion. Enemies on the prowl, outfitted with such extras as flowing cloaks and lightning

Continued on pg. 126

Spelling Tips How to Avoid the Castle Hassles

Although Mindscape states that you should only use the rule book's introductory guided tour as a last resort, I suggest that the easily discouraged sneak a quick peek anyway. Not only will the clues help you to defeat the initial minotaur, but the ways and means of approaching the different puzzles will become much clearer. This might help to eliminate some early frustration.

Here are a few more tips to keep Drinn grinning:

- When entering an unfamiliar room for the first time, you never know what you'll be up against. Initially, it's a good idea not to stray too far from the door. This way you can listen for the telltale music, wait for the aggressor to show itself, and still execute a quick exit. Once outside you can better prepare yourself by selecting the proper spell and fighting strategy.

- If you have a good nose for direction, the castle sections are limited

enough to make mapping an optional chore. But do take time to note the number and location of doors in each room. You never know when a secret door might reveal itself.

- When you're destined to die from either a misused spell or a lack of fire-power, it might be a good time to do some experimenting. It's better to take a few educated chances when nothing is at stake than to risk it all at some later stage.

- After you familiarize yourself with the layout of a castle section, note how often each room must be entered to solve the puzzle. This type of information can be useful when trying to decide how to avoid an adversary. If an opponent only has to be encountered once, you might try to simply run past him, or use a temporary spell like "Hold-it." But if you'll be facing the same foe a few times, it might be best to permanently eliminate him with either the hard edge of your sword or the blast of a fireball.

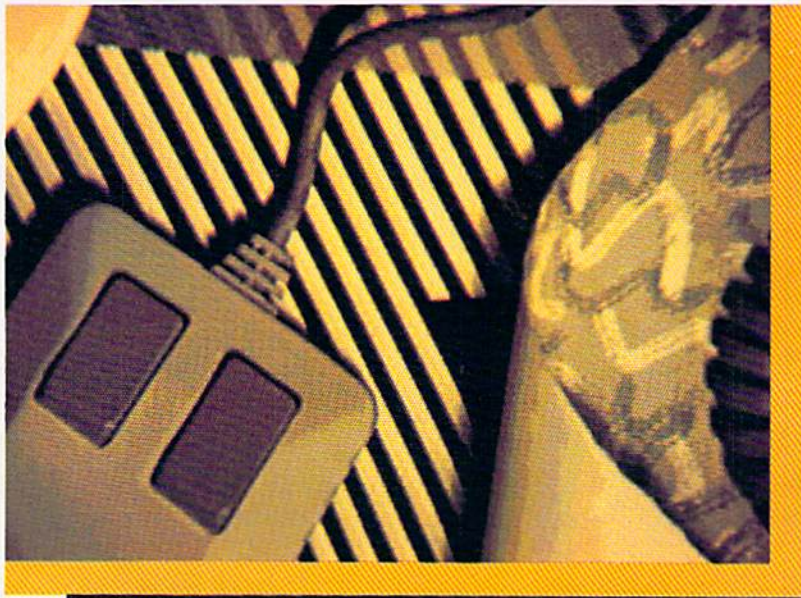
- Don't judge a chest or glyph by its cover. The helpful and harmful objects look the same. If you're weak or wary (from a Tell Tale spell), it's better not to take any chances.

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Ultima: The Lost Episode

Waiting for *Ultima V*? How about a game of *Ultima I* in the meantime? That's right, Origin Systems is re-releasing the fantasy that started it all, a game never before available for Commodore ore-slayers. "*Ultima I* will be rewritten in machine language," says Richard Garriott, better known as Lord British to legions of fans, "and the graphics will be upgraded." (When published in 1980, it was programmed in BASIC and used low-resolution graphics.) Garriott obtained the rights to his program from California Pacific earlier this year and hopes to have the new version out by the fall.

Ultima I pits you against the diabolical Mondain in a quest to relieve this fiend of an occult gem from which he draws his evil power. As you roam the land, shown from an aerial view, you explore mazes such as the Dungeon of Montor and the Mines of Mount Drash. Find the spaceship and you'll get to hyper-jump to distant starbases in this galaxy-spanning quest. Along the way, you'll get a crack at finding a princess and fulfilling other quests-within-a-quest. Your lone character may be a fighter, cleric, thief or wizard; potential races include human, elf, dwarf and hobbit. If true to the original, the game will offer joystick control for moving around and one-key commands for familiar spells such as "Blink" and "Magic Missile."

If you haven't already got the other *Ultimas*, you'll soon be able to get the entire series in a boxed set. Garriott also intends to get *Ultima V* out within a year instead of two years like the fourth installment. In the meantime, he's considering doing *Ultima IV, Part 2*, which would consist of a new story and quest using the same game system. "That idea is still up in the air," according to his Lordship.

Fantasy Worlds at War

Best known for their war games, Strategic Simulations has combined a swords-and-sorcery scenario with tactical combat in *Wizard's Crown*. The best thing about the game is the freedom it allows in developing your eight-character crew. Instead of automatically promoting



News and opinion from a leading explorer of those fantasy realms called adventure games.

you to the next level when you earn enough experience points, *Crown* lets you "spend" them to boost the particular traits you want to improve. And there are 30 different traits, everything from sword and crossbow skills to the ability to hunt, track, cast magic and read ancient writings.

The worst thing is that it's really more of a war game than a fantasy scenario. Sure, your sorcerers know 22 spells, priests can mumble a half-dozen prayers, and fighters can hack away with two dozen kinds of swords, crossbows, flails and other medieval weapons. But the combat

system is straight out of a war game—you direct the actions and movements of icons representing your characters, just as you would icons depicting tanks and infantry in *Mech Brigade*. These battles can last 15 to 45 minutes, and at that rate the game could take more than 100 hours to complete! A quick combat system reduces each battle to a few seconds, but you won't see anything but text.

If you like fantasy role-playing and war games, *Wizard's Crown* might be worth your time. (Just don't expect dazzling graphics or state-of-the-art animation.) This and *Phantasia* are being converted for the Amiga. *Phantasia II* probably will also be converted. It uses the same game system as the original, and you can transfer in characters developed in the first game.

Another sequel, *Bard's Tale II*, is a lot more "magic user-friendly" than the original game. Electronic Arts, responding to complaints that the early part of the original *Bard* was too hard, says the sequel, tentatively titled *The Arch Mage's Tale*, will be easier in the first phase.

Interplay, who created the *Bard's Tale* series, is also working on another role-playing game that will launch a new series. This one, still under wraps at press time, should send shock waves around the world—the real world, not Sosaria or Britannia or Skara Brae. Two classic games by Stuart Smith (*Adventure Construction Set* creator), are being polished and released in a two-for-one package called *Age of Adventure: Return of Hercules & Ali Baba*.

Buyout at the O.K. Corral

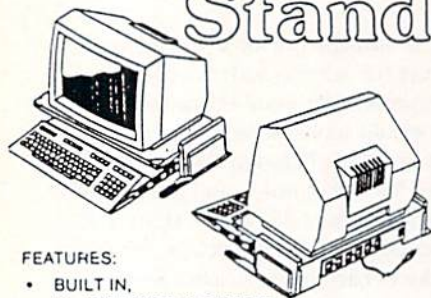
The big news in the world of text adventures (unless the deal is voted down by the board of directors at the last minute) is that Activision bought Infocom this summer. They say Infocom will continue developing and marketing its all-text adventures from Cambridge, while Activision will take over distribution. Infocom's latest game is *Trinity*; in which Brian Moriarty (*Wishbringer*) creates a world where magic and science co-exist, a place "somewhere between the Twilight Zone and Alice in Wonderland." (You can expect to see more new names on Infocom games, since Michael Berlyn and Marc Blank have both left the Circle of Enchanters to explore other realms.)

Continued on pg. 50

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ULTIMA

Continued from pg. 49

Perhaps *Trinity* will prove popular with the no-nukes crowd. It opens on the eve of a nuclear war—you're on the last day of a London vacation—and hops-scotches through time and space to the sites of atomic tests in the Pacific, Nevada, in Russia and outer space. Your goal is to retrace the history of the atomic bomb and change the course of history. This was the goal in *A Mind Forever Voyaging*, in which you went forward in time rather than backward. But this one is puzzle-oriented, while *A Mind Forever Voyaging* had only a couple of logical problems to solve. A standard-level challenge, it's the second title in Infocom's Interactive Fiction Plus series, which means you'll need an Amiga or Commodore 128 to play it.

Activision, when not out buying up the competition, has been lining up more new graphic adventures. *Crossbow* shanghai's you aboard a pirate ship, where you can choose to be a privateer or buccaneer. These were the two types of real pirates, and other details in the game are supposed to be equally authentic. You must equip your vessel with various gear from the days when pirates sailed the seven seas. Another Activision game, *Murder on the Mississippi*, is set on a Mississippi steamboat. As a riverboat gambler, you must solve a murder that takes place on-board.

The best new graphic adventure I've seen in months is Penguin's *Oo-topos*. An illustrated adaptation of Michael Berlyn's first adventure, it features rich, detailed artwork, numerous locations and skull-busters, and Berlyn's warped sense of humor. *Oo-topos* is an alien planet your ship has crash-landed on while transporting desperately needed medical supplies to another star system. The goal is to escape the alien complex, round up the cargo, repair your ship and get away. Disk access, thanks to fast-load routines provided by Commodore, is actually faster than on the Apple.

If you're currently stuck in an adventure and can't find the answers anywhere, not even in Kim Schuette's *Book of Adventure Games*, look for volume two of his book. Recently released by Haba/Arrays, it has maps and solutions to 40 adventures published since 1983. Meanwhile, the orc-alarm is ringing like crazy in my basement, and I've got to go check it out. Now, where did I leave that sword?

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Bugle calls: Some of the world's best known and most rousing music can be found in military bugle calls. Musically very simple, they lend themselves beautifully to computer reproduction. Prove it to yourself by typing in these classics.

The shorter programs are for the Commodore 128 only. To make them easier to type and proofread, I've broken the PLAY statements into arbitrary five-character groups. In the days before computers, military communications were coded in similar groups, which lent themselves to accuracy as well as secrecy. But be careful—PLAY statements often use the letter O, but seldom use a zero.

The longer programs will run on either the Commodore 64 or 128. Lines 110-140 are identical in both, except for the ranges of the FOR-NEXT loops in line 130.

Notice that while music programs are much shorter and simpler on the 128, they're still not easy for humans to read.

Louis F. Sander
Pittsburgh, Pennsylvania

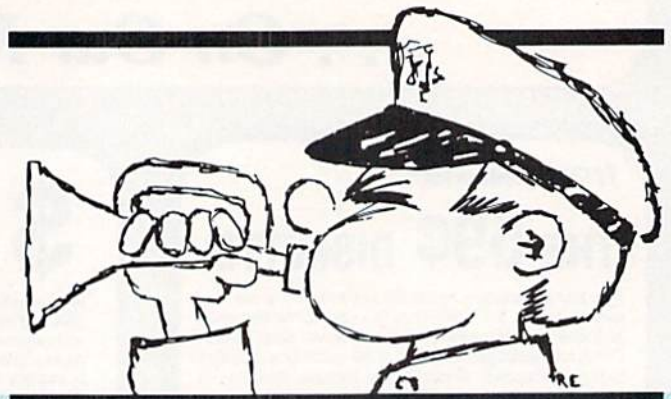
128 Taps

```
10 TEMPO 10:REM TAPS - LOUIS F.
   SANDER'CWDE
20 PLAY "T7I.O 3GSGH .04CI .03GS
   O4CH." 'BBLG
30 PLAY ".EIO3 GIO4C QEIO3 GIO4C
   QEIO3" 'BBUH
40 PLAY "GIO4C H..EI .CSEH GQEQC
   H.O3G" 'BBKI
50 PLAY "I.GSG H..O4 CIIII" 'BBEG
```

(END)

128 Assembly

```
10 TEMPO 15:REM ASSEMBLY-LOUIS F.
   SANDER'CBXF
20 PLAY "T7I.O 3GSGI .04CS O3GI.
   O4CSE" 'BBUG
30 PLAY "QCICS CI.ES CI.ES GQEI.
```



```
CSEQG" 'BBUH
40 PLAY "I.ESC QO3GI .GSGQ O4CI.
   CSCQ." 'BBSI
50 PLAY "CIIII" 'BBJD
```

END

64 Taps

```
100 REM C-64 TAPS - LOUIS F.
   SANDER'BWNB
110 S=54272:POKE S+5,9:POKE S+6,144
   :POKE S+24,15'HAAG
115 FOR N=1 TO 4:READ N(N,1),N(N,2)
   :NEXT'FSYH
120 READ NO,DU:IF NO=0 THEN END'FJIC
130 POKE S+1,N(NO,1):POKE S,N(NO,2)
   :POKE S+4,17:FOR J=1 TO 50*DU:NEXT
   :POKE S+4,16'MPTO
140 FOR J=1 TO 50:NEXT:GOTO 120'FJAD
150 DATA 012,143,016,195,021,031,025,
   030'BGEG
160 DATA 1,06,1,02,2,25,1,06,2,02,3,
   25'BENG
170 DATA 1,04,2,04,3,08,1,04,2,04,3,
   08'BERH
180 DATA 1,04,2,04,3,25,2,06,3,02,4,
   16'BESI
190 DATA 3,08,2,08,1,25,1,06,1,02,2,
   24'BEUJ
200 DATA 0,0'BDPW
```

END

64 Assembly

```
100 REM C-64 ASSEMBLY - LOUIS F.
   SANDER'BBDC
110 S=54272:POKE S+5,9:POKE S+6,144
   :POKE S+24,15'HAAG
115 FOR N=1 TO 4:READ N(N,1),N(N,2)
   :NEXT'FSYH
120 READ NO,DU:IF NO=0 THEN END'FJIC
130 POKE S+1,N(NO,1):POKE S,N(NO,2)
   :POKE S+4,17:FOR J=1 TO 15*DU:NEXT
   :POKE S+4,16'MPUO
140 FOR J=1 TO 50:NEXT:GOTO 120'FJAD
150 DATA 012,143,016,195,021,031,025,
   030'BGEG
160 DATA 1,06,1,02,2,06,1,02,2,06,3,
   02'BEHG
```

Continued on pg. 53

TIPS AND TRICKS/HINTS FOR FUN AND UTILITY

Continued from pg. 52

```
170 DATA 2,12,2,04,2,02,3,06,2,02,3,
06'BEKH
180 DATA 4,02,3,12,2,06,3,02,4,12,3,
06'BEOI
190 DATA 2,02,1,12,1,06,1,02,2,12,2,
06'BEEJ
200 DATA 2,02,2,18,0,00'BOEY
```

END

QuantumLink timesaver: Sometimes you're led through unwanted Q-Link screens to get where you want to go. When downloading a program, for example, the author's notes and instructions come up when you choose a file to download. If they are long and of no interest to you, you can waste lots of time waiting for them to finish.

But usually you can avoid the wait. Try pressing F5 as soon as the unwanted screen begins to print, then follow up by pressing F7. The appropriate menu will probably appear on screen, and you can be on your merry way.

The trick doesn't work under every condition, of course, but it's always worth a try.

Anne H. Sander
Boynton Beach, Florida

Modem connections: The Commodore 1670 and other similar modems can be used in ways you won't find in the manuals. For example, you don't need to plug the telephone and the line into the back of the modem. It's sufficient to connect the phone line only, and to treat the modem as just another extension on the line. When I discovered that trick, I immediately got rid of the telephone, which gave me extra desk space and eliminated an unnecessary wire.

Since the 1670 is an auto-answer modem, it will answer the phone whenever it's connected and the computer is on, whether or not you're running communications software. Since it's convenient to leave the modem permanently connected, we need to find a way to disable the auto-answer feature.

The hardest way is to send a software command to the modem, because every time you reset, you have to send it again. An easier way is to unplug the phone line. If your telephone is plugged in elsewhere (see above), that's pretty easy to do and has no undesirable side effects. Perhaps the easiest solution is to install a switch in the line. Make one up yourself, or buy Radio Shack's Ringer Silencer, which is really an in-line disconnect switch. It comes with a seven-foot cord, and could be just the right length for connecting your modem to a wall jack.

Mob Dem
San Francisco, California

Lottery assistant: Many states and provinces have lotteries in which the player chooses 6 numbers out of 40, or something in a similar range. The accompanying program can pick them for you at random.

It will pick any sized group of numbers from any equal or larger group of numbers without giving duplicate picks. If the number of items picked equals the number of items picked from, the result is the same as shuffling the latter group.

If you win the lottery as a result of this program, please re-

member where you got it. Send the gratuity to me, in care of this magazine. Most winners send a cashier's check for 20% of the winnings.

Louis F. Sander
Pittsburgh, Pennsylvania

```
1000 REM PICK WITHOUT REPEATING -
LFS'BYEA
1010 : 'ABHT
1020 REM INITIALIZATION - RUN ONCE
ONLY'BBND
1030 A=40:REM # OF ITEMS TO PICK
FROM'CWMD
1040 B= 6:REM # OF ITEMS TO PICK'CRVC
1050 DIM A(A),B(B)'BJOA
1060 : 'ABHY
1070 REM PICK ITEMS - REPEAT AT
WILL'BWRG
1080 FOR J=1 TO A:A(J)=J:NEXT'FKVG
1090 C=A:J=RND(-TI):IF B>A THEN
STOP'ILOJ
1100 FOR J=1 TO B:K=INT(C*RND(1)+1)
'IMPB
1110 B(J)=A(K):A(K)=A(C):C=C-1
:NEXT'FWUD
1120 : 'ABHV
2000 REM DEMONSTRATES THE PICKS'BUFA
2010 FOR J=1 TO B:PRINT B(J);:NEXT
:PRINT'GLOB
```

END

Mouse memo: The new Commodore 1350 mouse not only works great with programs designed for it, but it works as a joystick with *Doodle* and other joystick-oriented programs. My advice is to try the mouse where fine, slow action is called for, but stick with your joystick for the hard-core action games.

Reed Huisb
Mesa, Arizona

Easy-load file names: To help my children with loading and running, I name my programs using a file name of ten characters or less, followed by these six characters and the normal close quote and comma eight.

1. Shifted space
2. Commodore D
3. Commodore U
4. Commodore D
5. Commodore E
6. Shifted @

When the directory is listed, it will show the ten-character file name, followed by ",8,1:". To load and run the program, the kids just move the cursor to the proper directory entry, then press shifted RUN/STOP.

Dennis E. Smith
Houston, Texas

End address finder: This C64 program finds the end address of any program on your disk.

Marilyn Annucci
East Westham, North Carolina

Continued on pg. 54

TIPS AND TRICKS/HINTS FOR FUN AND UTILITY

Continued from pg. 53

```
100 PRINT "[CLEAR,RVS] FINDS THE END
ADDRESS OF FILES ON DISK "'BACG
110 PRINT TAB(12);"LOUIS F. SANDER
[DOWN2]"'CEVC
120 INPUT "[DOWN]FILENAME";F$
:IF F$="" THEN 190'EJPD
130 OPEN 2,8,2,F$'BIPA
140 POKE 782,1:SYS 65493'CLTC
150 CLOSE 2'BBJA
160 OPEN 15,8,15:INPUT#15,A,B$
:CLOSE 15:IF A>19 THEN PRINT"
[DOWN,RVS]";B$:GOTO 190'IEXL
170 EA=PEEK(174)+256*PEEK(175)'FPMI
180 PRINT "[DOWN]END ADDRESS IS";
EA'BDWI
190 END'BACE END
```

Machine-type detector: There are many ways for a program to detect which Commodore computer it is running on, but I like PEEK(65534) the best. The results will be as shown below.

```
C64: PEEK(65534)=72
C128: PEEK(65534)=23
Plus/4: PEEK(65534)=255
```

These were checked on my own machines, and are believed to be accurate for all. But there's a chance that ROM variations could cause them to change.

*Lucy S. Terrier
Alton, Illinois*

DOS Disabler: Some C64 programs are incompatible with DOS 5.1, the wedge program. Such incompatibility is seldom a problem if the wedge is disabled before those programs are run.

This routine senses whether the wedge is active, and disables it if it is. Put it at the start of your incompatible programs and see how your life improves.

*Louis F. Sander
Pittsburgh, Pennsylvania*

```
100 REM DISABLES DOS - LOUIS F.
SANDER'BAPC
110 IF PEEK(124)=201 THEN 130'ELFA
120 PRINT "[CLEAR,DOWN3]@Q"
:PRINT "[DOWN2]RUN [HOME]"
:FOR J=631 TO 633:POKE J,13:NEXT
:POKE 198,3:END'JWSJ
130 PRINT "[CLEAR]"'BATY
140 REM REST OF PROGRAM GOES HERE'BVDF END
```

Monitor shelf: I've found that commercial decorator shelf parts, suitably modified, can make a rugged adjustable shelf for your video monitor. The type I use have aluminum brackets that slide into slotted aluminum channels which mount on the wall. Both the channels and the brackets come in a variety of finishes. The most common brand is K & V, which is carried in most hardware stores in our area. Normally, these shelves are not sturdy enough for something like a monitor, but with simple modifications, they work like a charm.

To make my shelf, I bought one 3-foot channel and two 12-inch matching brackets. I cut the channel into two equal pieces and mounted them 12 inches apart on the wall behind my computer table. Simple plastic screw anchors were strong enough for the job.

The wooden shelf itself is the key to a rugged installation. I cut a piece of plywood just wide enough for my monitor to sit on, and an inch deeper than the length of the shelf brackets. For my 12-inch brackets, this was 13 inches deep. Then I cut two notches in the back of the plywood, just the size of the channels on the wall. The notches let the plywood sit flush against the wall, preventing sideways movement at that point.

The tops of the 12-inch brackets have little raised hooks on the front. The wooden shelf usually fits between these hooks and the wall to prevent it from moving forward and perhaps to the floor. In our heavy-duty installation, we take better advantage of the hooks. Since our shelf is cut large, it extends about 1/2 inch forward of the raised hooks. On the bottom of the shelf, I carefully marked the locations of these hooks, then drilled 1/8 inch holes about 1/4 inch deep right there. When I installed the shelf, the hooks fit into the holes, and the shelf is not only kept from moving forward, but also from side to side. The arrangement also keeps the brackets from moving sideways, which is a common problem with this type of shelf.

My finished shelf cost less than ten dollars. It is attractive, adjustable and solid as a rock. It gives me lots of surprisingly valuable room on my computer table. A similar shelf could do the same for you.

*Jonathan Greer
Tyrone, Pennsylvania*

1902 Monitor tips: There are two protruding levers on the sides of this monitor, about eight inches from the bottom front edge. If you pull them downward, they become feet that raise the back of the monitor with respect to the front. This really cuts down on reflected glare, and is a real eyesaver when your monitor sits on your desk or a raised shelf.

The little jack on the left side by the speaker is for headphones. Use them, and family members will feel better about your computing. If you get a 1/8 inch to 1/4 inch mono adapter at Radio Shack or a similar store, you can use your high-quality stereo headset to listen to your computer. The results are so good they may startle you.

*Barb Foltz
Sewickley, Pennsylvania*

C128 monitor switch: If you use a monochrome monitor with your 128, it is capable of displaying both 40- and 80-column screens without internal changes. But when you change screen widths, you still have to switch the monitor cable from one computer output to another. I solved the problem by making up a switchbox with a SPDT switch. The rotor of the switch goes to the monitor cable, while the two other contacts go to the computer's two video output connectors.

The 40-column monochrome output comes from pin one of the eight-pin DIN connector, while the 80-column monochrome comes from pin seven of the DB-9 subminiature connector. On both connectors, pin two is ground, and

Continued on pg. 55

TIPS AND TRICKS/HINTS FOR FUN AND UTILITY

Continued from pg. 54

should be connected to the shield of your video cable. Be careful when locating these pins, since the pin-out diagrams in the manual are somewhat ambiguous. Most connectors have tiny pin numbers molded into their plastic insulators. Look for them before making your connections, and double check them before soldering.

Reed Seitz

Ellington, Connecticut

C128 LIST trick: This little trick will make the 128 produce a BELL tone whenever the line is listed. Used cleverly, it can make a program play a one-note tune when it is listed.

1. Type the line number and REM.
2. Type two quotation marks, then CONTROL 9.
3. Use the cursor keys to backspace to the second quotation mark. Your cursor should be flashing on it at this point.
4. Use the INST key to insert two spaces.
5. Press SHIFT M, then CONTROL G.
6. Press RETURN.

Brian Jacques

Ontario, Canada

C128 DSAVE with replace: The C128's BASIC 7.0 does have a save with replace option, but it's a little hard to find. The secret is to precede the file name with an @ sign, but without using a colon. DSAVE"@ PROGRAM" will save your new version of PROGRAM and eliminate the old one. Note that the drive number zero is not needed in the DSAVE command. If you have a dual drive and want to use drive one, you must use DSAVE"@ PROGRAM",D1 or DSAVE"@ PROGRAM" ON 1. On the C64 and other machines, the syntax is SAVE"@ 0:PROGRAM",8.

Charles Lavin

Coral Gables, Florida

C128 AUTO bug: The 128's AUTO command has the bad habit of jumping the cursor to the right one position after printing the line number. That's fine for empty screen lines, but not for those containing an old READY prompt. When such a prompt is at the start of a line, AUTO gives something like this, with the cursor flashing on the "D": 80ADY. This requires the user to delete back to the line number before entering his line.

If you reprogram a function key to print DATA, PLAY, or another keyword that you often use at the start of a line, you can avoid the problem by putting a delete character before your statement. A typical example would be

```
KEY1, CHR$(20)+"DATA"
```

J. C. Vollmer

Prior Lake, Minnesota

C128 and locked files: Some software uses locked files to protect important information from being erased. (You can tell a locked file by the presence of a greater-than symbol next to its file type in the directory).

The 128, when using the 1571 drive, cannot load such files. To load them successfully, you must first unlock them. There are many simple programs to do the unlocking, or you can do it yourself with a disk editor. Go into the directory en-

try for the file, and find the file type byte. Change its first nybble from \$C to \$8, and the file will be unlocked.

W. Anthony Marsh

Somerville, Massachusetts

C128 variables: One very nice feature of the 128 is that variables are stored in their own bank of memory, meaning that they retain their values even after a BASIC line has been entered, deleted or changed. You can fix a bad line, then use GOTO to resume your program, with all variables and arrays intact.

Program chaining now works reliably, as well—you no longer have to be sure that the first program is longer than all the subsequent ones, and you can use static strings like G\$="GOLDMINE", since these too are stored in the variable bank.

Mike Tranchemontaigne

Nashua, New Hampshire

Plus/4 resources: There's a resurgence in interest in this machine, which was one of Commodore's really under-appreciated gems. Its manual is one of the best for any computer, but it's been hard to find additional documentation or other support. Well, there's plenty of it out there, if you know where to look.

The Programmer's Reference Guide for the Commodore Plus/4, by Cyndie Merten and Sarah Meyer. Invaluable resource of hard-to-find information, including programming tricks and techniques. (439 pages, \$21.95, Scott Foresman)

The Commodore Plus/4 Book, by Sarah C. Meyer. For beginners only. (295 pages, \$16.95, Howard W. Sams)

Commodore Plus/4: Computerfacts CC9, also from Howard W. Sams. Twenty-one page packet of schematics and technical data. Definitely not for beginners, but a valuable resource. (\$17.95)

The Complete Commodore Inner Space Anthology, by Karl J. H. Hildon. Information-packed pages of data and memory maps on all Commodore computers, including the Plus/4. (122 pages, \$12.95, Transactor magazine)

Machine Language for the Commodore 64 and Other Commodore Computers, by Jim Butterfield. Contains memory maps and information on the built-in machine language monitor. (326 pages, \$16.95, Brady Communications)

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Calvin Demmon

Monterey, California

Read it and (don't) weep: The next item is much more technical than our normal fare, so it may pass over your head. If that happens, read it anyway, trying to understand as much of it as you can. If you read it again after a week or more, you'll be surprised to see how much your understanding has improved. And if you wait a week and read it a third time, you'll find you're becoming an expert.

What you experience is an example of a common but little-known fact of computer literature: repeated readings, spaced by days or weeks, dramatically enhance your comprehension.

Continued on pg. 56

TIPS AND TRICKS/HINTS FOR FUN AND UTILITY

Continued from pg. 55

You can take advantage of this phenomenon if you own a stack of old computer magazines. Look into some of the ancient ones, and you'll be amazed how many really great articles they have. You'll wonder why you didn't see them the first time through. Well, the magazines haven't changed since you set them aside—you've changed, by accumulating technical knowledge. And that new knowledge, applied to the old magazine articles, turned them from discards into gems.

Louis F. Sander

Pittsburgh, Pennsylvania

Supermon revealed: The Public Domain *Supermon* program is one of the most familiar machine-language monitors for the 64. Most user groups and bulletin board systems have at least one version available for their members.

If you know *Supermon's* commands, of course, you can use it to work with machine-language programs. But if you also know something about its internal workings, your *Supermon* experience can be eminently more rewarding, especially after a program crash.

When the BASIC version of *Supermon* is run, it checks the top-of-BASIC memory pointer and creates a machine-language monitor program below that address. It then lowers the pointer to protect the machine language, points the BRK vector to the machine language's entry point, and executes a BRK. That displays the B* and register display, plus the dot prompt for the next *Supermon* command. After that happens, *Supermon's* original BASIC program is no longer needed, so you can NEW it or write over it at will.

The above-mentioned BRK vector is in addresses 790-791. Any time the computer executes a machine-language BRK, it looks at the address in the BRK vector, then jumps there. In this case, that jump will activate *Supermon*. From BASIC, a simple way to execute a machine language BRK is to SYS to a location containing a zero. SYS8 is easy to remember and to type.

If you crash when using machine language, pressing STO-P/RESTORE or a reset button will return the BRK vector to its power-up value. *Supermon's* machine language will still be at the top of memory, but a BRK will no longer activate it. You can fix everything up with a SYS to the top-of-BASIC pointer, as reset by *Supermon*. Before a crash, you can find it by

```
PRINT PEEK(55)+256*PEEK(56)
```

After recovering from a crash, just SYS to that number, and *Supermon* will be as good as new.

If you have a reset button, using it will return the top-of-BASIC pointer to its power up value, which means that *Supermon's* machine language is no longer in a protected area of memory. If you want to restore the protection, record *Supermon's* pre-crash values for locations 55 and 56, then restore them after using your reset button.

Frank Biondi

Mount Lebanon, Pennsylvania

Psychological insights: Nobody really understands the seductive lure of computing, but we who have succumbed are certain of its power. The following list appeared in a recent newspaper article on Gamblers Anonymous, a self-help organization for compulsive gamblers. They use it to identify pro-

spective members. For a spine-chilling thrill, type it into your word processor, then do a global search and replace, replacing "gambl" with "comput."

1. Did you ever lose time from work due to gambling?
2. Has gambling ever made your home life unhappy?
3. Did gambling affect your reputation?
4. Have you ever felt remorse after gambling?
5. Did you ever gamble to get money with which to pay debts?
6. Did gambling cause a decrease in your ambition or efficiency?
7. Did you often gamble until your last dollar was gone?
8. Did you ever borrow to finance your gambling?
9. Have you ever sold anything to finance gambling?
10. Were you reluctant to use "gambling money" for normal expenditures?
11. Did gambling make you careless of the welfare of your family?
12. Did you ever gamble longer than you had planned?
13. Have you ever gambled to escape worry or trouble?
14. Did gambling cause you to have difficulty in sleeping?
15. Did you ever have an urge to celebrate any good fortune by a few hours of gambling?

Most compulsive gamblers will answer yes to at least five of these questions.

John Proctor

Las Vegas, Nevada

Piece de resistance: Berlitz defines this French term as "the principal dish at a meal. Also used figuratively." Language teachers are far removed from the ebb and flow of current events, so Berlitz never thought of this figurative use. Type it in and see what we mean.

Georg Simon O.

Erlangen, Germany

```
100 A$="LOUIS F. SANDER - 1986" 'BCGB
110 B$="[RVS,BROWN] [BLUE] [BROWN]
    [YELLOW] [BROWN] [ORANGE] [BROWN]"
    :C$="[SPACE10]" 'CFVE
120 D$="[SHFT M,DOWN,SHFT M,DOWN,
    SHFT M,DOWN,SHFT M]"
    :E$="[CMDR P10]" 'CFKJ
130 F$=CHR$(206)+CHR$(205):G$=E$'FRDE
140 H$="[SHFT N,UP,SHFT N,UP,SHFT N,
    UP,SHFT N,DOWN4]":I$="[BLACK]
    "'CFBH
150 POKE 53281,13:PRINT "[CLEAR,DOWN3]
    ";CHR$(142)'DPXF
160 FOR J=1 TO 2:F$=F$+F$:NEXT 'GLUH
170 FOR J=1 TO 5:PRINT TAB(12)B$;C$
    :NEXT 'GNBI
180 PRINT "[UP3,SPACE2,RVS,GRAY3]";C$;
    SPC(10);"[BROWN]IRC[GRAY3,RIGHT3]
    ";C$'CLTL
190 PRINT "[WHITE,SPACE2]";D$;E$;F$;G$;
    H$;TAB(58);"R 64";TAB(181);I$'DDMM
200 PRINT TAB(11)"PIECE DE
    RESISTANCE"'CDWC
210 PRINT TAB(59);"BY";TAB(90);A$;"
    [L. BLUE]" 'DMTC
```

END

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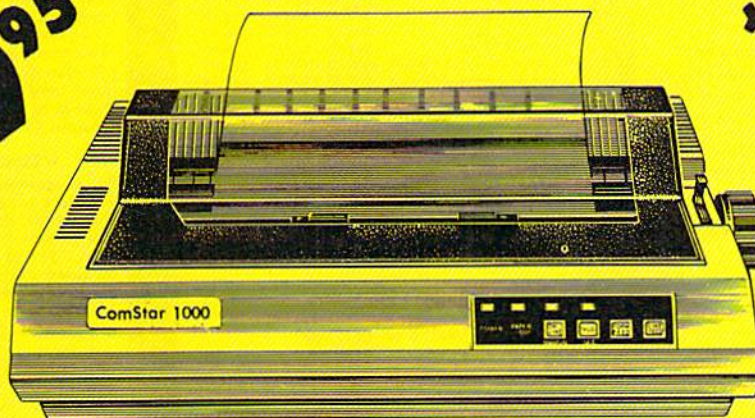
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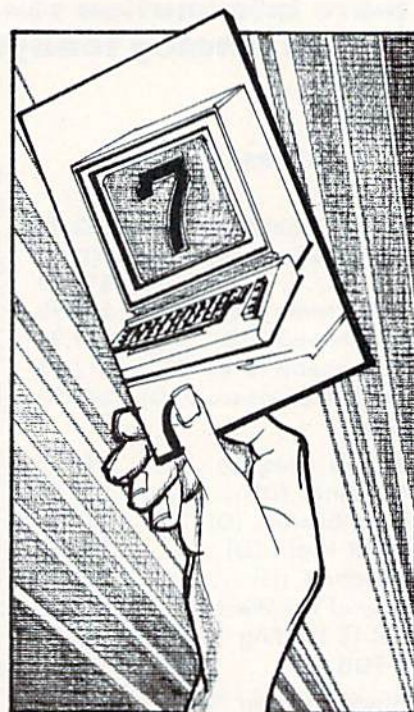
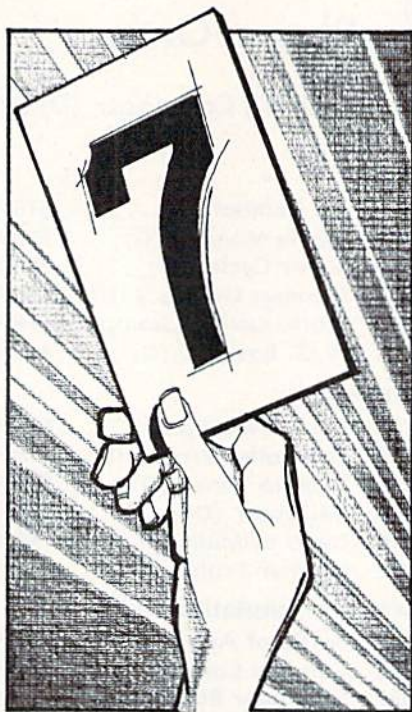
*for the Commodore
64 and 1541*

Here is a neat little number-guessing program that will absolutely amaze your friends. Tell a friend that you just got a new program that tests ESP. Have him or her sit directly in front of the keyboard to do all the typing. Since you will not touch the keyboard, there is no way you can communicate with the computer.

The program generates random numbers and has you try to guess them. At first, neither of you will guess many correctly. However, your guesses will always be a bit closer than your friend's. After eight to ten guesses, say to your friend, "You know, I think I'm starting to tune into the 64's wavelength!" Your next several guesses will be very close, and from then on, you're on the mark every time. Your friend looks a little uneasy, then downright suspicious.

"This game is rigged," your friend says. So you turn off the computer, and reload and run the program. This time, the computer's guesses are in a different sequence, but you still guess the numbers correctly. After a third reload, your friend is convinced that you have not memorized preassigned numbers. You cannot possibly be cheating, so you must really be tuned into the 64!

How did you guess all those numbers? Simple. The computer tells you. Not with the usual output devices. No, the CRT screen and the speaker display no clues. That would be too obvious. The computer communicates to you through the disk drive. Remember when you sat your friend down in front of the keyboard? Al-



though his view of the screen was excellent, your friend did not have a good view of the disk drive. The disk drive was positioned off to the side where you were sitting. Every time your friend pressed the RETURN key for a new number, the computer told you the number by blinking the red light on the disk drive.

How the Program Works

Type in the program as listed, but leave out the REM statements. (Your friend may not be good at BASIC, but he can read.) Lines 10 to 160 are pretty much a simple number-guessing game. You can choose easy mode (the number guesses are integers from 1 to 10) or hard mode (numbers vary between -99.9 to +99.9). The computer will loop between lines 60 to 150 and supply random numbers when you press RETURN. The seeds used for the random number generator are derived from the clock built into the 64, so you won't get the same number sequence every time.

The subroutine at line 10190 breaks

down the number (N) into individual digits, negative sign, and decimal point. This routine then calls the subroutine at line 10020 for each of these digits and symbols. Line 10070 causes the disk drive error light to blink by executing a machine-language program inside the disk drive's ROM. For a zero digit, the light will blink one short pulse. For digits one through nine, the light will blink the appropriate number of times using medium length pulses. A decimal point will show up as one long blink. If the number is negative, a sequence of five very rapid blinks will precede the actual number. Practice for five minutes to learn the code before you spring it on your friends.

You can also use the subroutines (line numbers greater than 10000) in any of your own programs. A blackjack program seems like a natural. Just set N equal to the number in question and GOSUB 10190. N can be positive or negative and can be any number of digits long. For a yes/no response, restrict N to zero (for no) and one (for yes). **C**

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Guess the Number

```
10 PRINT"[CLEAR,DOWN3,SPACE10]
    GUESS THE NUMBER[DOWN2]"'BAOE
```

```
20 EZ$="E": INPUT"EASY <E> OR HARD
    <H>[SPACE2][E]";EZ$'CILH
30 EZ$=LEFT$(EZ$,1): IF (EZ$ = "
    [SHIFT E]") THEN EZ$ = "E"'GTVI
40 HI = +100: LO = -100'ELOF
50 IF (EZ$ = "E") THEN HI = 10
    : LO = 0'FNCH
```

Continued on pg. 63

GUESS THE NUMBER

Continued from pg. 62

```

60 PRINT "[DOWN2]GUESS THE NUMBER
FROM " LO + 1 "TO" HI'CFSL
70 PRINT "PRESS [RETURN]
WHEN DONE.'"BAKK
80 N = RND(0)*(HI - (LO)) + LO +
.5'GQDL
90 N = INT( N * 10 ) / 10'EIKJ
100 IF (EZ$ = "E") THEN N =
INT(N)'FJUA
110 GOSUB 10190'BFKW
120 GET K$: IF K$ = "" THEN 120'EIWB
130 PRINT"THE ANSWER IS ";N'BCRC
140 K$ = "Y": INPUT" [DOWN]ANOTHER?
[SPACE2]<Y> OR <N>[SPACE2] [Y]";K$
: K$ = LEFT$(K$,1)'EPOL
150 IF K$ = "Y" OR K$="[SHFT Y]
" THEN 60'EGOF
160 END'BACB
10000 REM BLINK THE DISK ERROR
LIGHT'BWNX
10010 REM NL NUMBER OF TIMES'BPJW
10020 OPEN 15,8,15'BHAT
10030 IF NL<1 THEN GOSUB 10140
: GOSUB 10140: GO TO 230'HSUC
10040 GOSUB 10140'BFFV
10050 FOR JL=1 TO NL'DFFY
10060 : FOR IL=1 TO LT'DGSA
10070 : PRINT#15,"M-E"CHR$(0)
CHR$(193)'DMJD
10080 : NEXT IL'BDFA
10090 : GOSUB 10140'BGNB
10100 NEXT JL'BCYS
10110 CLOSE 15'BCGT
10120 RETURN'BAQT
10130 REM DELAY'BFDV
10140 FOR IL=1 TO 20*LT'EHYA
10150 NEXT IL'BCXX
10160 RETURN'BAQX
10170 REM DIVIDE NUMBER INTO
DECADES'BXWA
10180 REM AND SEND EACH DIGIT
OUT'BTGA
10190 N$ = STR$(N): ND = 0'DJCF
10200 IF LEN(N$) < 2 THEN 10300'EKTW
10210 FOR KL=1 TO LEN(N$)'EHLX
10220 : NN$ = MID$(N$,KL,1)'CNNY
10230 : IF NN$="" THEN 10290'DJYY
10240 : IF NN$="-" THEN NL = 5
: LT = 1: GOTO 10280'GRIF
10250 : IF NN$="." THEN ND = 1
: NL = 1: LT = 50
: GOTO 10280'HWGB
10260 : NL = VAL(NN$): LT = 10'DNWE
10270 : IF NL = 0 THEN NL = 1
: LT = 2'FLJA
10280 : GOSUB 10020'BGKC
10290 NEXT KL'BCZD
10300 IF EZ$<>"E" THEN: IF ND = 0
THEN NL = 1: LT = 50
: GOSUB 10020'KVQF
10310 RETURN'BAQU
    
```

END

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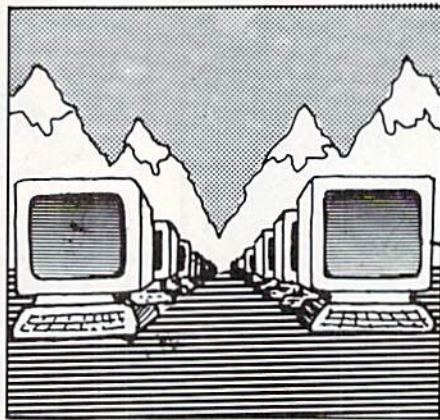
Previews of new products from the Valley—just released or in development.

When the former president of Syn-tech Corp, Donald Taylor, decided to form **Sonus** to produce and market MIDI products, his first priority was to create a MIDI sequencer for the 128. The extra memory and faster disk speed seemed natural for an enhanced sequencer.

Super Sequencer 128 features a librarian for saving system-exclusive program information from MIDI instruments. The set-up and editing commands include time-base transfers, punch, assignable velocity, delete, pitch wheel, mod wheel, sustain or volume changes, transposition, looping, channel assignment, muting, meter adjustment, OMNI off, and more. *Super Sequencer 128* will work with all of the major Commodore MIDI interfaces. This is a very hot package; check it out.

The very first game I ever played on my Commodore 64 was *Temple of Apsbai* from **Epyx**. I spent over 30 hours just mapping out the first level. I still have the map I painstakingly created. It came in very handy when I booted the *Temple of Apsbai Trilogy* on my Amiga. Fond memories returned as I began to explore for treasure and weapons, while fighting off creatures of the dark. The graphics and sounds are much better, while the mouse interface makes moving around simple. In the same vein from Epyx is *Rogue*, another classic adventure game, now also on the Amiga. The company will soon be releasing *Winter Games* on the Amiga, as well.

For the 64 are three new games from Epyx. *World Games* continues their award-winning games series with a new twist. You travel the globe, competing in games native to the country: for example, bull riding in the U.S., sumo wrestling in Japan, and cliff diving in Mexico. *Super Cycle* is a motorcycle racing game with



In Epyx's World Games, you travel the globe, competing in games native to the country.

vertigo-inducing graphics so real you will want to put your crash helmet on before picking up the joystick. *Championship Wrestling* reminds me of nights at the Olympic Arena in Los Angeles. It's a classic wrestling game where showmanship counts. But watch out, the crowd is very, very rowdy. Epyx is also releasing a professional-quality joystick.

SubLogic has just finished *Whole Brain Spelling*, a program to teach you how to spell. Positive user feedback through color graphics emphasizes the visual aspects of the learning process. Six different versions will be available: for children, *A Child's Garden of Words and Fairy Tale*; for teens, *General*; and for professionals, *Scientific, Medical, and Business*.

Activision has come up with a sequel to *Hacker* in *Hacker II: The Doomsday Papers*. Your expertise as a BBS hacker is needed to help the government uncover a plot to take over the U.S. Your mission is to find, recover, and deliver the "Doomsday Papers." A 64 version is first, with an Amiga version to follow.

Activision's Game Maker for the Amiga should be available by the time you read this, as well as library disks for the 64 version. The library disks contain pre-built theme parts for adventures. Topics will include sports and science fiction.

Since Activision acquired Creative Software, much work has been put into

the Creative line of programs. They are now being re-released as the Personal Choice software line. These are completely redesigned programs that are easy to use and inexpensive. *Personal Writer*, *Personal Filer*, and *Personal Planner* can use each other's files, and will be available as stand-alone programs or as an integrated package. Also new is *I Am the C128*, an introduction to programming in BASIC on the 128.

Clockwork Computers is finishing up the *Merchandiser* for the Amiga. This is an integrated package for job quotation, job order, sales transactions, inventory control and costing, sales forecasting, and business accounting.

Hippopotamus Software has just finished *Hippo Simple*, a database program for the Amiga. This is a file manager-type data base. Record format is designed on-screen, and each record can cover four screens. Sorts of up to 16 levels are available, as are arithmetic operators. *Hippo Simple* creates ASCII files and merges with *Hippo Word*, a word processor for the Amiga. *Hippo Word* can merge IFF graphics into a text document, creating a simple page layout program.

Access Associates has released *Alegra*, a 512K memory expansion for the Amiga. When one megabit DRAM's become available, it will be upgradable to two megabytes. A second version will also be available that cannot be upgraded. I don't usually talk about pricing in this column, since prices are the last thing to solidify on a new product. However, I can tell you that Access Associates intend to become the "Borland" of Amiga expansion products.

Anthony Studios has just released a printer driver for the Amiga that will control the Apple LaserWriter. They are also offering a set of programming utilities and a set of fonts for the Amiga-LaserWriter combination.

Aegis Development is releasing *Diga!*, a telecommunications package for the Amiga. It will support several protocols, including Amiga Binary and X-Modem. Multiple terminal emulations, macros and a telephone book will also be included. Aegis has also produced two "art pak" disks in IFF format for *Aegis Images* and *Aegis Animator*.

Datasoft is creating a new series of adventures called the Alternate Reality series. The first two will be *The Dungeon* for the 64 and *The City* for the Amiga.

Continued on pg. 65

Continued from pg. 64

Mindscape is introducing the first interactive movies for the Amiga called CinemaWare.

Mindscape will be introducing a new line of software for the Amiga called CinemaWare. Details are sketchy at this point, but here's what I've got. The programs are being described as interactive movies. One of the first titles is *Star Rush*. The music is being created by Mimetics (SoundScape), the art by Jim Sachs, the story line by Jerry Pournelle, and the programming by Bruce Webster. The other titles are *Defenders of the Crown*, a two-disk set, *King of Chicago*, *SDI*, and *Sinbad*. Some of the others involved in the project are Brian Brandenburg, Bill Williams and Doug Sharp. The story goes that when *Space Rush* is released, there will be a novel to go with it. This could be the beginning of a great new line of programs.

Cosmi will release *Super Huey II* for the 64 with six new scenarios. They will also release *Super Huey* for the Amiga. This is not a port from the 64, but an entirely new program from the ground up. One clue to the incredible graphics is that the development was done by the Electronic Design Group in collaboration with A Squared, developers of LIVE!, the video digitizer for the Amiga.

Batteries Included has shipped *Paperclip II* for the 64. They've finally added word wrap, the one feature I really missed. They also added a few other features, including an integral telecommunications program. You can toggle between word processing and telecommunications without dropping the carrier. There is also a 30,000-word spelling checker that can check an entire document in 40 seconds, with room for your own library of words. The speed is achieved with a turbo disk routine that also speeds file loading. Macros, multi-columnar layout, chaptering, and reverse video scrolling are added as well.

Batteries Included's spreadsheet for the Amiga features 1000 X 1000 cells, sparse matrix memory management, SYLK format file storage, and full math,

stat, and logic operators. *Paperclip Elite* for the Amiga is getting close, with new features being added all the time. A real-time spelling checker, idea processor, and the ability to integrate IFF graphics are planned.

Batteries Included will also port *Degas Elite* to the Amiga. This is a paint program originally developed for the Atari ST. *Homepak* has been enhanced for the 128 to take advantage of the expanded memory and fast disk drive. Faster switching from module to module, and larger documents and buffers are some of the new features.

Star Micronics has several new printers out. Of particular interest to Commodore owners are the Gemini II, PET ASCII-compatible printer with two serial plugs so you can daisy-chain additional devices on the buss, and the Star NL, and upgrade to the SG that uses plug-in modules for compatibility with various computers, including the 64 and 128. It has a new push tractor that eliminates paper waste, new front panel controls, and a much better NLQ font.

Finally, **Pacific Cypress** is developing a line of expansion products for the Amiga. They adhere to the new 100-pin standard, but Pacific Cypress has developed a novel approach to the high cost of large expansion boxes. They are marketing a two-board expansion box called the Xpander that attaches to the 86-pin buss on the side of the Amiga.

The first card they will market is a two-megabyte expansion board, socketed but empty of RAM chips. You can add either 1/2 a megabyte, one megabyte or two megabytes. The board is fully auto-configured and comes with diagnostics software. It will also have a 100 to 86-pin pass through to carry the buss on. You can put a second RAM expansion board in the box (with its own external power supply), or add their multi-function board. It will have a battery-backed clock calendar, parallel port, serial port, and a 300/1200-baud modem. There will also be a jumper for an additional SCSI port board (with SCSI hard disk driver software provided) that piggybacks on the multi-function board.

The expansion box has knock-out covers for all the possible ports you can add. Prices are not firm at this point, but the projected pricing places these products in the very affordable range. Not bargain basement, but well priced. The cost of Amiga expansion keeps getting

better.

For those of you who have been using *GEOS* and can't wait for more applications, here's good news. **Aegis** is working on *GEOScale*, *GEOSTerm*, *GEOSbase* and *GEOSBASIC*. Other third-party developers are also showing tremendous interest, and the 128 version of *GEOS* is nearing completion.

That's all for this month. Keep tuned for more news from the valley of melted sand.

Access Associates
491 Aldo Avenue
Santa Clara, CA 95054

Activision
2350 Bayshore Frontage Road
Mountain View, CA 94043

Aegis
2210 Wilshire Boulevard
Santa Monica, CA 90403

Anthony Studios
889 DeHaro Street
San Francisco, CA 94107

Batteries Included
17875 Sky Park North
Suite P
Irvine, CA 92714

Berkeley Softworks
2150 Shattuck Avenue
Berkeley, CA 94704

Clockwork Computers
4612 Holly Ridge Road
Rockville, MD 20853

Cosmi
415 North Figueroa Street
Wilmington, CA 90744

Datasoft
19808 Nordhoff Place
Chatsworth, CA 91311

Epyx
1043 Kiel Court
Sunnyvale, CA 94089


Hippopotamus Software
985 University Avenue #12
Los Gatos, CA 95030

Mindscape
3444 Dundee Road
Northbrook, IL 60062

Pacific Cypress
POB 14180
Fremont, CA 94539

Sonus
21430 Strathern
Suite H
Canoga Park, CA 91304

SubLogic
713 Edgebrook Drive
Champaign, IL 61820



TAKE OVER THE UNIVERSE!

BY SHAY ADDAMS

Manage your resources wisely, fend off alien invaders, and populate planets, and you, too, can rule a chunk of the galaxy with these games for the Commodore 64.

Strategy is the most important factor, for these are smart games. If you're not playing against other people, your opponent will be the program's own artificial intelligence.

It's a rainy day. As usual, there's nothing on TV. But with the boot of a disk you can escape this dreary planet and carve your own empire out of the stars—now, *there's* excitement; that's the way to spend a dull Saturday afternoon. But exactly how does a would-be space admiral take over the universe?

One planet at a time. First you dispatch starships to explore the nearest unknown planets. Next, colonists are sent to occupy the most suitable worlds and develop them while your other ships continue to probe stars further out. Your empire expands. Ultimately, you will encounter other beings bent on universal takeover, and the action shifts from exploration and expansion to intergalactic war against vast fleets of alien vessels. Strategy is the most important factor, for these are smart games. If you're not playing against other people, your opponent will be the program's own artificial intelligence.

Three games for the Commodore 64—*Berserker Raids*, *Reach for the Stars*, and *Imperium Galacticum*—offer distinct variations on this epic scenario. In each, the playing field is a screenful of stars, and the interface consists of a series of menus through which you enter orders and read the results of previous commands.

Berserker Raids

Berserker Raids shows a black and white sky whose ten stars are represented by asterisks and identified by numbers. It's the easiest game of this type to master and offers a good example of how the others are played.

The initial step is to build a few ships by accessing the "resource allocation" menu. You can divvy up your resource points between ship production, defense, and

technology, but at the outset will want to put them all into production. (The other factors determine the strength of a planet's defenses, and the technological level—therefore the effectiveness—of your ships' weapons, engines and other equipment.) When your ships are ready, you consult the star map for a destination and return to the command menu to issue orders with one-key commands: "T" for travel, in this case.

To capture a planet, you offload supplies and colonists there. After the required amount has been unloaded, a colony becomes a base where you can build more ships. You may choose to build merchant ships, battleships or four other kinds, and you can design your own by assigning design points to the ship's power drive, shields and other systems. These can be sent out to other planets, hopefully to found more colonies. When you have several planets in your empire, you cycle through them and issue orders one world at a time.

The enemy Berserkers—robot-controlled ships that are programmed to kill any living being—will eventually zero in on one of your colonies, and the combat phase commences. Only three of your ships can attack during a turn (one of the things that makes this game easy to learn), so you input your tactical decisions (speed, which weapons to fire, and so on) and watch an all-text screen report the effects of each phaser, missile and other weapons fired by both sides. This game has the best sound effects of any in its class, and they enliven the combat phase considerably. The game ends when one player takes over all the stars and planets. Success hinges on formulating a solid plan, shrewd distribution of resource points, and making effective combat decisions.

The game is easy to learn, but hard to beat. You can play a random set-up, in which the difficulty level is determined by setting parameters such as the number of ships each player gets to use and how soon they appear on the scene. There are also ten scenarios on the disk, designed by the eminent science fiction author Fred Saberhagen. (The game is based on his *Berserker* novels and stories.) In these scenarios, your ships are already in place and a situation report is provided in the hardbound manual. They can be played by one or two people, and the computer will become the Ber-

serkers in either mode.

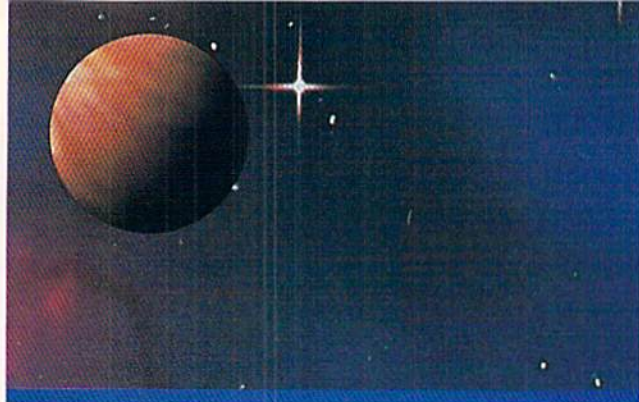
The only thing I don't like about this game is that the program is in BASIC, so it redraws the entire menu each time you make a selection, which can be irritating in a lengthy session. (There's no disk access, however.) *Berserker Raids* is a good introductory game, and even intermediate and advanced strategy gamers will find the ten scenarios challenging. The clear-cut documentation has instructions for a tutorial game and includes a short story by Saberhagen.

Reach for the Stars

This state-of-the-game program unfolds across a field of 54 stars that twinkle in high-res animation. The stars are classified by spectral class into red, yellow, blue and two other types, each circled by as many as three planets. In addition to factors for industry and technology, you must spend resource points to improve each planet's environment, society, defenses and other aspects. Formulating a satisfactory strategy is complex, and so is winning. Victory points are awarded at the end of each turn for colony development, starship battles, planetary conquest and colony destruction. A winner is declared after 20 turns, but you can keep playing until you've won or been left behind in the solar dust.

The streamlined interface lets you access a star's menus by typing its name or cursoring about the starfield, and all menu interaction is laser-fast. After you've mastered the basic game, play on a randomly generated star field and add some of the ten options: novas, natural disasters, solar debris, and six others that make this the most replayable of the lot. You can even set your own movement factors for the ships and choose your own victory conditions. One to four people can play. The computer opponent will play any empty positions, and can be set to one of three skill levels for each position. It also has color charts and other play aids as well as a tutorial game.

Sound effects are minimal, but the only thing I really miss here is the ability to customize the ships. You begin with Mark I ships, which all have the same movement and combat characteristics. When you advance to the next of the four tech levels, all new ships will be Mark II class—stronger and faster than Mark I



For those who demand more control over their starships, or who prefer the complexities of diplomatic intrigue, Imperium Galacticum is the best choice.

vessels, but they just don't include enough variety for my tastes. And you have fewer combat options: attack, take over a planet, and withdraw. But the machine-language program runs much faster than *Berserker* or *Imperium Galacticum*, the menus are easier to figure out and interact with, and there's no disk access—so this one gets my strongest recommendation.

Imperium Galacticum

Imperium Galacticum's starfield resembles that of the previous game, with five spectral classes of different colored stars but no animation and few sound effects. Some of the 50 stars may have one or two planets whose worlds are independent. Not controlled by any player, their allegiance must be won over through diplomacy. Game play follows the same pattern of switching between menus and the star map, but there's more to keep track of here. You have two kind of points—industrial and military—to spend, not just resource points. They're used to develop farms (to feed your population) and mines (for the raw materials to build ships), and to construct new ships and planetary defenses. Food and ore are automatically transported between planets if you have enough trade ships. Achieving a balance between these diverse activities presents a formidable task best tackled with a pocket calculator and plenty of scrap paper.

Imperium Galacticum's most intimidating aspect is its complex and confusing system for establishing new colonies, one that makes it nearly impossible to accom-

plish without having every last colonist starve to death; it takes hours to figure out a formula for doing so, even if you follow the one in the manual. It also takes hours to figure out the manual, which is among the most incomprehensible I've seen. And disk access is frequent and time-consuming in this BASIC program, which was compiled with Insta-Speed to run fairly fast. (Except when you're fighting a major space battle with a lot of ships, in which case the program often takes a minute or more to make up its mind.)

So why would anyone even consider *Imperium Galacticum*? Because it gives you the most in-depth control when building a fleet and taking it into battle. There are five standard kinds of ships, and three sizes of each. You can design and name your own classes by assigning points for energy weapons, missiles, evasion ability, and five characteristics. Space admirals who like to focus on "star wars" will enjoy more precise control over their fleets, as up to 255 ships can be assigned to each task force, and task forces are easily split up, joined, and otherwise manipulated. Instead of being limited to moving a task force and attacking or withdrawing, you may order it to perform one of eight missions, such as intercepting an enemy's trade ships. You've also got to take them in for repair, or to upgrade old ships to a higher tech level. Armies can be landed to attack a planet's defenses, and guerrillas may appear after you've captured a world. (All this is reported in a variety of all-text screens, of course.) When viewing the star map, a spaceship shows which player's ships are in each star system, a helpful feature unavailable in the other programs.

During each turn, you get to decide whether to adopt a hostile, friendly or neutral stance toward each opponent; you may also negotiate in hopes of convincing them to change their position toward you. This introduces an element of diplomacy that is missing in the other games—one that is significant if you expect to play against people more often than versus the computer. Up to four people can play, and the computer players can be set to one of four skill levels, but they can't be set at different levels as with *Reach for the Stars*. Random star maps can be created for any game. As with the others, a game in progress can be saved and contin-

ued later. For those who demand more control over their starships or who prefer the complexities of diplomatic intrigue, *Imperium Galacticum* is the best choice, despite its shortcomings in other departments.

Regardless of which vehicle you select, remember: You don't have to wait for a rainy Saturday afternoon. Taking over the universe is a lot of fun any day of the week. **C**

Rather be a Captain than an Admiral?

If running an intergalactic empire sounds like too much work, try a strategy game that puts you in charge of a specific task within the starfleet. In *Psi 5 Trading Company*, you captain a cargo ship that must deliver perishable goods to a distant galaxy. From a roster of 30 candidates, you select five crew members. The animation and sound effects are top-notch as you punch in one-key commands orders to the crew while space pirates attack on all sides. Figuring out which part of the damaged systems to repair first is only one of the many decisions you'll have to make in a hurry in this high-pressure game whose only weak point is the lack of a save feature.

In *Cosmic Balance*, you design your own ships by allotting points to various systems—lasers, engines, armor—in a series of all-text menus. Then your designs meet the ultimate test as you take the helm in semi-animated combat with computer-controlled cruisers and dreadnoughts. One or two can play, choosing from six scenarios. **C**

Manufacturers

Berserker Raids:

Simon & Schuster
Gulf and Western Building
New York, NY 10023

Reach for the Stars:

Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404

**Imperium Galacticum
and Cosmic Balance:**

Strategic Simulations
1046 North Rengstorff
Avenue
Mountain View, CA 94043

Psi 5 Trading Company:

Accolade
20833 Stevens Creek
Boulevard
Cupertino, CA 95014

Inside Amiga Software Development

A leading developer of Amiga software talks frankly about the excitement—and pitfalls—of creating software for a new operating system.

In recent months, there has been a lot of discussion about developing software for the Amiga: how easy or hard it is, the problems encountered by some developers, and the level of support given to developers. To get the inside story on these issues, I talked with William Volk, Vice President of Technical Operations at Aegis Development and the programmer of *Aegis Draw*. (Aegis also developed *Images* and *The Animator* for the Amiga. All these products were reviewed in *Commodore Power/Play*, August/September, 1986.)

Volk is in charge of all programming projects at Aegis, and also heads the technical evaluation team that examines products for potential acquisition. He holds degrees in physics and astronomy, and prior to coming to Aegis, worked as a programmer for a number of major publishers.

Leeds: There's been a lot of discussion by developers on what it's like to program on the Amiga. Some have complained that it's a very difficult machine to work on.

Volk: I think there are three classes of developers on the Amiga. There are people from the Mac world like us, people from the IBM world, and people from the C64 world. I think that the developers with Mac background have an advantage in that they understand how to handle events, menus and windows. The C64 people have the hardest time of it since they have never dealt with this kind of



operating system before. The IBM people are OK since they've dealt with C programming before, but they still have problems understanding how to handle windows and such.

Leeds: How did you solve the design problems then?

Volk: We used a file requester designed by someone else. It was written for Aegis by Charles Heath (of *TexEd*). With most file requesters, you have to wait for all the files to be read in, but with this one the files are displayed as they are being read, and the moment you see the file you want you can just click on it and off you go. The original version was written in Lattice C, and had been put into the public domain. Aegis paid Charles to write a version in Aztec C, and part of our agreement was to also put that version into PD. The version used in *Draw* has some small modifications, mostly relating to titles.

Leeds: Some developers have been doing their development on other systems and porting or cross compiling. *Aegis Draw* was produced on the Amiga. Why?

Volk: We started doing native-mode development because it was easier to test code. Instead of having to drag disks over every time we did a compile, it was simpler to do everything on the Amiga. However, as the program got longer, the compile times got longer, and it became ridiculous to keep doing things in that fashion. That's when we got lucky. We

became involved in a beta test of the Aztec C in November. We were sort of forced into that because we needed to use the fast floating-point math library on the Amiga, and the only way to get across to it was either to use Aztec C or do development on a Sun computer.

Leeds: Wouldn't it have been easier to work on a system you had more familiarity with?

Volk: Having your developers work on the machine may be painful at first, but they will learn a lot faster, and they won't put up with as much. If there's a bug in the software, they will get it fixed that much faster.

Leeds: What about problems with the operating system?

Volk: As far as the operating system, it's OK. I don't think that there are any bugs left that are real show stoppers. Version 1.1 is pretty reliable.

Leeds: What are you using for a text editor on the Amiga?

Volk: Believe it or not, I still use ED on the Amiga. I prefer it to any of the other editors I've used. Partly because I used ED while in grad school—almost the same ED as on the Amiga. I also like the access to the command-line interpreter that ED allows.

Leeds: You mentioned you were using Aztec C. Wasn't it risky to use a new piece of development software on a new hardware system?

Volk: In the beginning, there were bugs

AMIGA UPDATE

in Aztec C. We probably found more than anyone else, since we had a lot of programs in-house that we used for development. We had printing utilities and communications utilities that we developed in-house, and we moved all of these over.

Leeds: Some developers have commented that early development for the Amiga was like following a moving target. The operating system kept changing every few weeks.

Volk: I was lucky, I started with the Exec 28 operating system. I think the people that had the worst times with the Amiga operating system were those who started way back. I knew people who were developing on Exec 20, before there was a real operating system. Those people had a terrible time. That was before Intuition, and then it suddenly appeared. I purposely did not get involved in development until after the developer's conference in May, 1985. Even then we did not get our machines until August. We basically spent our time with Exec 28 and 29 learning the Amiga. We stayed with Version 1.0 until January of this year and have had no problems with 1.1.

Leeds: Then you have no complaints at all with 1.1?

Volk: There are still some design decisions that need a work-around. For example, text requesters. There is no way for a programmer to make a text requester come up active. That is, you still have to move the cursor into the box and click the mouse. You could force-feed events into the system to simulate cursor movements, but there is no clean way to do it in programming.

One thing we learned programming on the Mac is that when a new machine comes out, you do clean programming—you toe the line on "official" programming. You do things in a system-oriented way so that you are protected when a new version comes out. If you write directly to hardware, don't use their menus and other system supports, you're crazy—asking for trouble down the line.

Leeds: What about the manuals? With all the changes to the operating system, was the documentation up to date and was it useful?

Volk: There's been some talk that the documentation for the Amiga was not very good. That's just not the case. It's all relative. Certainly the documentation that came with the Amiga when we first received it was much better than the

documentation that was available for the Mac when it first came out. In some instances, the Amiga documentation is still better. The Mac's is not as well organized, and the Amiga documentation is much better as a tutorial. You can read one Amiga manual and start writing programs. On the Mac, you had to read every manual to get started, because every section depends on every other section. That, by the way, is not due just to the way the manuals were laid out, but also has to do with how the Mac works. The Amiga is much more Unix-like. Message handling and multi-tasking are well understood.

"End users should recognize that on a multi-tasking system, the whole system is only as safe as the weakest program."

Leeds: What were some of the advantages you found in developing for the Amiga?

Volk: We knew what was going on in hardware in the machine and took advantage of it. We use a lot of multiple windows, hardware fills, and so on. I am amazed by how many programs that are out that do not use the hardware. It's not hard to do; you just have to call the operating system properly. A lot of people are porting code from other machines, and rather than take out their routines that duplicate functions supported in hardware on the Amiga (which would speed up the program), they just leave them in. That happens all the time. It's called lameware.

Leeds: Electronic Arts came up with a standard file type (IFF) for data files on the Amiga. I know you are supporting it in your software, but I have been hearing that it is not the answer to everyone's needs.

Volk: One of the problems with IFF is that there is no way to know if a file is the type you want without opening the file. Our animation program uses file extensions as a way of knowing what type of

file a file is without opening every file on the disk. There should be a way of telling. Maybe there is one and we just haven't found it yet. Certainly putting each file type in its own drawer would be one answer, but then there are problems with path names.

Leeds: Anything else?

Volk: There are some types of files that should be stored as text. Scripts in our *Animator* package are stored as text, and I think that makes a lot of sense. It lets you go back and edit them outside of the program, and it lets developers who want to develop third-party programs that work with *Animator* do so very easily. We also use text files to store *Draw* files. We are going to publish the structure for *Draw* files so that third-party developers can use them in their own programs.

Leeds: Why are you using text files for *Draw* files?

Volk: The 68020 hardware add-ons are very important to many people. We wanted to make sure our software works with them, not just for the few people who may use them now, but for future upgrades to the Amiga. We wanted to be certain our software would be upwardly compatible.

The 68881 uses the IEEE math, and the goal will be that the Amiga will sense the presence of a 68881 and support it using the IEEE math library that was added to Version 1.1. That would be better than calling the 68881 directly. Fast floating-point is a different format than IEEE, and in the base Amiga it runs about 20 times faster than IEEE. That's very important since most people will have base machines. When you add the 68881 and use the IEEE, it's about five times faster than the fast floating-point, and it's also a little bit more accurate. But it's a different format. So we had a quandary—what to do about *Draw*? We solved that by using text format for *Draw* files. That way when we add the support for the 68881, the user will be able to use their existing files. If we had stored them as binary files, it wouldn't have worked.

Leeds: Some developers are saying that the Amiga's multi-tasking capability is a mixed blessing. They have mentioned problems with memory allocation and de-allocation, "holes" being left in memory, and out-of-memory crashes.

Volk: There are two basic schools of thought on memory allocation. One way

Continued on pg. 127

DELUXE MUSIC CONSTRUCTION SET

*Professional Music
Composition and Scoring
with Amiga*

BY PEGGY HERRINGTON

Still under development when this article was written, EA's Deluxe Music Construction Set should be on the shelves by the time you read this.

Electronic Arts' *Deluxe Music Construction Set* for the Amiga is a serious music-composition and scoring program designed for professional use. Since the Amiga is already both a versatile musical instrument and a sophisticated MIDI controller, this kind of utility is extremely useful for getting the most out of its music capabilities.

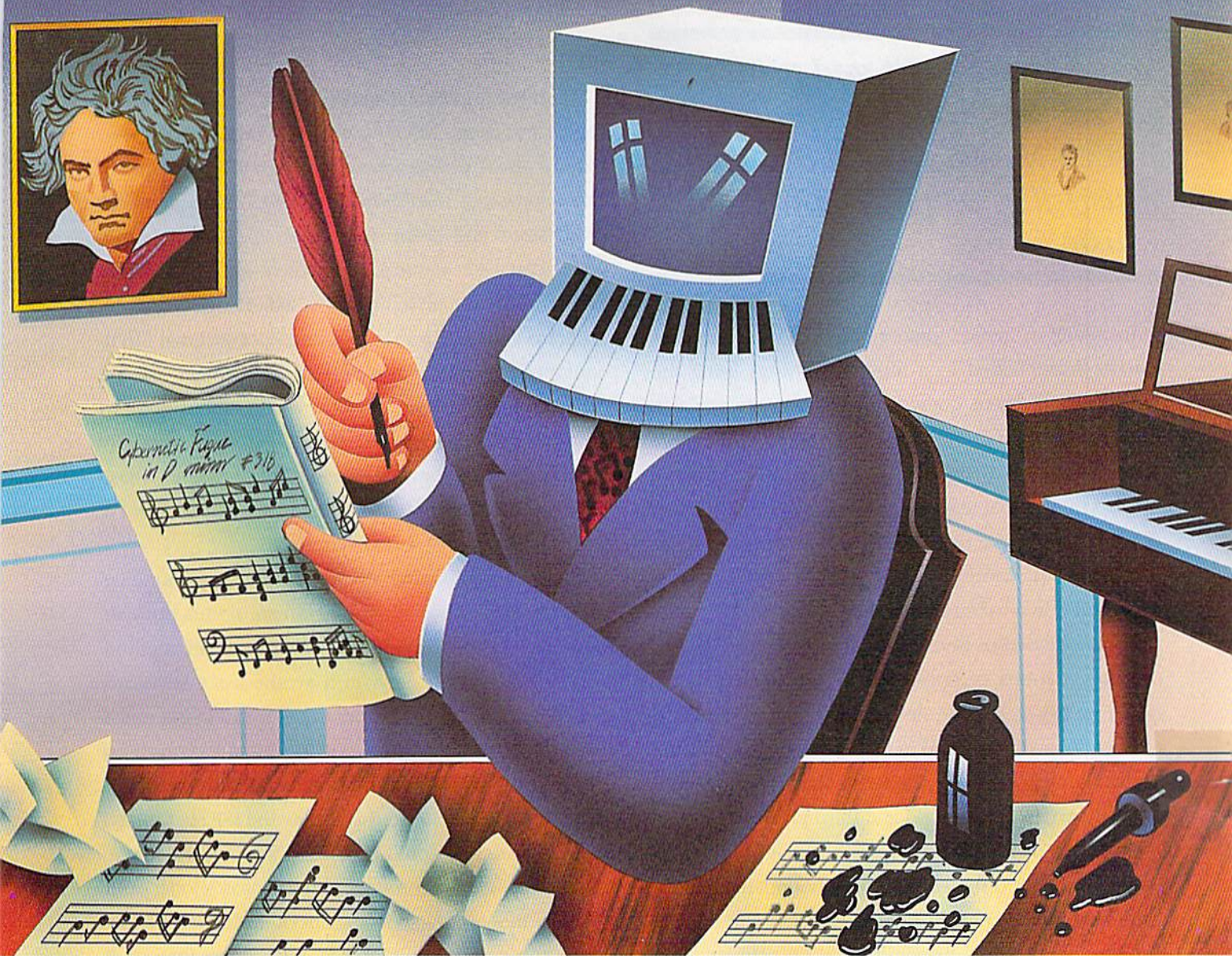
At start-up, three windows are displayed. One contains a palette that holds musical supplies rather than paint, one holds a blank score, and the third displays a six-octave piano keyboard.

The palette displays the basic tools of standard music notation: notes and rests from whole to 32nd-note du-

rations, the dot used for extending those durations by one-half, sharp, flat and natural signs, and options for directing note stems up or down and creating triplets or five notes in the place of four. Eight dynamic settings (from ppp to FFF) are available from the palette, and volume levels for the Amiga's four sound channels may be controlled independently through one of the program's many pull-down menus or established for each of two musical tracks on every staff. Also on the palette are a select button and a text icon.

The score window displays a musical grand staff with treble and bass clefs. This can be reconfigured to a maximum of eight individual staves. Each staff has two rhythm tracks (indicated by note stems going up or down) for a total of 16, each of which will accommodate up to six notes. Staves can be played or printed in-





dividually or in combination with any of the others.

Preprogrammed music compositions on disk will be provided with *Deluxe Music*, but their titles and number have at this writing yet to be decided. A scrollable listing will let you choose from among them. You can also edit and print music files from Electronic Arts' *Instant Music* program for the Amiga, as well as other music files which follow the IFF music format.

Entering Notes

There are two ways to enter music notation in *Deluxe Music Construction Set*, both based on the Amiga's mouse. A third method may be added, according to Geoff Brown, who, with John MacMillan, is designing and writing the program. From the palette on the

screen, you select a symbol with the mouse pointer and carry it over to the score. If that symbol is a note, its corresponding pitch will sound as it is moved up or down the staff. Once in position, you simply click the mouse button to enter it. A series of like symbols (notes of the same duration, for example) may be placed on the score without returning the pointer to the palette.

In the second note-entry method, notes and chords can be entered with the mouse from the piano keyboard on the screen. You indicate the position on the score and enter a note by touching the mouse pointer on a key on the piano keyboard and clicking the select button. In chord mode, notes are stacked vertically until you move to the next position on the staff. With this method of entry, the Amiga function keys are used to enter the duration of each note, chord or rest.

You can also edit and print music files from Electronic Arts' Instant Music, as well as other music files which follow the IFF music format.

In addition, music notation that has been entered can be manipulated in a number of ways using the mouse. Standard cut, copy, paste and clear are available from a pull-down menu along with "undo," which will get rid of the last thing you did. Also on the palette is a "select" button that lets you draw a box around a group of notes and move them horizontally or vertically on the staff or perform group operations with functions from pull-down menus. Their stems may be flipped or they may be tied or beamed—yes, real beamed groups of notes. Groups of notes may be transposed up or down by half-step, scale or octave, slurred or made to crescendo or diminuendo in amplitude, and their durations doubled or halved. Basic chords may be inverted up or down, in first, second and third positions.

Another pull-down menu gives access to operations that can be performed at measure boundaries. These include standard musical repeats and first and second endings as well as changing clefs, instrumentation, overall tempo, time and key signatures.

Instrumentation

The instrumental voices provided with *Deluxe Music* are the same as those included in Electronic Arts' *Instant Music*. They are numerous, and since many of them are digitized samples (actual recordings), they show off the Amiga's ability to mimic acoustic instruments—drums, guitar, piano, horns—with astonishing accuracy. Each staff will accommodate a different instrumental voice, and all voicings may be changed at measure boundaries. Brown says there is a very good possibility that digital samples recorded with Mimetics' SoundScape sampling device (and possibly others) could be used as instrumental voices by the Amiga when playing *Deluxe Music* scores.

MIDI

A limited implementation of the Musical Instrument Digital Interface (MIDI) standard is incorporated into *Deluxe Music Construction Set*. MIDI is the communication protocol that allows different brands of music synthesizers and drum machines to perform together under computer control. It is present in *Deluxe Music* as MIDI OUT on all 16 channels, which means that the program will synchronize the timing of external MIDI-equipped devices connected to the Amiga via the Amiga MIDI interface, and allow compositions of up to 36 simultaneous notes to be played by a properly equipped MIDI music system. Thirty-two of these notes are played by external instruments and four by the Amiga's internal sound system.

A possibility Brown discussed was incorporating MIDI IN capability into *Deluxe Music* scores from an external synthesizer in step-time (a two-part method involving pressing a key on a synthesizer's keyboard and then entering the duration). It would also mean that musical sequences entered in real-time (played on a keyboard) with Mimetics' SoundScape MIDI sequencing program (and others that follow the IFF file format) and saved to disk could be loaded into *Deluxe Music* and then edited and printed with the professional print qualities this program offers. Check with the distributors of these products if MIDI IN features are important to you, since Brown was not sure at this writing if this would be a part of *Deluxe Music*.

The instrumental voices provided with the program show off the Amiga's ability to mimic acoustic instruments with astonishing accuracy.

Playing Music

I asked Brown what would happen if the Amiga were instructed to play one of those lush 36-part scores, or any score involving more than its own four sound channels, singlehandedly. He explained that the

first criterion *Deluxe Music* uses is amplitude: It will play the four loudest notes and ignore the rest. (Remember, the volume may be set for each note individually or for each of two musical tracks on all staves.) If you fail to differentiate notes by volume (if they are all the same, for instance), Amiga will play the lowest note along with the three highest notes of any given chord.

Rather than scrolling, a screen display of a *Deluxe Music* score is erased after being sounded and quickly replaced by the next section. Brown says the Amiga does this so quickly that you don't miss anything. Small red boxes can be made to flash over noteheads as they sound and keys on the piano display can be highlighted. Gadgets allow the window containing the score to be resized to fill the entire screen. This can be done at any time, but it's particularly useful during play to fit more notation on the screen.

The overall volume and tempo of the music are set with options from pull-down menus, as are start, stop and resume play. A tap on the space bar during play stops the music and automatically displays the notation at that point in the score. This is an aid in finding and correcting errors. And you can designate a section of music and have it sounded repeatedly while you edit it on the screen as it plays in real time.

Printing Scores

A score set-up window (which Brown says may be two windows before they're finished) lets you reconfigure the score for either the screen display or a graphics printer. Besides specifying key and time signatures, you can set the width of the window or paper and specify the number of measures (from one to ten) to be included on each line. You can also extend or shorten measure and override proportional note spacing.

Through use of the text icon on the palette, lyrics can be typed in and non-sounding symbols can be added to the score. According to Brown, by using a font editor (a separate program not provided with *Deluxe Music*), you can also design such symbols as trills, double sharps and flats, unusual clefs, guitar tablature and chord symbols, and use them in printouts of *Deluxe Music* scores. You can arrange to music to suit yourself on standard 8-1/2 by 11-inch paper (or any size

your printer will accept) and accommodate lyrics and symbols above, below or between the staves. Attention to set-up details prior to entering the music notation will let you print out separate musical parts for various instruments along with entire scores for the conductor—or a relatively simple piano transcription.

CODA

The ability to print full pages of standard music notation with groups of tied and beamed notes and individually directed stems, including lyrics and special music symbols, is something that many Commodore Amiga musicians will appreciate even if they don't tap

Deluxe Music provides MIDI OUT on all 16 channels, which allows compositions of up to 36 simultaneous notes to be played—32 by external instruments and 4 by the Amiga's internal sound system.

the MIDI performance powers of *Deluxe Music*. That it will play the internal Amiga voices along with those produced by external MIDI-connected music synthesizers and accommodate standard IFF music files saved from other music composition programs makes *Deluxe Music Construction Set* one of the most powerful and flexible programs yet to be developed for the Amiga. Geoff Brown and John MacMillan also created and programmed *Deluxe Music Construction Set* for the Apple Macintosh. Amiga *Deluxe Music* is similar in design and operation, but it is a fresh programming effort (in C) and offers color screen displays and, according to Brown, runs significantly faster, thanks to the Amiga's custom blitter and sound chips.

Deluxe Music Construction Set is one of a series of Amiga programs from Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404, (415) 571-7171. Others include *Deluxe Video Construction Set*, *Deluxe Paint*, and *Deluxe Print*.

HOW TO TO A HIGHER



THE COMMODORE 128.

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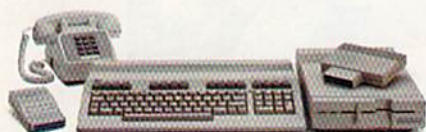
To run all that software and run it faster, you'll want the 1571 Disk Drive. You can't find a faster drive at the price. It transfers nearly 1,000 words a second (5200 cps), so you can load most programs instantly. And you'll save space as well as time because the 1571 holds up to 410K of data, the equivalent of 200 typewritten pages.



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Looking good in print could be your next move with the MPS 1000 Printer. It's a new dot matrix printer designed to make the most of the 128's high-resolution graphics because sometimes pictures speak louder than words. But it's no slouch when it comes to words. The MPS turns out about 1200 words a minute (100 cps) of draft-quality printing, or gives you near-letter-quality printing at nearly 240 words a minute (20 cps). And you can choose printing styles, use international characters, even make up your own symbols.



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COMMODORE 128 PERSONAL COMPUTER
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Vestor

Make shrewd investment decisions based on the information and analysis available from this data base of over 4,500 stocks, options, futures, and market indexes.

Vestor is not simple an investment program, but rather an on-line investment advisor consisting of over 30 specialized programs to retrieve and evaluate data from a data base of over 4,500 stocks, options, futures, and market indexes. This data base is updated daily, and since all of Vestor's software is on-line, the only program you need to run it is your own communications program. When you subscribe to Vestor, you receive a well organized user guide that explains how to get the most from Vestor's programs and includes a glossary of terms used by the system.

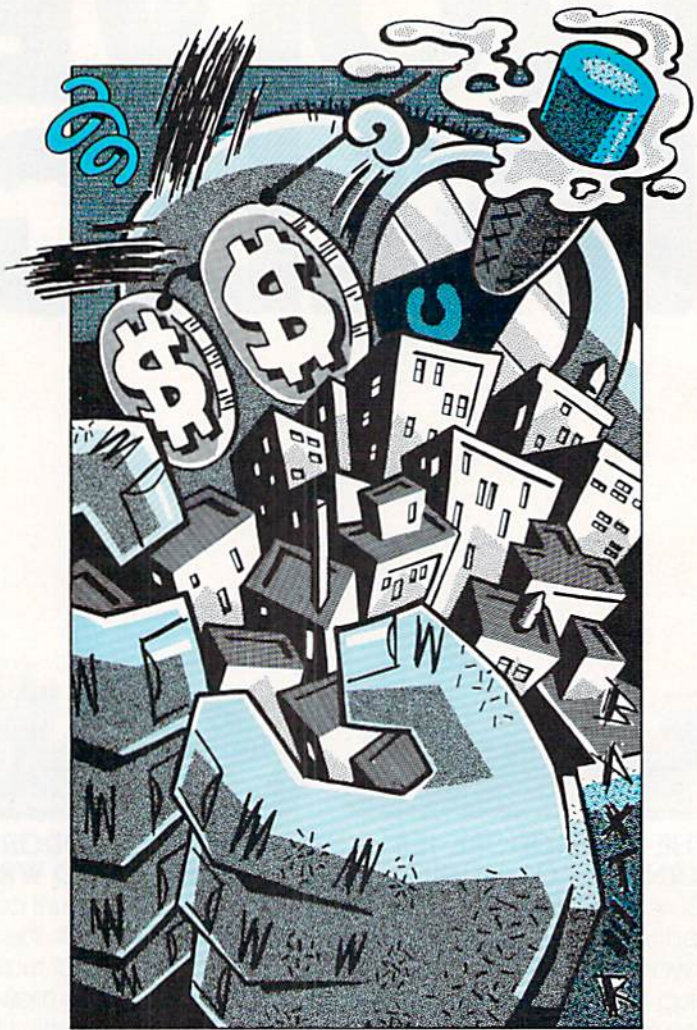
In addition to providing data on past performance of investments, Vestor can also predict the future performance of stocks and generate lists of from 10 to 100 of the top- and lowest-ranked stocks based on their Investment Strategy Rating (ISR). The ISR is a theoretical prediction of the percentage that a stock will appreciate or depreciate over the next 6 to 24 months, based on a combined fundamental and technical rating.

One of the most welcome features of Vestor is that it is menu-driven and, therefore, fast and easy to use. The main menu is divided into six sections, each containing from four to nine individual programs: Stocks, Options, Futures, Averages, Information, and Retrieval. Specific programs are accessed by entering two-character codes and, because of the speed of Vestor's mainframe computers, programs usually load within five seconds of selection.

The most commonly used program in Vestor's Stocks area is called Evaluate. As its name implies, this program helps you to evaluate selected stocks and portfolios by providing a detailed report that includes performance predictions, ratings, and buy/sell signals, as well as standard information such as price/earnings ratio, annual dividend, and yield. Not only will the Evaluate program give you this type of data on individual stocks, it also combines projected data on all the stocks you evaluate to forecast the overall gain or loss on your portfolio over the next 6 to 24 months.

Other programs in the Stocks area include Screen, which searches Vestor's data base to find specific stocks that, based on 13 variables that you select, fit your investment criteria; Chart, which helps you determine the best times to buy and sell by producing bar charts based on up to 45 weeks of price behavior for specific stocks; and Select, Vestor's pick of five of the most promising stocks for the week.

Similarly, Vestor's Options section contains four programs to assist you in making buy/sell decisions. Opplot, for exam-



ple, produces daily bar charts of stocks that carry underlying options and displays possible buy/sell points for day trading. Opchart works in much the same manner, but also generates minor, major, and super buy and sell signals based on mathematical calculations of a stock's volatility. Like many of Vestor's programs, Opchart can show you the percentage of profit or loss that would have been realized if its past recommendations were followed. Other Options programs are Opchart2, which allows you to enter an up-to-the-minute stock price for evaluation; and Opmodel, which displays performance statistics on a sample portfolio created by Vestor for comparison with your own portfolio and to suggest possible diversification for your own holdings.

Vestor's Futures programs provide the same types of graphic information to aid in trading decisions of commodities as the Stocks and Options do for the buying and selling of stocks. In addition, the Futures section also includes Comsense, a daily overview of the commodities markets provided by the *Financial Times of London*. Whether you trade in metals such as gold, silver, copper, tin, lead and zinc, or tastier futures like sugar, coffee and cocoa, Comsense can provide you with the news and commentary you need to help you make informed investment decisions.

Continued on pg. 79

TELECOMMUNICATIONS

Continued from pg. 78

By using on-line time wisely and making shrewd investment decisions based on the information and analyses available through Vestor, you should be able to make Vestor pay for itself.

To assist you with trading decisions and help you predict general market trends, Vestor's Averages area provides standard-format reports on Dow-Jones, Standard and Poor's, and New York Stock Exchange Composite averages. If you are considering investment in gold, you can generate similar reports based on London gold prices by selecting Gold from the Average menu.

The Retrieval programs available through Vestor let you do just that—retrieve information on the daily and weekly closing prices for up to 295 days or 55 weeks. Similarly, daily closing prices and trading volume data are available for options and commodities. Two other Retrieval programs, Myrecord and Mylist let you record your own transactions and store lists of portfolios you are monitoring. This list can then

be called up automatically as input into other programs, thus saving you entry time.

Finally, Vestor's seven Information programs tell you some of the things you need to know to get the most from the system. Besides basic instructions for using the system, the Information section also features a list of useful phone numbers such as direct-line and Telenet access to Vestor as well as the Vestor customer support line; a mail program that lets you send electronic mail; a listing of the days and time individual programs are updated; a performance history of Vestor's basic programs; and a breakdown of costs for using each of the programs along with Telenet charges.

Initial registration for Vestor costs \$295, plus a \$24 monthly fee. While the cost to use individual Vestor programs varies and is subject to change, typical charges range from \$1 per stock for the Evaluate program, to \$3 per run for Comsense. Also, if you access Vestor through Telenet, you will be billed an additional 20 cents per minute while on-line.

Consequently, you don't have to be a stock broker to see that charges can quickly mount. By using on-line time wisely, however, and making shrewd investment decisions based on the information and analyses available through Vestor, you should be able to make Vestor pay for itself.

Investment Technologies
510 Thornall Street
Edison, NJ 08837-2212
800-524-0831



Q-Link Update

Prepared Each Month by Quantum Computer Services

Welcome to the Q-Link Update! Q-Link is the easy-to-use affordable telecommunications service designed especially for Commodore computer owners. Q-Link continues to add interesting new features to its line-up of services, and we'll keep you up-to-date with this column.

New Travel Service

One of the most exciting new Q-Link additions is the Eeasy Sabre travel service, which is being provided by American Airlines. Travel agents around the world use the popular Sabre system to check schedules and book reservations. Now with Eeasy Sabre, families can tap into that same computer system from the comfort of their own homes to get the most convenient flights and the lowest possible fares.

Eeasy Sabre is an easy-to-use menu-driven system. You'll be asked to identify the departure and destination cities, the

date you're planning to travel, and personal preferences (time of day, specific airlines). The computer will then check all the available flights on over 300 different airlines, and a few seconds later a list of all the flights that meet your criteria will be displayed. You can then instruct Eeasy Sabre to book the most convenient flight. Your reservation will be confirmed while you are on-line, and you can then pick up your tickets at the airport, at a local travel agency, or have them sent to you by mail.

Eeasy Sabre has an option called Bargain Finder that is especially useful, because it will find you the lowest possible fare. Since airlines change their fares almost daily, and there are dozens of different types of discount fares, the Bargain Finder option comes in handy. With a little advance planning and Eeasy Sabre, you can save money on your next business trip or vacation. You can also reserve hotel rooms and rental cars.

Learning Center Enhanced

Now that school is back in session, you'll find the Educational Software Library on Q-Link of interest. Hundreds of

helpful programs are available, including the complete collection of public domain educational software published by Commodore. Whether you need some help with your math, spelling, history or English lessons, you'll find a program to assist you. Programs on Q-Link have been reorganized to make them easier to find and download.

Also new in Q-Link's Learning Center is a new section called The Resource Center, which is an excellent source of instructional information and software for teachers and parents.

Live Auditorium Events

The Q-Link Auditorium continues to offer live forums with leading Commodore experts like Jim Butterfield, Steve Punter and Jim Oldfield, as well as representatives from Commodore and independent software companies. These forums provide Q-Link members with the opportunity to chat with experts and ask them for help or information.

(If you would like more information about QuantumLink, you can call Q-Link Customer Service at 800-392-8200.)

How to Build a Lie Detector

Game Port Tutorial, Part 1

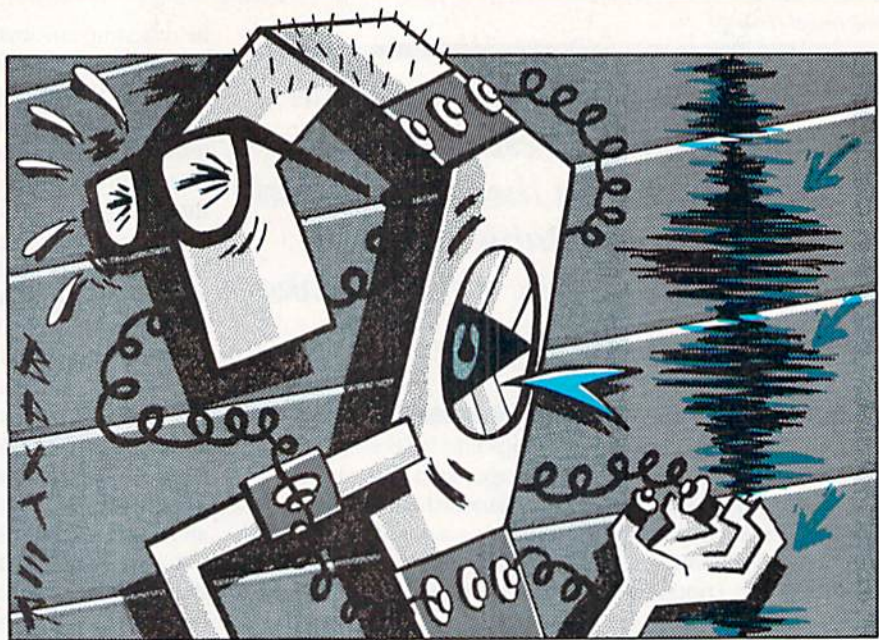
This is the first in a series of articles to help you understand the game ports on your Commodore 64. You will learn how to access the game ports using programs and peripherals.

As you know, the game ports are the two ports in front of the power switch on the right-hand side of the computer. You may presently call them joystick ports, because this is where you plug in your joysticks. But that does not accurately convey the wide range of functions these connectors have. You can also connect a touch pad, paddle, or light pen.

In this article, you will construct a simple interface, and then, using a pencil, sheet of paper and a short computer program, perform an experiment to see how easy it is to access the paddle function of the game ports. In the future, you will learn to construct a foot joystick, a video digitizer, a light pen, and a morse code receiver, and use these peripherals to study the other functions of the game ports.

The requirements for this series are few. You'll need an elementary knowledge of BASIC programming, and a familiarity with assembly language will also help. You will also need access to hand tools like a screwdriver, wire cutters, hand saw, and soldering iron.

The emphasis here is simplicity. There will be no complex construction or programming for you to do—just the basics. The complexity comes later as you use your knowledge to design your own projects.



The Ports

The game ports each have nine pins arranged in a D-shaped connector. A schematic of the connector is shown in Figure 1. This view of the connector assumes that you are looking at the port as it appears on the computer. Descriptions of the functions are in Table 1.

Accessing the game ports through software is relatively simple. Table 2 summarizes all the memory locations. Needless to say, unless you are already an expert in programming with these ports, this table won't make much sense to you. But by the end of this series, you should fully understand how to access each of these functions.

Making Your First Peripheral

The first step in constructing your peripheral is to collect the parts. You can purchase the electronic parts at your nearest Radio Shack store. You will need a nine-pin female D connector (part number 276-1538), a hood for the connector (part number 276-1539), and a spool of 22-gauge standard wire (part number 278-1296).

To make the interface, cut two 3-foot lengths of wire from the spool and strip about 1/4 inch of insulation from one end of each of these wires. The wire is very fine, so be careful not to cut the wire while stripping the insulation. Carefully solder one wire to pin nine of your connector and the other to pin seven. Next, remove about 1/2 inch of the insulation from the free ends of the wire and melt a little solder on them to stiffen the

ends.

Your peripheral is almost finished. You need only to make one further component. Get a piece of plain paper and a pencil. The pencil should be soft lead, no harder than a number two. Draw a rectangle on the paper about 1 inch wide by 6 inches long, and color the rectangle with your pencil. Be sure that you cover the rectangle thoroughly. Don't color it too darkly, because you can always darken it later. It also looks better if you stay inside the lines.

It is a little known fact that the lead of a pencil is electrically conductive. However, unlike copper wire which conducts electricity freely, pencil lead does not. Rather, it has a property known as resistance. Resistance simply means that the pencil lead inhibits the passage of the electrical signals. The paddle port works the same way: It measures the amount of resistance of the peripheral.

The paddle port contains an analog-to-digital converter. Simply put, it converts a voltage (in this case zero to five volts) to a number between 0 and 255 handled by the computer. A five-volt signal generates a value of 255, while zero volts generates a value of zero. Voltages between zero and five generate a proportional value from the converter.

The rectangle of pencil lead on the paper is actually a resistance strip, and the greater the amount of lead on the paper, the lower resistance of the strip. There is, however, a median value of the thickness of the pencil lead for this strip. Too little,

TECHNICAL TIPS/LIE DETECTOR

and the resistance change will be spread over too short an area, too much and the maximum allowed change in resistance will be longer than the suggested strip. You will test your resistance strip to determine how much more lead you will need to color on later.

The Program

When you have constructed your peripheral, type in and save Listing 1. The program tests the median value of the resistance strip by displaying a bar graph on the screen. Now plug the connector you made into game port two (port closest to the power switch) and run the program.

After a brief delay, you should see a bar of 39 asterisks displayed on the screen. Touch the stiffened ends of both wires to the strip of pencil lead, and you should immediately see another shorter bar of asterisks. Your rectangle of pencil lead is about right if you see only one or two asterisks when the wires are nearly touching, and 39 asterisks when the wires are 3 to 4 inches apart. Keep adding more pencil lead to your resistance strip until this happens.

Here is a line-by-line description of the program.

100	Clears the display screen.
110-140	Reads the machine-language subroutine from the DATA statements and stores it at memory location 49152.
150	Defines a string of 40 asterisks.
160	Calls the machine-language routine to read the paddle port.
170	Reads the value returned by the paddle port.
180	Since the number returned from the paddle port is between 0 and 255, it scales it to be between 0 and 39.
190	If this scaled value is the same as the last one, does not print another bar.
200	Saves the value for the length of the bar on the screen.
210	Prints the bar of asterisks on the screen.
220	Goes back to check the next value from the game port.
500-530	DATA statements with the

machine-language subroutine used to read the paddle.

The reading of the values from the paddle port is done in machine language, because reading the port is not reliable using PEEK and POKE statements from BASIC.

How to Read the Paddle

Before anything changes on port A, the data direction register for port A must have some bits set. This is necessary to indicate the direction of the flow of data on the port. The individual bits or lines on port A can be used either to send data to or to receive data from some outside device. If the bit on the data direction register is a zero, then the corresponding bit on the port is used as an input. If the bit on the data direction register is a one, then the corresponding bit on the port is an output.

The following fragment from an assembly-language program illustrates this.

```
LDA #%10000100
STA DDRA
```

This fragment will store the binary value 10000100 (decimal 132) into the data direction register for port A. Since bits seven and two are both set to one, they are both outputs on port A. The other bits on port A are inputs.

For this application, we wanted to change bits seven and six on port A, so we set both bits seven and six on the data direction register to one. This means that we can write data to both bits seven and six, but we cannot make any changes to bits five to zero.

Modifying the Program

Are you ready to have a little fun? Make sure that the program in Listing 1 is saved, then type in the lines from Listing 2. These lines will replace some of the lines already in memory and add some new lines. Save the program.

Here is a line-by-line description of these new lines:

155	Address for the start of the sound chip memory registers.
156	Sets attack/decay (A=0,D=9), then sustain/release (S=0,R=0) for voice one.
157	Sets volume to maximum (V=15), then selects waveform

(W=33 - sawtooth waveform).

- | | |
|-----|--|
| 213 | Calculates value for high frequency of sound. |
| 215 | Sets high byte of frequency, then low byte of frequency. |

When you read through the program description, you could see that you will be using your peripheral to generate sound. Run the program and move the wires across the pencil lead on the paper. When you do, you should hear a sound. When the wires are close together, the sound is low, and when they are far apart, the sound is high.

Building a Polygraph

Here's a project you can complete on your own: Convert your variable sound generator to a simple lie detector or polygraph. First, obtain two alligator clips from Radio Shack and attach one to each of the free ends of wire on your interface. Next, fold two pieces of 4 inch by 5 inch aluminum foil in half lengthwise. Now fold it in half crosswise two times. You should have a rectangular pad of aluminum foil about 1 1/4 inch by 2 inches in size.

Attach the alligator clips to the foil pads and wrap the pads around your subject's index and ring fingers. Make sure that the pads cover the inside of the fingers, not the fingernail. These pads can be attached using tape or rubber bands. Make sure that they are firmly attached to the fingers, but not so tightly they cut off circulation.

As a person becomes more tense, the skin conductivity increases. This means that the value from the machine-language subroutine will go to a lower value. Experiment with this. Then, using the techniques you have learned in this article, rewrite the program in Listing 1 to either indicate the skin resistance of your subject or to suggest when he is lying.

Remember, however, that this polygraph is only a very simple one and lacks the proper sensitivity and operator to accurately determine the probability of someone telling a lie. In spite of this limitation, you can still have a lot of fun with your own polygraph at your next party.

In the next article, I will present the techniques for the construction of a simple foot-controlled joystick along with a program to control the cursor with your feet. Imagine how nice it would be to be able to edit a program without having to move your hands!

Continued on pg. 124

Return from the SCRATCH Zone

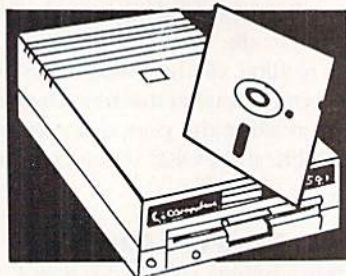
A 1541 Disk Utility Program

After working on a program or data file for some time, you inadvertently scratch your only copy of the file. Don't panic: We have discovered an ancient technique to bring a scratched file back from the world beyond. Of course, it is best to avoid tempting fate by keeping back-up copies of all your disk files. Use the unSCRATCH program only when no back-up for the scratched file exists. Your chances of recovering the file are best if no disk-write operations have been performed since the scratch. In particular, if you have saved to the disk since the scratch, the scratched file may be unrecoverable and the newly saved file could be corrupted by running this program. If possible, you should copy all the unaffected files to another disk before running unSCRATCH.

To help you understand the unSCRATCH program, let's review a few facts about the 1541 disk drive and its disk format. The disk is divided into 35 tracks, which are further divided into sectors. Each sector is a 256-byte data block. A disk file consists of a group of data blocks, each referred to by its track and sector address. The number of sectors in each track is as follows:

Track Numbers	Number of Sectors
1 to 17	21
18 to 24	19
25 to 30	18
31 to 35	17

Of the 683 blocks on a disk, 664 are available for user data and programs. One block is used to indicate to the disk drive the availability of each of the other blocks. This block, which resides in track 18 sector 0 on a 1541 disk, is known as the Block Availability Map (BAM). Each block on the disk is assigned one bit of the BAM. When a bit is zero, the corresponding block is currently allocated;



You've inadvertently scratched a vital file — but don't panic.

when it is one, the block is available.

The other bookkeeping area of the disk is the directory, which consists of one or more blocks on the disk. On a 1541 disk, the first directory block is track 18 sector 1. The first two bytes of a directory block contain pointers to the track and sector of the next directory block. The last directory block contains a zero in its track pointer. The remainder of each directory block contains file entries, a maximum of eight. A file entry is 30 bytes long and includes information on the type of file (byte 0), pointers to the first track and sector of the file (bytes 1 and 2), and its file name (bytes 3-18).

When a file is scratched, none of its contents is actually erased from the disk. Rather, the file-type byte in the directory is changed to zero, which indicates a scratched file. At the same time, the BAM is updated to indicate that all of the blocks previously allocated to the file are now free. Later, when other files are saved to the disk, directory entries of scratched files and possibly the blocks previously comprising them are written over and lost forever. That is why the unSCRATCH program will probably not work after a save.

The unSCRATCH program makes use of the validate (or COLLECT) procedure. A validate command goes through the disk directory one file at a time. If the file is valid (properly closed and not scratched), the BAM is modified to indicate that all of the blocks comprising the file are allocated. If the file is not properly closed or is scratched, the BAM is modified to indicate that its blocks are free.

The unSCRATCH program merely changes the file-type byte of the scratched file from zero to the file-type

specified by the user (presumably the same as before the scratch). Then, a validate command is sent to the disk drive and the validate procedure reallocates all of the file's data blocks. Some disks contain information that is not handled correctly by a validate command. Do not use the unSCRATCH program on such a disk, or on any disk you would not validate (COLLECT) from BASIC.

Program Description

This program should function properly in BASIC on any Commodore computer connected to a 1541 disk drive. It has been tested on the VIC 20, Commodore 64, Plus/4 and Commodore 16. It will certainly work on a Commodore 128 in 64 mode. The program was adapted to run on several computers, and the idiosyncrasies of each were taken into account. It can be made slightly more efficient if it is dedicated to run on only one type of computer.

UnSCRATCH has one subroutine in lines 450-470. Its function is to read the error channel of the disk drive, and if an error occurs, report it and abort the program. This subroutine is called after virtually every disk operation.

Line 10 sets up a string array, A\$, that is used to store a disk directory block. In line 20 a string variable, \$\$, is set equal to 16 shifted spaces (CHR\$(160)). Shifted spaces are used by the disk drive to fill out the 16 characters in a file name when the user specifies a name with fewer than 16 characters.

In lines 30 through 60 the user is instructed to insert the disk with the scratched file and hit a key to signal that the disk is present. This is included because the user probably has the unSCRATCH program stored on a different disk than the scratched file. Once the user signals the disk is present, it is initialized while the command channel is opened in line 80. Initializing is a very important function that is often overlooked. The disk drive keeps a working copy of the BAM in its own RAM. An initialization updates this internal copy to the BAM from the current disk. Whenever you switch disks, you should execute an initialization command.

The name of the scratched file is requested in line 100. In line 110, the file name is padded with shifted spaces and made exactly 16 bytes in length, as it is in

Continued on pg. 83

TECHNICAL TIPS/RETURN FROM SCRATCH ZONE

Continued from pg. 82

the disk directory. Line 120 allows the user to double-check the file name being sought. In line 130, a direct-access channel is opened to be used to get the information from the disk directory.

The first directory block is track 18 sector 1. Line 150 initializes the track, T, and sector, S, to 18 and 1 respectively. Then, line 160 reads the directory block into the disk drive buffer. Lines 180-200 read the buffer into the array A\$. The extra check in line 190 for a null string is needed only on some Commodore computers to set A\$(1) to an acceptable value.

Each directory block can contain eight file entries. Line 210 initializes the variable F, which counts them and ranges from zero to seven. A pointer, B, to the file name to be checked is set in line 220, and the file name variable, FF\$, is initialized to a null string. Then, in lines 230-240, the file name is retrieved from A\$. Line 250 compares it to the desired name and jumps to 290 when a match is found.

If the file names do not match, line 260 advances to the next file entry in this

block. When all of the file entries in this block have been checked, line 270 sets T to the track number of the next directory block. When the last directory block has just been checked, T is 0 and the search has failed. The user is informed, and program execution jumps to line 440 to end. When T is not zero, the variable S is set to the sector number of the next directory block and the search continues with line 160.

When the directory entry for the desired file is found, the user is informed in line 290. Line 300 adjusts the pointer, B, to point at the file-type byte of the file entry. The file-type byte will be zero for a scratched file. If it is nonzero, line 310 informs the user and aborts the program. Otherwise, the user must designate the correct file type in lines 320-340.

Now, we are ready to unSCRATCH the file. The user must be certain that the procedure should continue, so a confirmation is requested in lines 350-360. If the user does not confirm, the unSCRATCH is aborted and no change is made to the disk. Line 370 changes the buffer pointer to the disk drive buffer,

which still contains the directory block data, to point at the file type byte for this file. Line 380 writes the new file-type byte into the buffer. Finally, line 390 writes the buffer back to the disk. The file type byte now indicates that the file is not scratched. But, the BAM has not been updated to indicate that its blocks are allocated. This is done by line 420, which executes a validate command. Program execution ends with line 440.

For more detailed information on unSCRATCH, see the books in which the original program appeared: *Programmer's Reference Guide for the Commodore Plus/4* by C. Merten and S. Meyer, and *Programmer's Reference Guide for the Commodore 16* by S. Meyer and C. Merten, both published by Scott, Foresman and Company. Written to provide complete programming information on the Plus/4 and C16, these books also cover subjects applicable to other Commodore computers, such as peripheral handling and 6502 machine-language programming.

The unSCRATCH program is used with permission. C

Before typing this program, read "How to Enter Programs." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007. 1-800-831-2694.

unSCRATCH

If entering the program on the VIC 20, delete the apostrophe and 4 letters at the end of each line.

```
10 DIM A$(255)'BHPX
20 FOR I=1 TO 16:SS=SS+CHR$(160)
   :NEXT'HPQF
30 PRINT CHR$(147)'CFBB
40 PRINT"INSERT DISK CONTAINING FILE
   TO UNSCRATCH":PRINT'CBJM
50 PRINT"PRESS ANY KEY WHEN DONE"
   :PRINT'CBFI
60 GET K$:IF K$=""THEN 60'EHDG
70 PRINT"INITIALIZING DISK":PRINT'CBGJ
80 OPEN 15,8,15,"I"'BIMG
90 GOSUB 450'BDMG
100 INPUT"FILE TO UNSCRATCH";F$'BDFA
110 F$=LEFT$(F$+SS,16)'DLHA
120 PRINT:PRINT"LOOKING FOR ";F$'CEJC
130 OPEN 1,8,2,"#" 'BGAY
140 GOSUB 450'BDMA
150 T=18:S=1'CGWC
160 PRINT#15,"U1:";2;0;T;S'BLAE
170 GOSUB 450'BDMD
180 FOR I=0 TO 255'DFKF
190 GET#1,A$(I):IF A$(I)=""THEN
   A$(I)=CHR$(0)'GWDM
200 NEXT'BAEV
210 F=0'BCOX
220 B=32*F+4:FF$=""'EJVC
230 FOR I=1 TO 16'DEIB
240 FF$=FF$+A$(B+I):NEXT'ENXF
250 IF F$=FF$THEN 290'DICE
260 F=F+1:IF F<8 THEN 290'FJXH
270 T=ASC(A$(0)):IF T=0 THEN PRINT
   :PRINT F$;" NOT FOUND"
   :GOTO 440'ITWO
280 S=ASC(A$(1)):GOTO 160'DMRI
290 PRINT:PRINT"FOUND ";F$'CECI
300 B=B-2'CDTY
310 IF ASC(A$(B))<>0 THEN PRINT
   :PRINT F$;" IS NOT A SCRATCHED
   FILE":GOTO 440'IQOM
320 PRINT:PRINT"1 = SEQ, 2 = PRG,
   3 = USR, 4 = REL"'CBLH
330 INPUT"WHAT TYPE OF FILE";N%'BDDE
340 IF N%<1 OR N%>4 THEN 320'FJMG
350 PRINT:INPUT"OK UNSCRATCH (Y/N)";
   K$'CEOI
360 IF K$<>"Y"THEN 440'EFVG
370 PRINT#15,"B-P:";2;B'BHRH
380 PRINT#1,CHR$(128+N%);'DKAJ
390 PRINT#15,"U2:";2;0;T;S'BLBJ
400 GOSUB 450'BDMY
410 PRINT:PRINT"VALIDATING DISK"'CBRE
420 PRINT#15,"V"'BDDB
430 GOSUB 450'BDMC
440 CLOSE 1:CLOSE 15:END'DFCE
450 INPUT#15,EN,EM$,ET,ES'BPUE
460 IF EN=0 THEN RETURN'EDCH
470 PRINT EM$:CLOSE 1:CLOSE 15
   :END'EJIJ
```


Game Design

Part 4:

Moon Base for the Commodore 64

This is the fourth in a series of articles that explain some of the in's and out's of programming your own games.

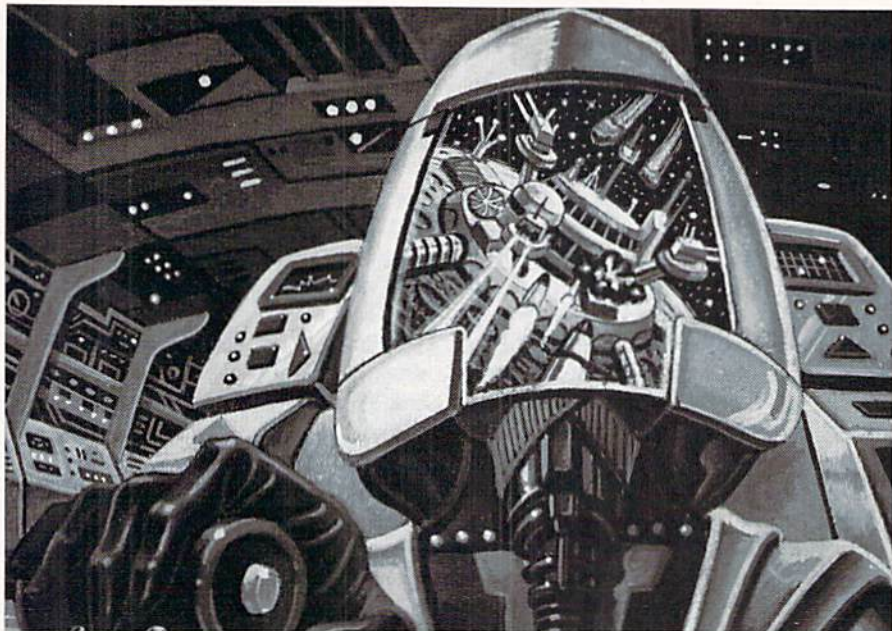
Moon Base is an arcade-style game that features sprite graphics and animation. The object of the game is simple: You have to maneuver the space vehicle at the bottom center of the screen to avoid the oncoming boulders of fire and also shoot missiles up to destroy the enemy spaceships that are menacing your base on the moon.

The idea for Moon Base came from a similar arcade game. Although some of the game play of the arcade game remains, it turned out to be a very different game from the original. Instead of being attacked by hordes of hovering spaceships, you only have to deal with one in Moon Base.

The reason that the background doesn't scroll as convincingly as the arcade version is that BASIC can't handle too many moving objects at once without slowing down to a crawl. Many tricks had to be used to keep the game at its present speed. One of the most important is creating movement through string manipulation.

Moving Strings

If you take a close look at lines 52 through 55 of Listing 1, you can see that the functions RIGHT\$ and LEFT\$ are used extensively. These are used to move the background mountains, the fiery boulder, the ground underneath the space vehicle, and the hovering spaceship in the sky. Each string variable that



these functions manipulate is initialized in lines 610-635 and in lines 670 and 675. The functions are used in such a way that the left-most character in the string is shaved off (so to speak) and added through string concatenation to the end of the 39 right-most characters. The new string is then printed on the screen, producing the movement.

This is a faster technique than poking the characters on the screen, because printing takes care of both the screen RAM and color RAM. If you were to poke all the characters on the screen, you would have to also poke their corresponding color into the color RAM area. Since there are quite a few characters to poke for the mountains in the background, the poke technique would make the game so slow that you could take a coffee and donut break each time the screen was rebuilt.

Another trick that speeds up the movement is that variables are used within each implementation of the string functions. BASIC can execute a variable much faster than it can execute an integer or floating-point number. When your program encounters a variable, it searches for it in its variable table and executes the value it finds there. This is quicker than placing a real number in your program because, when the computer finds that real number, it has to evaluate whether it is an integer or a floating-point variable and whether it is positive or negative, and then assign it a temporary space in memory. Every time it encoun-

ters the number, it must repeat the process. This, of course, slows down your program. It will slow the program down even more if it is within the main loop of the program where it must be executed many times. Therefore, variables are used in the main loop of Moon Base to make the game faster.

Another technique that can speed up your program is placing the main loop at the beginning of the program. The BASIC interpreter searches for the target line of a GOTO from the beginning of the program until it finds it. Therefore, if your loop begins very close to the beginning of the program, you will gain a substantial savings in time. Moon Base starts its main loop at the second line in the program (line 50).

Animated Sprites

Perhaps a more interesting aspect of the game is that it uses sprite graphics for the animation of the space vehicle, missile and explosion. Lines 799 through 1330 of Listing 1 hold the data for each of the six sprites used in the game. Two sprites are used for the animation of the space vehicle. These two are almost identical except for the wheel placement and flame length at the end of the vehicle. They are placed in the cassette buffer in sprite locations 13 and 14 and are switched consecutively onto the screen by line 85.

The technique is simple. You design two sprites that are similar, store them in

Continued on pg. 85

COMPUTER TUTOR/GAME DESIGN

Continued from pg. 84

memory, then switch the sprite pointer at the location corresponding to the sprite number you are using (in my case location 2040 for sprite number 1) to point to one and then the other. If you continuously switch back and forth, you create animation. The sprite pointer locations are different for each sprite, but are located between 2040-2047.

Three sprite images are used for the missile explosion because it creates a more believable effect. First, a very small sprite explosion image is placed on the screen and then a second larger one is placed in the same location, and finally the largest image is placed there. This creates the illusion that an explosion is actually taking place.

If the program detects that the missile hit the spaceship, then another explosion routine is also called. This routine is in lines 445-461 and is completely composed from keyboard characters that are

printed and then erased very quickly from the screen to create the illusion that the spaceship has been destroyed and that fragments from it have been scattered helter-skelter in the sky.

The missile sprite is just a simple multicolored sprite. It is always behind the vehicle because it has a lower sprite priority. The priority makes it look like the missile sits in the middle of the vehicle instead of just behind it. You can launch the missile by hitting the F7 key. When you have the program running, you will notice that the missile slopes backwards as it goes up. This was done to reinforce the illusion of forward movement.


White Noise

Sound routines for the explosions are located in lines 300-305 and lines 420-440 of Listing 1. They generate white noise by poking 129 into memory location 54296, and make the boom sound by starting off with a high volume that is

decreased to a value of zero.

Playing the Game

To play the game you must type in Listing 1, save it, then run it. If everything has been typed in correctly, the title screen should show up and stay on the screen while the sprite data is loaded into memory. After the data is poked into memory, the game graphics will be printed on the screen.

You begin the game with three lives (if you want more lives just change the value for the variable LV in line 640). Every time you are rammed by a fiery boulder, you lose a life, so you must be careful to jump over the boulders by pressing the F1 key. The jump only lasts a short time, so time your jumps precisely or you will fall onto a boulder and die. The boulder will destroy your ship only if it hits the center, so don't worry about brief frontal collisions or about the flames in the rear of the vehicle hitting the boulder. 

Before typing these programs, read "How to Enter Programs," and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Listing 1. Moon Base

```
1 GOSUB 700:GOSUB 605:POKE 53280,.  
:POKE 53281,.'EXYF  
50 J=J+1:IF J=10 THEN IF CJ THEN CJ=.  
:POKE V+1,PEEK(V+1)+15:J=.  
:IF B=. THEN GOSUB 105'SGWT  
52 F$=RIGHT$(F$,Q)+LEFT$(F$,U)  
:E$=RIGHT$(E$,R)+LEFT$(E$,P)'IEAO  
53 D$=RIGHT$(D$,Q)+LEFT$(D$,U)  
:C$=RIGHT$(C$,Q)+LEFT$(C$,U)'IERP  
54 B$=RIGHT$(B$,Q)+LEFT$(B$,U)  
:A$=RIGHT$(A$,Q)+LEFT$(A$,U)'IEFQ  
55 G$=RIGHT$(G$,U)+LEFT$(G$,Q)  
:H$=RIGHT$(H$,U)+LEFT$(H$,Q)'IEQR  
85 A=ABS(A)-1:POKE N,13-A  
:PRINT"[HOME,DOWN4,BLUE]"G$;H$'GRNR  
90 PRINT"[HOME,DOWN18,WHITE]"A$;B$;C$;  
D$;"[RED]";F$;"[GREEN]";E$;"[HOME]"  
"BUQL  
92 GET K$:IF K$=CHR$(136) THEN B=U  
:GOSUB 300'HQQO  
93 IF CJ THEN IF J THEN 97'EFUL  
94 IF K$=CHR$(133) THEN J=.  
:POKE V+U,PEEK(V+U)-15:CJ=U  
:IF B=0 THEN GOSUB 110'PEPA  
97 IF CO=33 THEN CO=:GOSUB 200  
:GOSUB 405:B=:GOTO 100'IWHV  
98 IF B THEN POKE V+3,PEEK(V+3)-4  
:CO=CO+U:IF A THEN POKE V+P,  
PEEK(V+P)-3'QAIE  
99 IF PEEK(1923)=81 THEN IF CJ=. THEN  
GOSUB 500'IOOV  
100 X=FRE(X):GOTO 50'DHVX  
105 POKE V+3,PEEK(V+3)+15:RETURN'GKUG  
110 POKE V+3,PEEK(V+3)-15:RETURN'GKVC  
200 POKE V+P,PEEK(V+P)-8  
:POKE V+3,PEEK(V+3)-8  
:POKE T,197'LNXI  
210 FOR X=1 TO 5:NEXT:POKE T,198  
:FOR X=1 TO 5:NEXT:POKE T,199'KVTH  
220 FOR X=1 TO 10:NEXT:POKE V+23,P  
:POKE V+29,3:POKE T,197'JXMI  
230 POKE T,198:POKE T,199:POKE V+23,0  
:POKE V+29,U:RETURN'HYUI  
300 POKE S+U,U:POKE S,143:POKE S+5,48  
:POKE S+6,144'HXGG  
305 POKE S+4,129:POKE S+24,7  
:RETURN'FNNH  
400 FOR X=12544 TO 12799:READ B  
:POKE X,B:NEXT'GSTF  
405 FOR X=1194 TO 1198'DJIG  
410 IF PEEK(X)<>32 THEN PO=PO+25  
:POKE 53280,2:POKE 53281,2'JCBK  
411 IF PEEK(X)<>32 THEN GOSUB 665  
:GOSUB 445:GOTO 415'IQJI  
412 NEXT'BAEB  
415 X=FRE(X):POKE T,196  
:POKE V+3,PEEK(V+U)-U:POKE V+P,173  
:POKE V+28,3'MHRT  
420 POKE V+40,7:POKE V+21,3  
:POKE S+24,.:POKE S,143  
:POKE S+5,48:POKE S+6,144'LLCO  
430 POKE S+4,129:FOR X=15 TO 0 STEP-U  
:POKE S+24,X:POKE S+1,28-X'MAKO  
440 FOR X1=1 TO 25:NEXT X1,X  
:POKE 53280,.:POKE 53281,.  
:RETURN'HCCL  
445 PRINT"[HOME,RIGHT6,PURPLE]";
```

Continued on pg. 86

COMPUTER TUTOR/GAME DESIGN

Continued from pg. 85

```
PO'BDIJ
450 PRINT"[BLUE,HOME,DOWN4,RIGHT9,
  CMDR W,CMDR B,CMDR C,SHFT J,
  CMDR I,CMDR *,SHFT C,LEFT8,DOWN,
  SHFT H,SHFT J,SHFT O,SHFT E,
  CMDR X,CMDR -,SHFT *,SHFT U,LEFT8,
  DOWN]";'BBOB
452 PRINT"[CMDR B,SHFT C,SHFT V,
  CMDR *,CMDR -,SHFT POUND,CMDR X,
  CMDR D,LEFT8,DOWN,SHFT O,SHFT U,
  SHFT Y,SHFT POUND,SHFT J,SHFT L,
  SHFT M,SHFT V]"'BAUX
455 FOR X2=1 TO 80:NEXT'EGGL
460 PRINT"[BLUE,HOME,DOWN4,RIGHT9,
  SPACE7,LEFT8,DOWN,SPACE8]";'BBWN
461 PRINT"[LEFT8,DOWN,SPACE8,LEFT8,
  DOWN,SPACE8]"'BAER
465 RETURN'BAQJ
500 POKE V,PEEK(V)-8:POKE V+U,
  PEEK(V+U)-8:POKE V+23,U
  :IF B=0 THEN POKE V+21,U'PEUP
510 POKE N,197:POKE N,198:POKE N,199
  :POKE S,143:POKE S+5,48'GEQK
512 POKE 53280,12:POKE 53281,12'CRNG
515 POKE S+6,144:POKE S+4,129
  :FOR X=15 TO 0 STEP-U:POKE S+24,X
  :POKE S+1,15-X'OHBV
520 POKE V+23,U:POKE V+29,U:POKE N,197
  :POKE N,198:POKE N,199'HEBM
530 NEXT:POKE V+23,.:POKE V+29,U
  :POKE V+21,3'HSWK
535 POKE V,PEEK(V)+8:POKE V+U,
  PEEK(V+U)+8:POKE V+23,0
  :POKE N,13'LBOW
537 IF B THEN GOSUB 300'DEWL
540 LV=LV-1:PRINT"[HOME,PURPLE]";
  TAB(29);LV:POKE 53280,
  :POKE 53281,.'GEEN
545 IF LV THEN RETURN'DCWK
547 PRINT"[HOME,DOWN8]":POKE 53280,1
  :POKE 53281,1'DQXP
550 PRINT TAB(6)"[RED,CMDR +3]
  [CMDR +] [CMDR +] [CMDR +3,SPACE3,
  CMDR +3] [CMDR +,SPACE2,CMDR +]
  [CMDR +2,SPACE2]"'CCAR
555 PRINT TAB(5)"[SPACE2,CMDR +,
  SPACE2,CMDR +] [CMDR +] [CMDR +,
  SPACE5,CMDR +,SPACE3,CMDR +2]
  [CMDR +] [CMDR +] [CMDR +]"'CCUT
560 PRINT TAB(5)"[SPACE2,CMDR +,
  SPACE2,CMDR +3] [CMDR +2,SPACE4,
  CMDR +2,SPACE2,CMDR +4] [CMDR +]
  [CMDR +]"'CCXR
565 PRINT TAB(5)"[SPACE2,CMDR +,
  SPACE2,CMDR +] [CMDR +] [CMDR +,
  SPACE5,CMDR +,SPACE3,CMDR +]
  [CMDR +2] [CMDR +] [CMDR +]"'CCUU
570 PRINT TAB(5)"[SPACE2,CMDR +,
  SPACE2,CMDR +] [CMDR +] [CMDR +3,
  SPACE3,CMDR +3] [CMDR +,SPACE2,
  CMDR +] [CMDR +2,SPACE2]"'CCTR
575 PRINT"[WHITE]":END'CBMM
600 REM *** INITIALIZATION ***'BUDE
605 A=.:Q=39:R=38:N=2040:U=1:T=N+U:P=2
  :S=54272'JIJT
610 A$="[SPACE5,SHFT N,SHFT M,SPACE2,
  SHFT N,SHFT M,SPACE4,SHFT N,
  SHFT M,SPACE6,SHFT N,SHFT M,
  SPACE5,SHFT N,SHFT M,SPACE7]"'BCYN
615 B$="[SPACE4,SHFT N,SPACE2,SHFT M,
  SHFT N,SPACE2,SHFT M,SPACE2,
  SHFT N,SPACE2,SHFT M,SPACE4,
  SHFT N,SPACE2,SHFT M,SPACE3,
  SHFT N,SPACE2,SHFT M] [SHFT N,
  SHFT M,SPACE3]"'BCMUM
620 C$="[SPACE3,SHFT N,SPACE4,SHFT M,
  SPACE3,SHFT M,SHFT N,SPACE4,
  SHFT M,SPACE2,SHFT N,SPACE4,
  SHFT M] [SHFT N,SPACE4,SHFT M,
  SPACE2,SHFT M,SPACE2]"'BCAO
625 D$="[SPACE2,SHFT N,SPACE6,SHFT M,
  SPACE2,SHFT N,SPACE6,SHFT M,
  SHFT N,SPACE6,SHFT M,SPACE6,
  SHFT M,SPACE2,SHFT M]"'BCIS
630 E$="[CMDR POUND,CMDR P,
  CMDR POUND3,CMDR P,CMDR POUND2,
  CMDR P,CMDR I,CMDR POUND3,CMDR P2,
  CMDR POUND2,CMDR O,CMDR P,
  CMDR POUND2,CMDR P,CMDR O2,
  CMDR POUND4,CMDR O,CMDR P,
  CMDR POUND2,CMDR P,CMDR POUND2,
  CMDR P2,CMDR POUND2]"'BCAF
635 F$="[SPACE8,SHFT Q,SPACE30]"'BCXO
640 FOR X=832 TO 958:READ B:POKE X,B
  :NEXT:V=53248:LV=3'IAIO
645 POKE N,13:POKE V+U,217:POKE V,158
  :POKE V+29,U'GXPS
650 POKE V+39,7:POKE V+37,2
  :POKE V+38,6'GRGM
655 FOR X=12544 TO 12799:READ B
  :POKE X,B:NEXT:POKE T,196'HYET
660 POKE V+3,PEEK(V+U)-U:POKE V+P,173
  :POKE V+28,3'JVXQ
662 POKE V+40,7:POKE V+21,3
  :PRINT"[CLEAR]"'FMMO
665 PRINT"[HOME,PURPLE]SCORE:";PO
  :PRINT"[HOME,RIGHT23]LIVES
  :";LV'CHAV
670 G$="[CMDR @,CMDR P,CMDR O,CMDR P,
  CMDR @,SPACE34]"'BCRP
675 H$="[CMDR Y,CMDR T,CMDR Y,
  SPACE35]":RETURN'CDVU
700 POKE 53280,12:POKE 53281,12
  :PRINT"[CLEAR,DOWN2]"
  :CC=54272'EBMJ
702 FOR X=1025 TO 1062:POKE X,121
  :POKE X+960,120:POKE X+CC,0
  :POKE X+960+CC,0:NEXT'MPWT
703 FOR X=1064 TO 1944 STEP 40
  :POKE X,118:POKE X+39,117'HADN
704 POKE X+CC,0:POKE X+39+CC,0
  :NEXT'GOCM
705 PRINT TAB(7)"[RED,SPACE2,CMDR @2]
  [CMDR @2] [CMDR @4] [CMDR @4]
  [CMDR @,SPACE3,CMDR @,SPACE5]
  "'CCAS
```

Continued on pg. 87

COMPUTER TUTOR/GAME DESIGN

Continued from pg. 86

```
710 PRINT TAB(7)" [CMDR M,SHFT M]
    [SHFT M2] [SHFT M2,SPACE3,SHFT M2,
    SPACE3,SHFT M3] [CMDR M,SHFT M2,
    SPACE4]"'CCIQ
715 PRINT TAB(7)" [CMDR M] [CMDR +2]
    [CMDR +2] [CMDR +4] [CMDR +4]
    [CMDR +] [CMDR M] [CMDR +,SPACE4]
    "'CCQU
720 PRINT TAB(7)" [CMDR M] [CMDR +]
    [CMDR +] [CMDR +] [CMDR +,SPACE2,
    CMDR +] [CMDR +,SPACE2,CMDR +]
    [CMDR +2,CMDR M] [CMDR +,SPACE4]
    "'CCNO
725 PRINT TAB(7)" [CMDR M] [CMDR +,
    SHFT M,CMDR +] [CMDR +] [CMDR +,
    SHFT M] [CMDR +] [CMDR +,SHFT M]
    [CMDR +] [CMDR +] [CMDR +]
    [CMDR +,SPACE4]"'CCSU
730 PRINT TAB(7)" [CMDR M] [CMDR +]
    [CMDR M] [CMDR +] [CMDR +]
    [SHFT M,CMDR +] [CMDR +] [SHFT M,
    CMDR +] [CMDR +] [CMDR M,CMDR +2,
    SPACE4]"'CCGQ
735 PRINT TAB(7)" [SPACE2,SHFT M,
    CMDR +,SPACE2,SHFT M,CMDR +,
    SHFT M,CMDR +4,SHFT M,CMDR +4,
    SHFT M,CMDR +,SPACE2,SHFT M,
    CMDR +,SPACE4]"'CCGY
745 PRINT TAB(7)" [DOWN,YELLOW,SPACE4,
    CMDR @3,SPACE2,CMDR @4] [CMDR @4]
    [CMDR @4,SPACE5]"'CCAX
750 PRINT TAB(7)" [SPACE3,CMDR M,
    SHFT M,SPACE2,SHFT M,CMDR M,
    SHFT M,SPACE3,SHFT M2,SPACE3,
    SHFT M2,SPACE3,SHFT M,SPACE4]
    "'CCFR
755 PRINT TAB(7)" [SPACE3,CMDR M]
    [CMDR +3,CMDR M] [CMDR +4]
    [CMDR +4] [CMDR +4,SPACE4]"'CCVA
760 PRINT TAB(7)" [SPACE3,CMDR M]
    [CMDR +,SPACE2,CMDR +] [CMDR +]
    [SHFT M,CMDR +] [CMDR +,SPACE2,
    SHFT M] [CMDR +] [SHFT M,SPACE5]
    "'CCPR
765 PRINT TAB(7)" [SPACE3,CMDR M]
    [CMDR +3,CMDR M] [CMDR +4,SHFT M,
    CMDR +4] [CMDR +3,SPACE5]"'CCJB
770 PRINT TAB(7)" [SPACE3,CMDR M]
    [CMDR +,SPACE2,CMDR +] [CMDR +,
    CMDR M] [CMDR +,SHFT M,SPACE2,
    SHFT M,CMDR +] [CMDR +,SPACE2,
    SHFT M,SPACE4]"'CCUT
775 PRINT TAB(7)" [SPACE4,SHFT M,
    CMDR +3] [SHFT M,CMDR +] [SHFT M,
    CMDR +,SHFT M,CMDR +4,SHFT M,
    CMDR +4,SPACE4]"'CCRD
780 PRINT TAB(11)" [DOWN,RED,SHFT U,
    SHFT *16,SHFT I]"'CDNY
782 PRINT TAB(11)" [BLACK,SHFT -,RVS]
    BY ROBERT ALONSO [RVOFF,SHFT B]
    "'CDHU
785 PRINT" [RIGHT11,RED,SHFT J,
    SHFT *16,SHFT K]"'BAEE
790 FOR X=1 TO 500:NEXT:RETURN'FHUO
799 REM * DATA FOR SHIP 1 *'BOWX
800 DATA 0,0,0,0,0,0,0,0,0,0'BRVF
805 DATA 0,0,0,0,0,0,0,0,0,0'BRVK
810 DATA 0,0,0,0,0,0,0,0,0,0'BRVG
815 DATA 0,0,0,0,0,0,0,0,128,0'BTDL
820 DATA 0,160,0,0,172,0,4,170,
    128'BAIJ
825 DATA 4,170,168,1,170,10,4,170,
    170'BDTO
830 DATA 4,134,134,0,16,16,0,4,4,
    0'BAGK
899 REM * DATA FOR SHIP 2 *'BOXY
900 DATA 0,0,0,0,0,0,0,0,0,0'BRVG
905 DATA 0,0,0,0,0,0,0,0,0,0'BRVL
910 DATA 0,0,0,0,0,0,0,0,0,0'BRVH
915 DATA 0,0,0,0,0,0,0,0,128,0'BTDM
920 DATA 0,160,0,16,172,0,20,170,
    128'BCJK
925 DATA 5,170,168,1,170,10,5,170,
    170'BDVP
930 DATA 20,146,146,16,4,4,0,16,
    16'BAVL
999 REM * DATA FOR MISSILE *'BQYA
1000 DATA 0,0,0,0,0,0,0,0,0,0'BRVV
1005 DATA 0,0,0,0,0,0,0,0,0,0'BRVB
1010 DATA 0,0,0,0,0,0,0,0,0,0'BRVW
1015 DATA 0,0,0,0,0,0,0,0,80,0'BSCC
1020 DATA 0,208,0,0,208,0,0,80,0'BWIY
1025 DATA 0,80,0,1,84,0,0,0,0'BTIE
1030 DATA 0,160,0,2,8,0,0,0,0'BVUA
1099 REM * DATA FOR EX #1 *'BNMO
1100 DATA 0,0,0,0,0,0,0,0,0,0'BRVW
1105 DATA 0,0,0,0,0,0,0,0,0,0'BRVC
1110 DATA 0,0,0,0,0,0,0,0,0,0'BRVX
1115 DATA 0,0,0,0,128,0,0,96,128'BWRE
1120 DATA 2,86,64,1,85,96,5,89,80'BXIB
1125 DATA 5,154,0,2,150,64,0,86,0'BXAF
1130 DATA 0,5,0,0,4,0,0,0,0,0'BTWA
1199 REM * DATA FOR EX #2 *'BNNP
1200 DATA 0,0,0,0,0,0,0,0,0,0'BRVX
1205 DATA 0,0,0,0,0,0,0,0,0,0'BRVD
1210 DATA 0,0,0,0,0,0,0,0,0,0'BRVY
1215 DATA 0,80,0,0,148,96,16,101,
    144'BBUG
1220 DATA 6,86,64,9,85,100,37,89,
    84'BAKC
1225 DATA 37,154,72,2,150,64,8,86,
    16'BBRH
1230 DATA 1,133,16,0,37,0,0,2,128,
    0'BACD
1299 REM * DATA FOR EX #3 *'BNOQ
1300 DATA 0,0,0,0,0,0,0,0,0,0'BRVY
1305 DATA 0,0,0,0,0,0,0,0,0,0'BRVE
1310 DATA 0,0,0,0,32,0,0,164,8'BUIB
1315 DATA 32,80,148,148,148,96,20,101,
    148'BGJI
1320 DATA 6,86,65,9,85,101,37,89,
    86'BAOD
1325 DATA 37,90,74,82,86,65,9,86,
    16'BANI
1330 DATA 9,165,24,86,101,8,4,6,128,
    0'BCHE
```

END

Let's C Now

Part 1: An Introduction to C

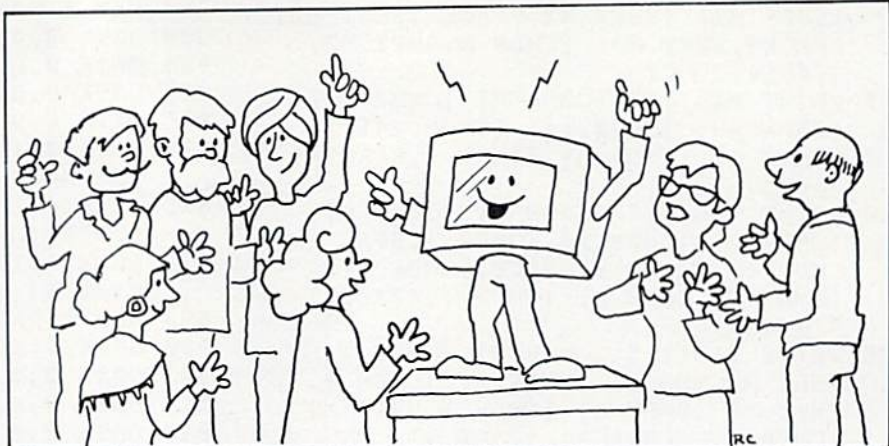
Get to know the C programming language in this series by expert programmer Paul Higginbottom.

I recently decided that it was about time to write something about the C programming language, which I have been writing programs in for over two years. It is now available on the C64, C128, and Amiga computers as well as many other computer systems ranging in size from micros to mainframes.

C is a structured, function-oriented programming language that combines features of low- and high-level languages to allow the programmer to solve a wide variety of programming problems. It has become popular in the last few years in colleges and among software developers.

The purpose of these articles is to provide you with enough information and examples of the C programming language so that you can decide if you want to use it for your own programming projects. I can promise that you will learn something about C if you read this series of articles. I can't promise that you will become a good C programmer, though, because that will take an ongoing effort on your part.

I have found C to be a good language to grow with as a programmer. BASIC became too clumsy for me after a time, and at that point I switched to assembly language or machine code for a lot of my programming projects. Then, in the course of my work, I started using C. At first I found it peculiar, but soon discovered that it freed me from some restrictions while giving me the opportunity to write better programs. The term "better programs" is subjective, but only to a point. Better programs, in my opinion,



are ones that can be understood by others and by the author after six months of not seeing them! In addition, better programs should go out of their way to look simple. I believe that simple is always better. Or said in another way—being clever is not always being smart.

The only thing I am assuming of you is a reasonable familiarity with the BASIC programming language, with which I will draw numerous comparisons.

Compilers vs. Interpreters

Before saying anything else about C, I should note that C programs are generally compiled, as opposed to being interpreted like BASIC programs. Compiling a program usually means executing a program (called a compiler) that reads a file and translates it into a machine-language program (the object file), which can then be run.

Computer language interpreters, on the other hand, are much like human interpreters because they execute an appropriate piece of machine language within themselves for each command or statement in a program as it runs. The advantage of an interpreter is that the program can be run as soon as it has been written, without the need for any conversion to another form. The disadvantage is that the overhead of the interpretation process itself tends to seriously limit the speed of the running program.

Conversely, the disadvantage of a compiler is that the program must be compiled after any changes are made to it, before it can be executed with the changes. This can take from a few seconds to many minutes. Once it has been compiled and no more changes are made, however, it does not have to be recompiled in order to run again, because the

output from the compiler (the executable object file) still exists on disk or in memory.

The advantage of a compiler is that once the compilation has taken place, there is no interpretation overhead, and the program should run (depending on how good the compiler is) almost as fast as it would if it had been written directly in machine language. This typically means that compiled programs can run between 5 and 100 times faster than interpreted ones.

Origination and Portability

C's original specifications were laid down by the originators of the language, Dennis M. Ritchie and Bruce W. Kernighan, in a fine book called *The C Programming Language*, which I cannot recommend highly enough! C was designed to not be specific to any one computer, and consequently the language has come to operate almost identically on a wide range of computers, from micros to mainframes.

This degree of portability—meaning that the same C program can be recompiled on any system and run with no or just a few changes—is very important for software developers. If you learn C on a VAX, a computer running the Unix® operating system, an Amiga, or even a Commodore 64, you probably won't have to learn much else about C when you switch to a different system.

Functions

As I mentioned at the start of this article, C is a function-oriented programming language. This means that a program is generally divided up into different functional pieces that are called upon

Continued on pg. 89

COMPUTER TUTOR/LET'S C NOW

Continued from pg. 88

by one another to do various things. This is similar to subroutines using GOSUB and RETURN in BASIC, in that it breaks a program into different parts. It is dissimilar, however, in the fact that different functional parts of a C program are basically like separate programs altogether, usually with their own variables. Each functional part can optionally pass values or parameters to another functional part. From here on, I shall just refer to these functional parts as functions.

Every C program has a function called "main." This is where the program will execute from, and, unlike BASIC, it need not necessarily be the first line of the program.

Jumping in the Deep End: An Example

I believe that to learn a language well, you must write lots of programs in it, so I'm going to kick off with a real program, which you can look at, type in, compile, and run, if you have a C compiler for your computer. Can you guess what it does? If not, let's examine it closer. I will not analyze the syntax, I will simply tell you what each part does.

The first line specifies a function name—in this case it is "main." The two parentheses show that it is a function (the only function in this program), but because it has no arguments (parameters), there is nothing between them.

The next line contains only an opening brace (or curly bracket). This simply means that a block of program starts here. Since it is just after the function declaration, it means "the code for this function starts here." It can be visually matched up with the closing brace at the end of the function, indicating the end of this block of program.

You should note that each time an opening brace is entered, subsequent lines are indented by one tabstop, and conversely, when a closing brace is entered, the code goes back one tabstop. This gives a nice symmetry to programs and provides an instant indication of how

C combines the features of low- and high-level languages to allow the programmer to solve a wide variety of programming problems.

deep into the program you are looking. However, a C compiler doesn't require any indenting or any spacing anywhere. In fact, the whole program could be on one line! But, to make the program more readable, indentation is usually used. There are several different styles of it, but you'll have to put up with mine for now!

Within the block of code outlined by the opening and closing braces, there are eight lines, which form the body of the function "main." The first of those eight lines declares two variables named "row" and "column" as integers. This means they can take on only signed whole number values, which is fine for the program's purpose.

The next line specifies a loop, saying that "row" will start at 0, the loop will continue only while it is less than 11, and after each time through, "row" will be incremented by one. At the end of the line is another one of those opening braces, so we see that another block of code starts here. A block within a block, no less! And consequently, the next line is indented still further.

And hey! It's another loop! It's just the same as the one above, only the variable is "column" this time. And since it's a loop, it opens yet another block of code—yes, a block within a block, within a block!

Finally we get to see what lurks at the innermost depths of the loop within a loop. (Try saying "printf.") This line prints out (without moving to the next line) the value "row x column" formatted to occupy at least three character spaces, and preceded by one space.

Note the syntax of the printf() function, as you will use it extensively—a string enclosed in double quotes which specifies the

format, and then the arguments(s) to be printed. The percent sign in the format specifies that there is an argument to be printed there.

The innermost block then ends, meaning that only the printf line gets performed each time through the inner (column) loop. Then another printf statement appears that must be performed only after the innermost loop has finished. This one advances the cursor to the start of the next line. The funny sequence printed ("\\n") means "move to the beginning of a NEW LINE."

Finally the outermost loop block finishes with a closing brace, and the program itself finishes with the last closing brace.

Sigh! What a lot of words to explain such a simple program. If you still don't know that it does, don't be disillusioned, all will become clear with more examples (he says with an evil chuckle).

Okay, I'll tell you then. It prints a multiplication table from one to ten in each direction! Pretty trivial really, but let's look at the BASIC equivalent:

```
10 FOR R = 1 TO 10
20 FOR C = 1 TO 10
30 PRINT R*C;
40 NEXT R
50 NEXT C
```

Note that the BASIC version doesn't format the printing into nice columns like the C version does. This could be done by using the PRINT USING command found in some versions of BASIC, and would look somewhat similar. Also, the C version doesn't need NEXT statements to end the loops. The start and end of what is to be looped through are enclosed by the braces.

Both programs are quite readable, but the indentation in the C program makes it clear what is executed within what. And, finally, although loops in BASIC are specified by a start value, an ending value, and an optional STEP value, in C these three values are replaced by initialization statements and statements to be performed after each time through. Initialization statements provide a test which must be satisfied for the loop to continue.

Despite the differences, I hope you'll see that it really wasn't that wild a departure from what you know. It is only in more complex programs that the points raised will become more valuable. **G**

C Program

```
main()
{
    int row, column;

    for (row = 0; row < 11; ++row) {
        for (column = 0; column < 11; ++column) {
            printf("%3d", row * column);
        }
        printf("\\n");
    }
}
```


Speedread for the Commodore 64

Increase your reading speed and comprehension using this speedreading program.

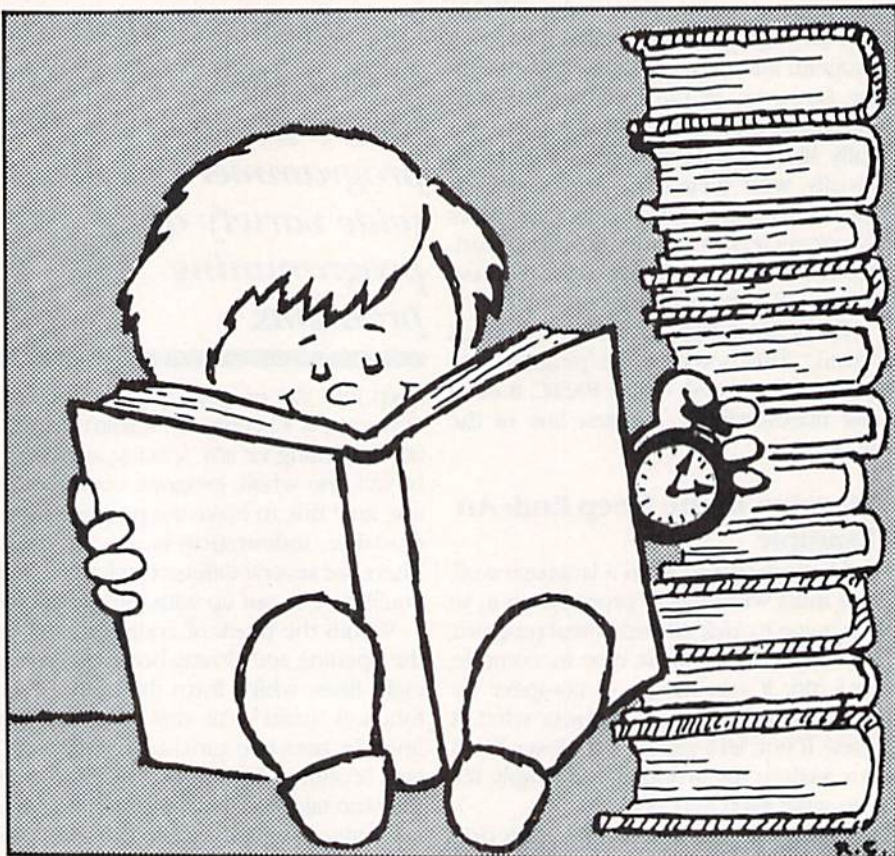
We all know there is an information explosion occurring. The volume of information doubles about every seven years. There are almost 12,000 different periodicals and about 42,000 books published every year. No matter how motivated a person is to stay current, it is almost impossible.

The average person reads at a rate of about 250 words per minute, with a comprehension rate of only about 70 percent. This is because most people read only one word at a time, thereby requiring the mind to link these separate words into coherent thoughts. This slows the reading and comprehension rate.

It is, however, possible to improve your reading and comprehension rates so you can absorb more information. But improving reading skills is not an overnight job. You must commit yourself to the task. Whenever you reach a learning plateau, reread the first paragraph of this article to get incentive to continue. It isn't hard to improve your skills, but it isn't automatic, either. Nevertheless, the rewards far outweigh the difficulties.

To begin to improve your reading skills using this program, it is essential, first, that you set aside a definite time for study. Studying speed reading sporadically simply will not work. Most people have no trouble setting aside specific times to watch their favorite television program or to do some enjoyable task. It should be just as easy to set aside time to improve yourself.

After you have set up a schedule, stick to it. If you find yourself slipping, think about why you started in the first place.



The average person reads at a rate of about 250 words per minute, with a comprehension rate of only about 70 percent.

This should get you started. If it doesn't, try reading the first paragraph of this article again.

Only about one half-hour per day is needed. It should be at a time when you can be free from distractions. Studying more often will help as long as there is at least two hours between sessions. Studying more often than this won't hurt, but the small gain won't be worth it.

The program at the end of this article uses the "flashcard" concept for building speed. It displays a phrase for fixed periods of time and allows you to enter the phrase. This should not only improve your ability to see things faster, but should also improve your concentration, help in controlling eye movement, and exercise your memory. Concentration and memory are just like muscles: They get stronger with use.

How to Use the Programs

Type in and save the two programs, Speedread and Flashcard Creator, at the end of this article. Be sure to save them both on the same disk, since the Speedread program automatically loads the files from Flashcard Creator.

Next, create flashcards using the Flashcard Creator program. To do this, load and run the program and follow the screen instructions. Suggestions for words and phrases you can enter to create your flashcards are listed separately elsewhere, but if you don't want to use these, you can customize your flashcards with any similar kinds of entries.

When you want to use the flashcards, load Speedread, press zero and choose your flashcard level. The program will automatically load that level from the

Continued on pg. 91

64 USERS ONLY/SPEEDREAD

Continued from pg. 90

Flashcard Creator files you entered. If you have never had eye training before, choose level one, but even this will probably be just a blur at first.

When the flashcard display appears, place yourself in a comfortable, relaxed position, focus your eyes in the center of the screen between the two solid lines, and press RETURN. A phrase or number will appear momentarily and disappear. Type exactly what you saw. The computer will check your answer and tell you whether you were right or wrong. If you were correct, it will increment a counter at the top center of the screen.

Each time you have answered correctly 15 times in a row, the flash speed will increase. At the end of 45 correct responses, the next level will load and the flash speed reset to slow. If you make a mistake in any of the groups of 15, the score will be set to zero for that group and you must begin again. The ability to consistently see the phrases is necessary to learn.

If you lose your concentration when the phrase or number is being displayed,

you can repeat it by entering the letter R, but do not abuse this function, because you will only be retarding your progress. Push yourself. You'll find your mind is very much like an elastic band. You can stretch it a great deal and when you relax, you will find that it is somewhat larger after the exercise.

Whenever you feel like quitting, enter a backslash (/). The computer will summarize your score and display it for you. Any key will return you to the menu after you quit.

You can use the stopwatch function of the program to time your reading speed when you are reading a book or article. A good way to estimate the number of words read is to count the number of letters (including spaces) on the first line of the page. Multiply this by the number of lines on the page. Multiply this by the number of pages you have read, and divide the total by five. Enter this number when you are asked for the number of words you have read. The computer will display elapsed time in minutes and your reading speed in words per minute.

Whenever you read, push yourself.

You will soon discover you are reading at a much higher rate than you ever did before and remembering more. A side note on memory: If you constantly mislay things, it is usually due to lack of attention. The next time you put something down, simply think about it. You should find you don't lose things anymore.

One thing that is essential to speed reading is a good vocabulary. It has been found that it is very difficult to learn from the written word, in general, if you do not understand a word. In speed reading, words are seen in groups so a word that is not understood causes the whole thought to be missed. This breaks the chain of reasoning and will cause you to learn poorly.

In order to cover everything in a speed reading course, this article would need to be much longer. Even so, if you apply the reasoning here to use of the program, you will improve your reading skills considerably.

Jerry E. Goff is an industrial physicist with training in speed reading and speed learning.

Continued on pg. 92

Copy Worldwide Short-wave Radio Signals on Your Computer

Remember the fun of tuning in all those foreign broadcast stations on the short-wave radio? Remember those mysterious sounding coded tone signals that baffled you? Well, most of those beeps & squeals are really digital data transmissions using radioteletype or Morse code. The signals are coming in from weather stations, news services, ships & ham radio operators all over the world. Our short-wave listener cartridge, the "SWL", will bring that data from your radio right to the video screen. You'll see the actual text as it's being sent from those far away transmitters.

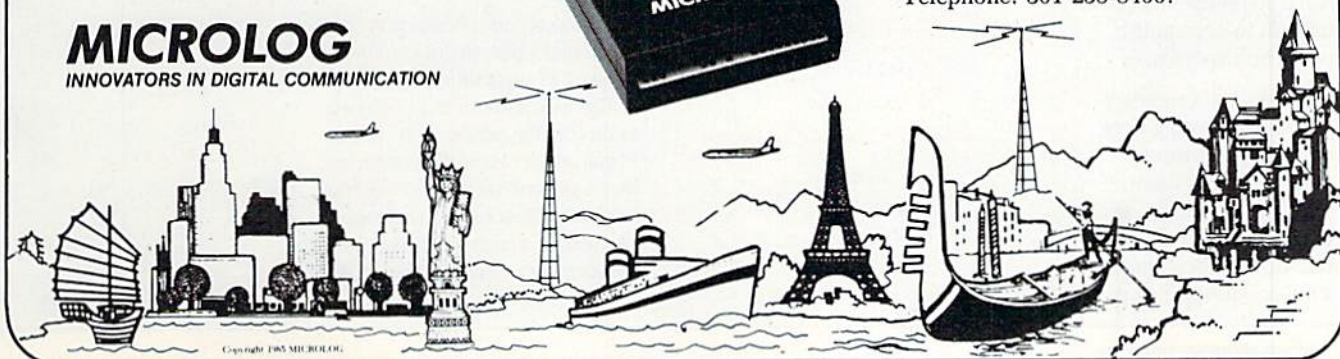
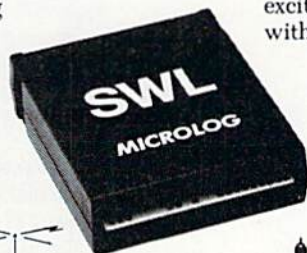
The "SWL" contains the program in ROM as well as radio interface circuit to copy

Morse code and all speeds/shifts of radioteletype. It comes with a cable to connect to your radio's speaker/earphone jack, demo cassette, and an excellent manual that contains a wealth of information on how to get the most out of short-wave digital DXing, even if you're brand new at it.

For about the price of another "Pac-Zapper" game, you can tie your Commodore 64, 128 or VIC-20 into the exciting world of digital communications with the Microlog SWL. \$64. Postpaid, U.S. MICROLOG CORPORATION, 18713 Mooney Drive, Gaithersburg, Maryland 20879. Telephone: 301 258-8400.

MICROLOG

INNOVATORS IN DIGITAL COMMUNICATION



64 USERS ONLY/SPEEDREAD

Continued from pg. 91

Flashcards

Level 1 (2-5 characters, 1-digit numbers)

have	agent	he has	let me	use
brain	habit	four	five	it
them	wine	dine	value	solar
it is	energy	lift	energy	put
burn	watch	pen	happy	spring
fall	enjoy	truth	afoot	third
push	govern	joy	memory	think

Level 2 (6-11 characters, 2-digit numbers)

he observed	he said	in fury	step up on
as she left	be serious	she rose	our friend
the sunrise	will deny	turn left	head start
speed read	not well	lift it up	cover up
now that	they possess	farm product	big party
water bed	this part	happy child	time is now
the army	study this	this scene	to an extent
tight reign	dropped one	learned it	an air force

Level 3 (12-16 characters, 3-digit numbers)

heard laughter	did not hesitate	a state function
on the defensive	violates the law	a bright light
routine business	was not legible	will use force
a new employee	a valuable stone	a long interval
from the east	was a champion	on the eleventh
money is needed	dark and dreary	had to transfer
in an airplane	monthly magazine	support the bill
was a doctor	fine painting	shrewd and wise

Level 4 (17-20 characters, 4-digit numbers)

was an impossibility	familiar requirement	a courageous pilot
thoughtful and kind	calm and peaceful	rich and successful
unfinished business	on the fourteenth	gave his assistance
will not reconsider	conservation	ten feet underground
	program	
appoint the leader	recognize the child	on the battlefield
kick the football	able to accommodate	locate the trouble
improve your	was very suspicious	impatient with them
memory		
living in seclusion	permission refused	permission granted

Level 5 (21-24 characters, 5-digit numbers)

interesting and suitable
will mingle with a crowd
he won a decisive battle
read the advertisement
a dangerous undertaking
had a complimentary pass
difficult to accomplish
relate his experiences

a presidential candidate
read an interesting book
comfortable position
accept his resignation
was not very pessimistic
explained his grievance
treasurer of the company
a miraculous discovery

an enthusiastic crowd
additional money is needed
every available person
recognize his ability
her introductory remarks
six influential citizens
was the only survivor
post hurricane warnings

Level 6 (25-28 characters, 6-digit numbers)

an indefinite period of time
the roads were inaccessible
asked for his resignation
one of his own countrymen
in the diplomatic service
indifferent to his remarks
a solid and substantial base
held them in great suspense
urged a speedy settlement
heard the weather forecast
can comprehend the meaning
great-grandmother and son

heard his eloquent remarks
both useful and ornamental
disgraceful and dishonorable
the camouflage was complete
more than sixteen horsepower
known for his reliability
many preparations were made
the punishment was severe
at the semiannual meeting
a large proportion attended
a high rate of evaporation
in a semiconscious condition

Level 7 (29-32 characters, 7-digit numbers)

magnificent view from the
window
his helpfulness was appreciated
technical knowledge required

necessary to postpone the vote
his eligibility was questioned

all stockholders were waiting
his acknowledgment was
received
will edit the new publication
read all supplementary material
supervision throughout the
state

a satisfactory explanation given
window
suspicious looking characters
temporary quarters were
provided
issued the first proclamation
worried about his
disappearance
only the producer was present
natives were very superstitious

found two prehistoric animals
splendid cooperation received
reached the point of saturation
state

Level 8 (33-36 characters, 8-digit numbers)

certificate was signed and delivered
geographical differences discussed
terminate all previous relations
encounter departmental differences
superintendent of all city schools
respectfully submitted by his son
punctuation and paragraphs correct
managerial responsibilities posted
observations or suggestions accepted
international boundaries recognized

discussion of fundamental principles
established a permanent committee
followed all suggestions faithfully
immigration authorities questioned
reconstruction period in the south
examinations eventually completed
always discontented and depressed
involved ridiculous circumstances
educational arrangements completed
modification to existing law needed

Continued on pg. 93

64 USERS ONLY/SPEEDREAD

Continued from pg. 92

Before typing this program, read "How to Enter Programs." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Speedread

```
1 CLR: DIM JS(500)'CIAB
2 FOR R=54272 TO 54296: POKE R,0
  :NEXT'FQNG
3 POKE 54274,0: POKE 54275,8'CPCF
4 POKE 54278,240: POKE 54296,0'CRDG
5 POKE 54277,0: POKE 54276,65'CQHH
6 POKE 54272,63: POKE 54273,72
  :LT=0'DVLK
7 POKE 53280,11: POKE 53281,11
  :POKE 646,LT'DYWL
8 PRINT CHR$(14): PRINT"[CLEAR,DOWN2]"
  :C%=15'EKNL
9 R%=7 :GOSUB 150:PRINT"0[SPACE2,
  SHFT F]LASHCARDS"DIBO
10 R%=9 :GOSUB 150:PRINT"1[SPACE2,
  SHFT S]TOPWATCH"DIXE
11 R%=11:GOSUB 150:PRINT"2[SPACE2,
  SHFT Q]UIT";DKWE
12 GET T$:IF T$=""THEN 12'EHSO
13 T=VAL(T$):IF T<0 OR T>2 THEN
  12'HMDH
14 IF T=1 THEN 300'DFBD
15 IF T=2 THEN 119'DFFF
16 YES=0:NO=0:PRINT"[CLEAR,DOWN2]"
  "'DJVI
17 C%=11:GOSUB 150:PRINT"[SHFT E]
  NTER LEVEL[SPACE2](1-8)[SPACE2]";
  'DKRM
18 GET L$:IF L$=""THEN 18'EHIJ
19 LV=VAL(L$)'CGRI
20 IF LV=0 THEN SP=3:GOTO 28'FJGD
21 LEV=1'BEBA
22 FOR J=1 TO 8'DDMC
23 LEV=LEV*10'CIPE
24 IF LV<>J THEN 26'EFIF
25 N$="LEVEL"+STR$(J):GOTO 29'EIPI
26 NEXT J'BBDE
27 GOTO 16'BCOF
28 IF LV=0 THEN N$="DEMONSTRATION"EF
  FN
29 I=0:SP=2'CGKJ
30 PRINT"[CLEAR]":R%=12:C%=12
  :GOSUB 150'EOHF
31 PRINT"[SHFT L]LOADING[SHFT SPACE]";
  N$'BDHE
32 OPEN 8,8,4,""+N$+"",R'DINF
33 INPUT#8,K$:IF K$=""THEN 37'EJAG
34 I=I+1'CDFE
35 JS(I)=K$'BHGP
36 GOTO 33'BCNF
37 CLOSE 8'BBPG
38 IF LV=0 THEN 50'DFBK
39 R0=RND(-RND(0))'EHNH
40 K=I-1:L=LEV*10'EKCF
41 I=2*I:IF I>500 THEN I=500'GMWH
42 FOR J=K TO I'DDFE
43 M=INT(L*RND(R0))'EINH
44 IF M<LEV THEN 43'DGCH
45 M$=STR$(M)'CFHH
46 O$=RIGHT$(M$,LEN(M$)-1)'EMKL
47 J$(J)=LEFT$(O$,LEN(O$)-1)'EPNM
48 NEXT J'BBDI
49 REM DON'T GET NUMBERS FOR DEMO'BWRP
50 CLOSE 8'BBPB
51 PRINT"[CLEAR]":C%=17:R%=3'DJBG
52 IF LV=0 THEN C%=13'EHBH
53 GOSUB 150:PRINT N$'CGDG
54 C%=13:R%=4:GOSUB 150
  :POKE 646,3'ESPL
55 FOR O=1 TO 14:PRINT"[CMDR R]";
  :NEXT'FHGL
56 C%=13:R%=8:GOSUB 150'DMRL
57 FOR O=1 TO 14:PRINT"[CMDR E]";
  :NEXT'EFHN
58 C%=0:R%=9:GOSUB 150:POKE 646,
  15'ESTP
59 FOR O=0 TO 39:PRINT"[CMDR Y]";
  :NEXT'FHRP
60 R%=11:GOSUB 150'CIGE
61 FOR O=0 TO 39:PRINT"[CMDR P]";
  :NEXT'FHJI
62 INAROW=0:POKE 646,LT'CONI
63 R0=RND(-RND(0))'EHNJ
64 IF LV>0 THEN R1=INT(RND(R0)*I)
  :IF R1=0 THEN 64'KXSQ
65 IF LV=0 THEN R1=R1+1
  :IF R1>22 THEN 108'IQEP
66 R%=15:GOSUB 200:GOSUB 150'DMSM
67 X=YES+NO'CGPM
68 PRINT"[SHFT T]OTAL=";X;" READY";
  :INPUT P$'CHGQ
69 IF P$=""THEN 108'DFHO
70 C%=21-(LEN(JS(R1))/2):R%=10'FUNK
71 GOSUB 150:PRINT JS(R1)'CKFH
72 LIM=SP:IF LIM>0 THEN GOSUB 250'FNML
73 R%=10:GOSUB 200'CIBI
74 R%=15:GOSUB 200'CIGJ
75 C%=0:R%=15:GOSUB 150'DMLM
76 INPUT A$'BCIJ
77 IF A$=""THEN 108'DFSN
78 IF A$="R"THEN 70'DEDO
79 IF A$=JS(R1)THEN YES=YES+1'FPYS
80 IF A$<>JS(R1)THEN NO=NO+1'GNEL
81 H%=5:Q%=5'CHJH
82 IF SP=1 THEN H%=7:Q%=6'FKPL
83 IF SP=0 THEN H%=10:Q%=7'FLHM
84 IF A$<>JS(R1)THEN 96'EKVM
85 POKE 646,H%'BGHK
86 C%=INAROW+13:R%=Q%:GOSUB 150
  :PRINT"*"'FUSS
87 POKE 646,LT'BGDN
88 INAROW=INAROW+1'CNTR
89 IF INAROW<14 THEN 64'DKGR
90 INAROW=0'BHCH
91 SP=SP-1:IF SP>=0 THEN 63'GLWM
92 SP=2:LV=LV+1:IF LV<=8 THEN 21'HPJP
93 PRINT"[CLEAR]":R%=10:C%=10
  :PRINT"[SHFT Y]OU'VE MASTERED THE
```

Continued on pg. 123

Biorhythm

for the Commodore 64

Everyone has had good days and bad days. But have you ever wondered why certain days are so much better (or worse) than others?

Research done by Dr. Wilhelm Fleiss of Berlin, Professor Herman Swoboda of the University of Vienna, and by Alfred Teltscher of Austria early in this century, produced the theory known as biorhythm, or bio-mathematics, which held that man's natural cycles fall into three groupings, which they labeled "physical," "emotional," and "intellectual."

According to the theory, these cycles are generated by the natural rhythms of your body and can be measured with regularity throughout your life. They have nothing to do with astrology, or any other mystic art, but instead are based on scientific research and statistics.

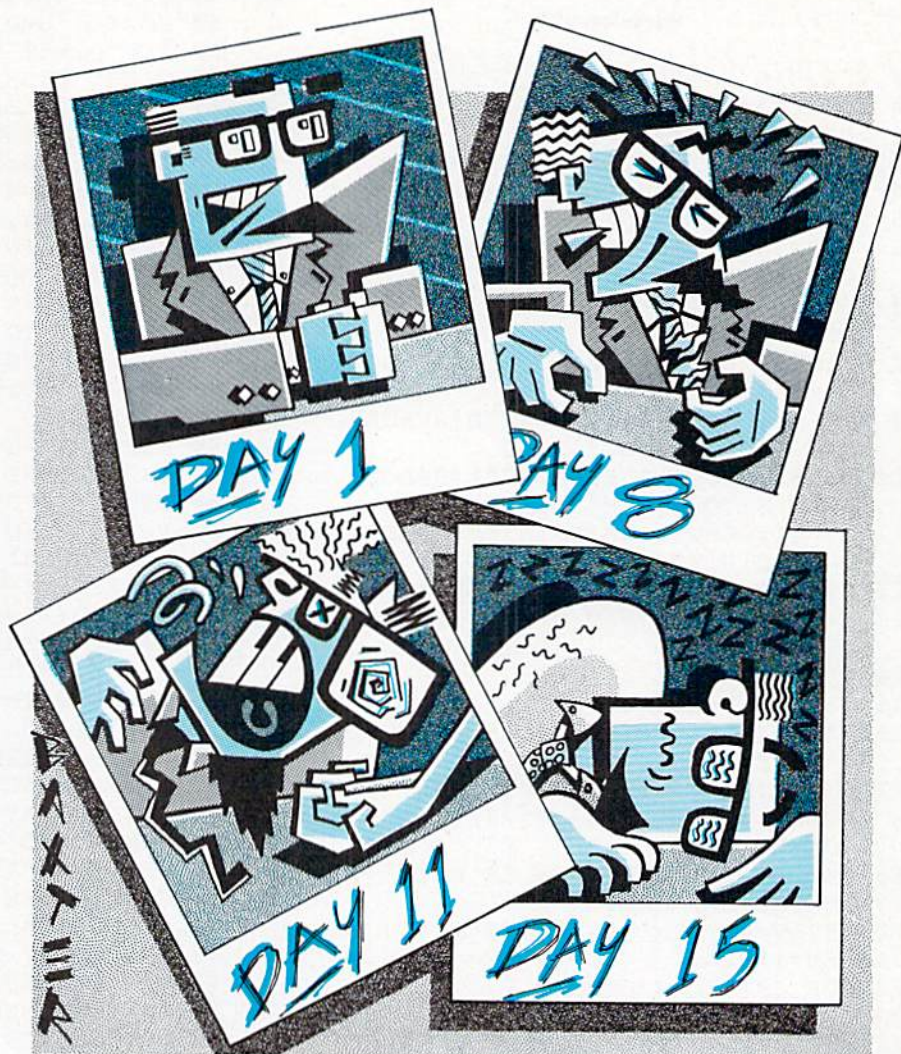
The "physical" rhythm makes a complete cycle every 23 days and affects your physical strength, endurance, energy, and your resistance to illness. It also measures your confidence, coordination, stamina, and general well-being.

The first half of the cycle (11½ days) are the days when a person feels vigorous and when his or her endurance is at its best. The second half of the cycle is a recharging period. During these days a person may tire more easily. This second period should by no means be considered bad. In fact, this period can have advantages.

The two important points in this cycle are the first day and the halfway mark (when the cycle is switching from high to low). These are the "critical days," which I will explain later.

The emotional or sensitivity, rhythm makes a complete cycle in 20 days and affects your nervous system—your moods, intuition, feelings, creative abilities, and sexuality. This cycle has its critical days during the first day of a new cycle and again during the fifteenth day, when the cycle switches to a recuperative period. The day of the week that you were born on will always repeat on the first and fifteenth day of the cycle.

The last rhythm, your intellectual cycle, runs for 33 days and affects your



alertness, memory, logic, and your mental reaction rate. The two important points of this cycle are on the first day and at 16½ days. You are at your creative best when the cycle is high. During the second 16½ days, it may be best not to study any new material.

Whenever a cycle crosses the center (X) line, you have a critical day. This means that your body, which is affected by certain neurological, chemical, and fluid changes, may be off-kilter on these days. There are the days when your cycles are switching from high to low or vice-versa. These days are not dangerous, so you don't have to lock the doors and stay in bed. Rather, they are days during which an individual's reaction to his or her environment may bring about a difficult situation. Having a critical day does

not mean you will get sick, have an accident, or have a bad day. In fact, a critical day may well pass unnoticed.

When your curves are high, or to the right of the "X" line, you will probably have more energy and stamina. You may feel better during these days and be able to think and react more quickly. You will be better able to perform your daily routines.

When your curves are low, or to the left of the "X" line, you may not have as much energy available. Being on the low side doesn't mean that you won't feel good or be unable to function. It just means that you may run out of gas sooner.

How far the curves extend to the right or left of the center line is not important. Neither is it meaningful when the curves

Continued on pg. 95

64 USERS ONLY/BIORHYTHM 64

Continued from pg. 94

cross each other. Only when they cross the "X" line is there significance. The chart that is drawn by the program is a picture of how you may be functioning.

Probably the best way to use a biorhythm chart is to make brief notes about the kind of day you have had and compare these notes with your chart later. That way, you won't pre-program yourself for a bad day.

I used a Commodore MPS-801 printer for testing the program's print routine,

but if you are using another brand, please take note of the following and make the appropriate changes according to the manual that came with your printer. In line 730, the variable A\$ is made equal to CHR\$(16). On the MPS-801, this sets the print tab position. If you use the BASIC command TAB, the printer will print according to the position of the cursor on the screen and not the position of the print head on the paper. Line 990 finds the length of STR\$(L) and prints the appropriate symbol at that point. For each

row of symbols, the printer will move back and forth from its starting position without executing a line feed until all of the symbols have been printed for that date. In both programs you have the option of having any one or all of the cycles printed.

One additional note. The first prompt will ask you for the current date. If you want a chart for any other time period, just enter the date of the day you want the chart to start from, instead of the current date. G

Before typing these programs, read "How to Enter Programs." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-851-2694.

Biorhythm

```
100 POKE 53280,1:POKE 53281,1'CPNY
110 PRINT CHR$(147):FOR X=1 TO 10
:PRINT:NEXT'HMO
120 PRINT TAB(15)"BIORHYTHM"
:PRINT TAB(15)"-----"'EHTF
130 FOR T=1 TO 1000:NEXT'EHQB
140 PRINT CHR$(147):PRINT'DGGC
150 DIM A(150):GOSUB 2290'CLPD
160 DF=6.28318'BJPD
170 GOTO 240'BDFD
180 X=(V/X-INT(V/X))*DF'GLWJ
190 Y=SIN(X)'CEOG
200 X=X*57.295755'CLHY
210 Y=(Y*18)+44'DITA
220 Y=INT(Y)'CEFA
230 GOTO 2330'BEFA
240 PRINT"STARTING DATE (EX 9,12,1984)
: "'BARH
250 INPUT M,D,Y'BFXC
260 A=M:B=D:C=Y'DIHX
270 GOSUB 1380'BENE
280 Z=T'BCUF
290 PRINT:PRINT"YOUR BIRTHDAY (EX 9,
12,1984):"'CBAN
300 INPUT M,D,Y'BFXC
310 E=M:F=D:G=Y'DITC
320 GOSUB 1380'BENA
330 V=T-Z'CDVC
340 V=ABS(V)'CEAD
350 :':ACPC
360 PRINT'BACD
370 PRINT"HOW MANY DAYS DO YOU WANT
DISPLAYED";:INPUT O'CDXP
380 PRINT'BACF
390 REM *** CYCLE CHOICE ***'BRPK
400 PRINT TAB(11)"P... PLOT
PHYSICAL"'CDPE
410 PRINT TAB(11)"I... PLOT
INTELLECTUAL"'CDDG
420 PRINT TAB(11)"S... PLOT
SENSITIVITY"'CDKH
430 PRINT TAB(11)"A... PLOT ALL
CYCLES"'CDVH
```

```
440 PRINT'BACC
450 PRINT TAB(12)"[RVS]ENTER SELECTION
:[RVOFF]";:INPUT L$'DHYL
460 IF L$<>"P"AND L$<>"I"AND
L$<>"S"AND L$<>"A"THEN 450'NLNQ
470 PRINT CHR$(147):PRINT'DGGI
480 PRINT:PRINT'CBHH
490 PRINT"YOUR BIRTHDAY IS ";
:MN=E'CFEO
500 GOSUB 1170'BEKA
510 PRINT F;G'BDVB
520 PRINT"YOU WERE BORN ON A ";:DB=N+1
:GOSUB 1300'ELFK
530 PRINT",";V;"DAYS (";
INT((V/365)*100)/100;
"YEARS) AGO."'FTMN
540 PRINT'BACD
550 PRINT"YOUR BIORHYTHM CYCLES FROM
: "'BAUM
560 MN=A:GOSUB 1170:PRINT B;C;"TO ";
'DOKK
570 S=A:R=B+O-1:T=C'FKEM
580 IF S<12 THEN 600'DGXX
590 S=1:T=T+1:GOTO 630'EKBN
600 IF S<>2 THEN 630'EFED
610 IF INT(T/4)<>T/4 THEN 630'HJIH
620 K=1'BCUD
630 IF R<=(S+100)+K THEN 660'GMDJ
640 R=R-(S+100)+K:IF S<>1 THEN
S=S+1:K=0'LVJQ
650 GOTO 580'BDMG
660 MN=S:GOSUB 1170:PRINT R;T'DMCK
670 PRINT:PRINT:PRINT TAB(8);
"1- SEND CHART TO SCREEN"'EFJQ
680 PRINT TAB(8);"2- SEND CHART TO
PRINTER"'CDUQ
690 PRINT:PRINT TAB(9);"[RVS]
ENTER SELECTION NUMBER[RVOFF]
"'DEUS
700 GET Z$:IF Z$=""THEN 700'EIGF
710 ON VAL(Z$)GOTO 1760,720'DMOG
720 PRINT:PRINT TAB(4)"[RVS]
TURN ON PRINTER AND PRESS RETURN.
[RVOFF]"'DDSP
730 GET Z$:IF Z$=""THEN 730'EIJI
740 IF Z$<>CHR$(13)THEN 730'FJQK
750 A$=CHR$(16):OPEN 4,4'DKDK
```

Continued on pg. 96

64 USERS ONLY/BIORHYTHM 64

```

760 PRINT#4,SPC(36)"SYMBOLS"
:PRINT#4,SPC(36)"-----" 'ELMP
770 PRINT#4,SPC(28)"X... CENTER
LINE" 'CFXO
780 PRINT#4,SPC(28)"P... PHYSICAL
(23-DAYS)" 'CFIQ
790 PRINT#4,SPC(28)"S... SENSITIVITY
(28-DAYS)" 'CFIS
800 PRINT#4,SPC(28)"I... ITELLECTUAL
(33-DAYS)" 'CFSK
810 PRINT#4:PRINT#4'CDJE
820 PRINT#4,SPC(7)"DATE";SPC(9)"(-)";
SPC(18)"(X)";SPC(18)"(+)"
:PRINT#4'GRAN
830 PRINT#4'BBDF
840 U=V+N:U=U-7*INT(U/7):B=B-1:U=U-1
:V=V-1:K=0'OBFW
850 FOR I=1 TO 0:V=V+1:B=B+1:U=U+1
:IF A<>2 THEN 880'NVCU
860 IF INT(C/4)<>C/4 THEN 880'HJGO
870 K=1'BCUK
880 IF B<=A(A+100)+K THEN 900'GMQQ
890 A=A+1:B=1'DGJO
900 IF U<7 THEN 920'DFMG
910 U=0'BCEF
920 IF A<=12 THEN 940'EGPI
930 A=1:C=C+1'DGMJ
940 IF(A<>E)+(B<>F) THEN 960'HLRN
950 PRINT#4,SPC(28)"--- HAPPY ";
ABS(C-G);" BIRTHDAY ---"
:PRINT#4'FNXT
960 DA=U+1:GOSUB 1550'DJXM
970 PRINT#4,"[SPACE3]";:GOSUB 1630
:PRINT#4,B;C;'DPEP
980 IF L$="P"OR L$="A"THEN 1000'FIVQ
990 GOTO 1010'BEYN
1000 X=23:GOSUB 180:A(30)=Y'DOJX
1010 IF L$="S"OR L$="A"THEN 1030'FICY
1020 GOTO 1040'BEVC
1030 X=28:GOSUB 180:A(35)=Y'DOTB
1040 IF L$="I"OR L$="A"THEN 1060'FIUC
1050 GOTO 1070'BEFY
1060 X=33:GOSUB 180:A(40)=Y'DOLE
1070 M=0:FOR L=19 TO 66
:PRINT#4,A$;LEN(STR$(L));'HUCI
1080 IF A(30)=L THEN PRINT#4,"P";
:GOTO 1130'FOXH
1090 IF A(35)=L THEN PRINT#4,"S";
:GOTO 1130'FOGI
1100 IF A(40)=L THEN PRINT#4,"I";
:GOTO 1130'FORA
1110 IF L=40 THEN PRINT#4,"X";'EGGY
1120 IF L=66 THEN PRINT#4,'EFWY
1130 M=M+1:IF M<>4 THEN 1140
:L=100'HPHF
1140 NEXT L,I'BDQY
1150 PRINT#4:CLOSE 4:GOTO 2350'DICC
1160 ::'ACPA
1170 IF MN=1 THEN PRINT"JANUARY";
:GOTO 2330'FJWI
1180 IF MN=2 THEN PRINT"FEBRUARY";
:GOTO 2330'FJTJ
1190 IF MN=3 THEN PRINT"MARCH";
:GOTO 2330'FJDJ
1200 IF MN=4 THEN PRINT"APRIL";
:GOTO 2330'FJRB
1210 IF MN=5 THEN PRINT"MAY";
:GOTO 2330'FJCB
1220 IF MN=6 THEN PRINT"JUNE";
:GOTO 2330'FJXD
1230 IF MN=7 THEN PRINT"JULY";
:GOTO 2330'FJRE
1240 IF MN=8 THEN PRINT"AUGUST";
:GOTO 2330'FJTF
1250 IF MN=9 THEN PRINT"SEPTEMBER";
:GOTO 2330'FJXH
1260 IF MN=10 THEN PRINT"OCTOBER";
:GOTO 2330'FKII
1270 IF MN=11 THEN PRINT"NOVEMBER";
:GOTO 2330'FKPJ
1280 PRINT"DECEMBER";:GOTO 2330'CGHH
1290 ::'ACPE
1300 IF DB=1 THEN PRINT"WEDNESDAY";
:GOTO 2330'FJQD
1310 IF DB=2 THEN PRINT"THURSDAY";
:GOTO 2330'FJSE
1320 IF DB=3 THEN PRINT"FRIDAY";
:GOTO 2330'FJRE
1330 IF DB=4 THEN PRINT"SATURDAY";
:GOTO 2330'FJNG
1340 IF DB=5 THEN PRINT"SUNDAY";
:GOTO 2330'FJPG
1350 IF DB=6 THEN PRINT"MONDAY";
:GOTO 2330'FJEH
1360 PRINT"TUESDAY";:GOTO 2330'CGHG
1370 ::'ACPD
1380 H=Y-1800:I=INT(H/4)
:J=INT(I/25)'ITUN
1390 L=INT((H+200)/400)'EMAK
1400 K=0'BCTX
1410 IF I*4<>H THEN 1450'FHIC
1420 IF J*100<>H THEN 1450'FJVE
1430 IF L*400-200<>H THEN 1450'GMMG
1440 K=1'BCUC
1450 T=365*H+I-J+L-K'GJHI
1460 T=T+A(M)+D-1'EIWH
1470 IF M<3 THEN 1490'DGAH
1480 T=T+K'CDDH
1490 IF INT(H/4)<>H/4 THEN 1520'HKGM
1500 IF M>2 THEN 1520'DGQB
1510 T=T-1'CDDB
1520 N=T-7*INT(T/7)'FHGF
1530 GOTO 2330'BEFC
1540 ::'ACPC
1550 IF DA=1 THEN PRINT#4,"WED";
:GOTO 2330'FLIJ
1560 IF DA=2 THEN PRINT#4,"THU";
:GOTO 2330'FLBK
1570 IF DA=3 THEN PRINT#4,"FRI";
:GOTO 2330'FLLL
1580 IF DA=4 THEN PRINT#4,"SAT";
:GOTO 2330'FLTM
1590 IF DA=5 THEN PRINT#4,"SUN";
:GOTO 2330'FLJN
1600 IF DA=6 THEN PRINT#4,"MON";
:GOTO 2330'FLXF

```

Continued on pg 97

64 USERS ONLY/BIORHYTHM 64

Continued from pg. 96

```

1610 PRINT#4,"TUE";:GOTO 2330'CIYD
1620 ::'ACPB
1630 IF A=1 THEN PRINT#4,"JAN";
      :GOTO 2330'FKOH
1640 IF A=2 THEN PRINT#4,"FEB";
      :GOTO 2330'FKDI
1650 IF A=3 THEN PRINT#4,"MAR";
      :GOTO 2330'FKXJ
1660 IF A=4 THEN PRINT#4,"APR";
      :GOTO 2330'FKCK
1670 IF A=5 THEN PRINT#4,"MAY";
      :GOTO 2330'FKCM
1680 IF A=6 THEN PRINT#4,"JUN";
      :GOTO 2330'FKJN
1690 IF A=7 THEN PRINT#4,"JUL";
      :GOTO 2330'FKIO
1700 IF A=8 THEN PRINT#4,"AUG";
      :GOTO 2330'FKAF
1710 IF A=9 THEN PRINT#4,"SEP";
      :GOTO 2330'FKHH
1720 IF A=10 THEN PRINT#4,"OCT";
      :GOTO 2330'FLTI
1730 IF A=11 THEN PRINT#4,"NOV";
      :GOTO 2330'FLIJ
1740 PRINT#4,"DEC";:GOTO 2330'CIPH
1750 ::'ACPF
1760 PRINT CHR$(147)'CFBI
1770 PRINT TAB(16)"SYMBOLS"
      :PRINT TAB(16)"-----"'EHRO
1780 PRINT TAB(5)"X... CENTER
      LINE"'CCDN
1790 PRINT TAB(5)"P... PHYSICAL
      (23-DAYS)"'CCHQ
1800 PRINT TAB(5)"S... SENSITIVITY
      (28-DAYS)"'CCHJ
1810 PRINT TAB(5)"I... ITELLECTUAL
      (33-DAYS)"'CCSK
1820 PRINT:PRINT'CBHE
1830 PRINT"DATE";TAB(12)"(-)";
      TAB(19)"(X)";TAB(27)"(+)"'EMCL
1840 PRINT'BACF
1850 U=V+N:U=U-7*INT(U/7):B=B-1:U=U-1
      :V=V-1:K=0'OBFW
1860 FOR I=1 TO 0:V=V+1:B=B+1:U=U+1
      :IF A<>2 THEN 1890'NWCU
1870 IF INT(C/4)<>C/4 THEN 1890'HKGO
1880 K=1'BCUK
1890 IF B<=A(A+100)+K THEN 1910'GNQQ
1900 A=A+1:B=1'DGJF
1910 IF U<7 THEN 1930'DGLG
1920 U=0'BCEF
1930 IF A<=12 THEN 1950'EHKJ
1940 A=1:C=C+1'DGMJ
1950 IF(A<>E)+(B<>F) THEN 1970'HMLO
1960 PRINT TAB(7)"--- HAPPY ";
      ABS(C-G);" BIRTHDAY ---"'EIYR
1970 DA=U+1:GOSUB 2210'DJRM
1980 PRINT B;'BCWL
1990 IF L$="P"OR L$="A" THEN 2010'FIXQ
2000 GOTO 2020'BEBU
2010 X=23:GOSUB 180:A(30)=Y'DOJA
2020 IF L$="S"OR L$="A" THEN 2040'FIEB
2030 GOTO 2050'BEEH
2040 X=28:GOSUB 180:A(35)=Y'DOTD
2050 IF L$="I"OR L$="A" THEN 2070'FIWE
2060 GOTO 2080'BEHB
2070 X=33:GOSUB 180:A(40)=Y'DOLG
2080 M=0:FOR L=19 TO 66
      :PRINT TAB(L/2);'HNCJ
2090 IF A(30)=L THEN PRINT"P";
      :GOTO 2140'FMLI
2100 IF A(35)=L THEN PRINT"S";
      :GOTO 2140'FMFA
2110 IF A(40)=L THEN PRINT"I";
      :GOTO 2140'FMFB
2120 IF L=40 THEN PRINT"X";'EERA
2130 IF L=66 THEN PRINT'EDCB
2140 M=M+1:IF M<>4 THEN 2150
      :L=100'HPJH
2150 NEXT L,I'BDQB
2160 PRINT:PRINT TAB(8);"[RVS]
      PRESS RETURN TO CONTINUE[RVOFF]
      "'DEHL
2170 GET Z$:IF Z$="" THEN 2170'EJHG
2180 IF Z$<>CHR$(13) THEN 2170'FKOI
2190 GOTO 2350'BEHF
2200 ::'ACPV
2210 IF DA=1 THEN PRINT"WED";
      :GOTO 2330'FJTC
2220 IF DA=2 THEN PRINT"THU";
      :GOTO 2330'FJMD
2230 IF DA=3 THEN PRINT"FRI";
      :GOTO 2330'FJWE
2240 IF DA=4 THEN PRINT"SAT";
      :GOTO 2330'FJFF
2250 IF DA=5 THEN PRINT"SUN";
      :GOTO 2330'FJUG
2260 IF DA=6 THEN PRINT"MON";
      :GOTO 2330'FJHH
2270 PRINT"TUE";:GOTO 2330'CGEG
2280 ::'ACPE
2290 FOR I=1 TO 12:READ A(I):NEXT'FKMK
2300 FOR I=101 TO 112:READ A(I)
      :NEXT'FNHC
2310 DATA 0,31,59,90,120,151,181,212,
      243,273,304,334'BRTG
2320 DATA 31,28,31,30,31,30,31,31,30,
      31,30,31'BKZG
2330 RETURN'BAQA
2340 :'ABHB
2350 PRINT CHR$(147):PRINT'DGGF
2360 PRINT TAB(4);"DO YOU WANT
      ANOTHER CHART (Y/N)";'CEKN
2370 GET Z$:IF Z$="" THEN 2370'EJJI
2380 IF LEFT$(Z$,1)="Y" THEN CLR
      :GOTO 140'GKML
2390 IF LEFT$(Z$,1)="N" THEN CLR
      :GOTO 2410'GLBM
2400 IF LEFT$(Z$,1)<>"Y"AND LEFT$(Z$,
      1)<>"N" THEN 2370'JQGI
2410 PRINT CHR$(147):FOR X=1 TO 11
      :PRINT:NEXT'HMFP
2420 PRINT TAB(12);"[RVS]
      END OF PROGRAM.[RVOFF]":END'DFVH

```

END

Loan Calculator

for the
Commodore 64

Some amortization programs on the market are rather long, and not all of them have the capability of making a printed copy. Here is one that is relatively short, does everything the others will, and gives you a printed copy. It can be used to produce amortization tables for home mortgages, auto loans, or any other type of long- or short-term loan. The program was designed for use with the VIC 1525 printer and leaves a wide margin at the bottom and top of each page by skipping about 15 lines. This can be changed for other printers by changing the numbers in lines 950 and 980.

The program begins by asking for the number of months the loan is for, the in-



terest rate, the amount of the principal, and the month and year the first payment is due. It then displays the monthly payment amount. Pressing the RETURN key will start the display scrolling by, and you can stop it and start again anytime by pressing RETURN. The amount paid on interest and principal are displayed, as well as the balance due. At the end of each year it displays the year, the total amounts paid that year, and the accumu-

lated "to date" amounts.

At the end of the display you are given the choice of seeing it again, making a printed copy, clearing the figures to do another calculation, or quitting.

I like to use bright colors in my programs, but if you have a monochrome monitor, you may want to change the colors on the title page. These are found in lines 610, 625 and 685 of the title page. G

Before typing these programs, read "How to Enter Programs," and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Loan Calculator

```

5 DEF FN R(X)=INT(100*X+.5)/100'HPEK
7 GOSUB 600'BDJG
10 POKE 53281,15:PRINT"[CLEAR,ORANGE,
  DOWN,RIGHT11,RVS] LOAN CALCULATOR
  "'CJXG
20 INPUT"[DOWN3,BLUE]NO. OF MONTHS";
  N'BCCC
60 INPUT"[DOWN]INTEREST RATE % ";
  AR'BDSH
80 MR=AR/1200'CIH
90 INPUT"[DOWN]PRINCIPAL";P'BCDI
96 INPUT"[DOWN]MONTH OF FIRST PMT (1
  TO 12)";MO'BDTT
98 INPUT"[DOWN]YEAR OF 1ST PMT";
  YR'BDSS
100 PMT=(P*MR)/(1-(1+MR)^(-N))'HTSE
105 PMT=FN R(PMT)'CJTD
110 PRINT"[DOWN2]PAYMENT=",
  FN R(PMT)'CHFB
111 PRINT"[DOWN]PRESS RETURN KEY"'BACC
112 PRINT"TO RUN OR TO STOP"'BAVD
113 GET A$:IF A$="" THEN
  113'EIED
115 PRINT"[CLEAR,RVS]PMT #[SPACE3]
  INT AMT[SPACE4]PRIN AMT[SPACE5]
  BAL DUE "'BAFL
120 TA=0:TB=0:K=0:NP=P:NY=YR'FTRF
125 FOR I=1 TO N'DDIE
132 GET A$:IF A$=""THEN 140'EIEE
134 GET A$:IF A$<>""THEN 134'FIKG
136 GET A$:IF A$=""THEN 136'EIJI
140 IP=NP*MR'CGBC
145 PP=PMT-FN R(IP)'DKGI
150 NP=NP-PP'CGGD
155 AI=AI+IP'CGJI
160 IF I=N THEN PP=PP+NP:NP=0.00'GPCI
162 CP=CP+PP'CGIG
165 PRINT I;TAB(8);FN R(IP);TAB(18);
  FN R(PP);TAB(29);FN R(NP)'HFXR
167 IF I=N THEN PRINT"FINAL PAYMENT=";
  FN R(PP+IP)'GKHS
170 TA=TA+FN R(IP):REM ACCUMULATES
  INT.PD.'EDPM
175 TB=TB+FN R(PP):REM ACCUMULATES
  PRIN. PD.'EECR
177 IF I=N THEN 215'DFTM
180 IF I=13-MO THEN GOSUB 800
  :GOTO 210'GMHJ
185 K=K+1:IF K=12 THEN GOSUB 800'GKUO
210 NEXT I'BCBW
215 GOSUB 800'BDLD
220 PRINT"[DOWN,RIGHT,RVS] F1 [RVOFF]
  TO SEE AGAIN[SPACE3,RVS] F5
  [RVOFF] TO QUIT"'BARH
230 PRINT"[DOWN,RIGHT,RVS] F3 [RVOFF]
  TO DO ANOTHER[SPACE2,RVS] [^]
  [RVOFF,SPACE2]PRINTED COPY"'BAZK
235 GET B$:IF B$=""THEN 235'EILI
240 IF B$="[F1]"THEN 300:REM F1'EIME
250 IF B$="[F3]"THEN CLR:GOTO 5
  :REM F3'GHQG
260 IF B$="[F5]"THEN PRINT"[CLEAR]"

```

Continued on pg. 99

64 USERS ONLY/LOAN CALCULATOR

Continued from pg. 98

```
:NEW:REM F5'GGFI
270 IF B$="[ ^]" THEN 400'DFKG
280 GOTO 235'BDJF
300 NP=P:AI=0:NY=YR:CP=0:GOTO 110'FUKE
400 REM DATA TO PRINTER'BNLC
405 PRINT"[CLEAR,DOWN,RIGHT9,ORANGE,
RVS] SEND TO PRINTER "'BAJK
410 PRINT"[DOWN2,RIGHT2,BLUE]
IS PRINTER ON AND READY?"'BAOG
415 PRINT"[DOWN2,RIGHT2]
NAME OF THIS DOCUMENT (75 CHAR
LIMIT)":PRINT'CBCP
420 INPUT"[PURPLE]";F$'BDXB
425 IF LEN(F$)>75 THEN PRINT"[BLACK,
DOWN,RIGHT2]NAME TOO LONG,
TRY AGAIN[PURPLE,DOWN]"
:GOTO 420'GKUS
430 PRINT"[DOWN,RIGHT2,GREEN]
HOLD ON WHILE I TALK TO THE
PRINTER."'BAJL
440 OPEN 1,4'BDWD
445 CMD 1'BBFH
450 PRINT#1,F$'BETE
455 PRINT#1,"MONTHLY PAYMENT
: ";PMT;CHR$(16)"30"AMOUNT OF LOAN
: ";P'CNV
460 PRINT#1,"[RVS] PMT #[SPACE5]
INTEREST PMT[SPACE6]PRINCIPAL PMT
[SPACE6]BALANCE DUE"'BCGS
462 TA=0:TB=0:K=0:NP=P'EOFM
463 CP=0:AI=0:NY=YR'DMNN
465 FOR I=1 TO N'DDIL
470 IP=NP*MR'CGBI
475 PP=PMT-FN R(IP)'DKGO
480 NP=NP-PP'CGGJ
485 AI=AI+IP'CGJO
490 IF I=N THEN PP=PP+NP:NP=0'GMKO
492 CP=CP+PP'CGIM
495 PRINT#1,I;CHR$(16)"10";FN R(IP);
CHR$(16)"30";'EUIT
496 PRINT#1,FN R(PP);CHR$(16)"50";
FN R(NP)'ESFU
497 IF I=N THEN PRINT#1,
"FINAL PAYMENT=";FN R(PP+IP)'GMYJ
500 TA=TA+FN R(IP):REM ACCUMULATES
INT PD.'ECUJ
505 TB=TB+FN R(PP):REM ACCUMULATES
PRIN PD.'EDGO
507 IF I=N THEN 540'DFUJ
510 IF I=13-MO THEN GOSUB 900
:GOTO 530'GMNG
520 K=K+1:IF K=12 THEN GOSUB 900'GKVV
530 NEXT I'BBCC
540 GOSUB 900'BDME
550 CLOSE 1:L=0:PRINT"[CLEAR,BLUE]"
:GOTO 220'EJWJ
600 REM TITLE'BFRC
605 POKE 53281,15'BISH
610 PRINT"[CLEAR,ORANGE,DOWN,RIGHT6,
SHFT V28]"'BAQB
615 PRINT"[RIGHT6,SHFT V5,RVS] LOAN
[SPACE2]CALCULATOR [RVOFF,SHFT V5]
"'BASU
620 PRINT"[RIGHT6,SHFT V28]"'BACB
625 PRINT"[DOWN,RIGHT3,GREEN]
THIS PROGRAM WILL CALCULATE LOANS
AND"'BASS
630 PRINT"[RIGHT]MORTGAGES AND MAKE A
PRINTOUT ON PAPER."'BAHO
635 PRINT"[RIGHT]THE PRINTER PROGRAM
IS WRITTEN TO SKIP"'BAKT
640 PRINT"[DOWN,RIGHT]15 LINES FROM
ONE SHEET TO ANOTHER WHEN"'BADP
645 PRINT"[RIGHT]USING THE 1525
PRINTER. THIS MAY HAVE"'BAST
650 PRINT"[DOWN,RIGHT]TO BE CHANGED
FOR OTHER PRINTERS. SEE"'BAOP
655 PRINT"[DOWN,RIGHT]LINES 950 AND
980."'BAPO
657 PRINT"[DOWN,RIGHT3]
JUST FOLLOW THE SIMPLE
INSTRUCTIONS"'BAZX
660 PRINT"[DOWN,RIGHT]GIVEN BY THE
PROMPTS.[ORANGE,SPACE2]
(HIT ANY KEY)"'BAOQ
690 GET A$:IF A$="" THEN 690'EION
695 RETURN'BAQO
800 PRINT"[CMDR @40]"'BAVD
810 PRINT"[UP,RVS]TOTALS [RVOFF]"
:PRINT"YR";NY:NY=NY+1'EKKM
840 PRINT"[UP]"TAB(8);TA;TAB(18);
TB'DMNL
845 PRINT"ACCUM"TAB(8);FN R(AI);
TAB(18);FN R(CP)'FSHT
850 PRINT"[RVS]PMT #[SPACE3]INT AMT
[SPACE3]PRIN AMT[SPACE5]BAL DUE
[SPACE2]"'BANQ
860 TA=0:TB=0:K=0'DKSM
865 RETURN'BAQN
900 PRINT#1,"-----
---";'BDKJ
905 PRINT#1,"-----
-----"'BCAP
910 PRINT#1,"[RVS] TOTALS [RVOFF]
"'BCHH
920 PRINT#1,NY;CHR$(16)"10";TA;
CHR$(16)"30";TB'DUUM
930 PRINT#1,"ACCUM";CHR$(16)"10";
FN R(AI);CHR$(16)"30";
FN R(CP)'FYSQ
935 PRINT#1,"-----
---";'BDKR
937 PRINT#1,"-----
-----"'BCAU
940 NY=NY+1'CFSJ
950 L=L+1:IF L=3 OR L=6 OR L=9 OR
L=12 OR L=15 OR L=18 OR L=21 OR
L=24 OR L=27 THEN GOSUB 980'WGAF
955 TA=0:TB=0:K=0'DKSR
960 RETURN'BAQJ
980 FOR S=1 TO 15:PRINT#1:NEXT'FHCP
990 PRINT#1,"[RVS] PMT #[SPACE5]
INTEREST PMT[SPACE6]PRINCIPAL PMT
[SPACE6]BALANCE DUE"'BCGB
995 RETURN'BAQR
```

END

The Investor

for the
Commodore 64

The fierce battle we wage with the IRS is difficult enough without having to come up with all the tax information on our investments every year. Most of us mean to keep those important pieces of paper handy for tax time. The trouble is that we don't always keep them together.

The purpose of The Investor is to keep those records in one place and to have all those tedious calculations performed for you. Since The Investor is menu-driven, the task is as simple as possible.

The Investor keeps separate files of your active investments as well as your capital gains. The files can be added to and deleted from, as well as corrected for things like dividend reinvestments. You can personalize your files any way you like, and get a printout so you can always have a paper copy for quick reference.

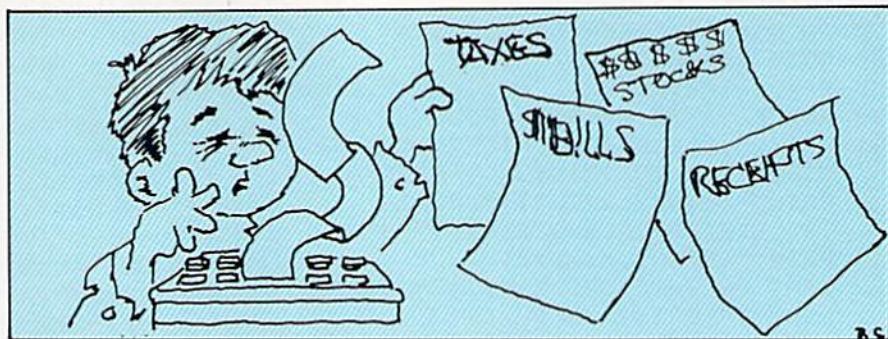
I like to use The Investor to print out how my investments are doing on any particular day. The program will tell you the points for 10%, 20%, 30% and 40% profits. It will also calculate your current capital gains and percent gain on an individual and collective basis.

But the best part is that all the information is there when you need it for your tax preparation.

How to Use the Program

Once you have a working copy of The Investor saved, run it. The first prompt you see is for the date, in mm/dd/yy format. You don't need to use zeros since the input is a string.

The first menu is for Update or Create. Use Create the first time you run the program. The program will prompt you for the name of the investment, date bought, number of shares, price per share, and commission charge. As you add more in-



Keep your investment records up-to-date with ease—and have all your data in one place for tax time.

vestments, The Investor will display the previously entered name at the top of the screen. This helps you keep track if you are interrupted. When you finish creating the file, you go to another menu. When you get to this menu, you should save your newly created file.

The second menu allows you to add, delete or correct the file, sell a stock, go to the capital gain file, or update your investments. Most often you will use this menu to update. When you add, delete or correct part of the file, be sure to immediately save the new investment file.

When you update, the program displays the name of the investment and prompts you for the current price. The Investor then performs all the calculations. The update loop will continue until all your investments have been updated. Always update your files with current prices before you either print them out or use "sell a stock." This way your printed and data files will always be current.

The third menu appears after you either complete your updating or choose "file complete" from the second menu.

You then have the option to print hard-copy, save to tape, save to disk, print to screen, rerun, or correct errors.

The Capital Gains File

The Capital Gains subroutine does several nice things for you. When you sell a stock, you will be asked if a capital gains file exists for that year. If you answer no, your data will be used to create a new file. I suggest you name your file for the year, such as "86ACG" for 1986 Annual Capital Gains. If you answer the prompt with yes, a file exists, and you will be asked for the file name. A simple "86*" will load the file into the computer. You may now add additional stocks you have sold or simply produce a printout.

Be sure to update the investment file before you use the capital gains subroutine. If you want to see only the capital gains data, use "cap gains data" when the second menu appears.

Note the novel use of the WAIT statement, as in line 55. The POKE clears the keyboard buffer and the wait statement tells the program to wait until one character is entered into the buffer. The program continues without a RETURN key so that the usual two lines to INPUT and GET are reduced to one line, and no question mark appears on the screen. Simple GET statements are used for pausing.

The Investor will help you keep track of your investment data so you don't have to spend time tracking down all those little slips of paper. □

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

The Investor

```
5 POKE 53280,1:POKE 53281,1
  :R$=CHR$(13)'EWFK
10 DIM A$(40),B$(40),C(40),CC(40),
  D(40),E(40),F(40),G(40),H(40),
```

```
P(40)'BMBJ
15 DIM CG(40),GG(40)'BNBF
20 PRINT"[CLEAR]";SPC(9)"TODAY'S DATE
  IS MM/DD/YY":INPUT TD$'DHUI
25 X=1'BCIE
30 PRINT"[CLEAR]";SPC(14)"[RVS]
  THE INVESTOR[RVOFF,DOWN2]"'CEHF
35 PRINT SPC(4)"A=UPDATE FILE[DOWN]
```

Continued on pg. 101

64 USERS ONLY/THE INVESTOR

```

''CCHJ
40 PRINT SPC(4)"B=CREATE FILE"CCBF
45 PRINT SPC(12)"[RVS] LOAD FILE
[RVOFF]"CDYK
50 PRINT SPC(3)"[DOWN]PROGRAM
CHOICE"CCFG
55 POKE 198,0:WAIT 198,1:GET Z$
:IF Z$="A"THEN 125'GUVO
60 GOTO 65'BCSC
65 PRINT"[CLEAR]";SPC(14)"[RVS]
CREATE FILE[RVOFF,DOWN2]"CEVN
70 I=1'BCSE
75 IF I=1 THEN GOTO 85'EEIL
80 PRINT"[CLEAR,RVS]PREVIOUS=";A$(I-1)
:PRINT"[RVOFF,DOWN]"DIRL
85 INPUT"NAME OF INVESTMENT";
A$(I)'BGJP
90 INPUT"DATE BOUGHT MM/DD/YY";
B$(I)'BGRM
95 INPUT"# SHARES ";D(I)'BFEN
100 INPUT"PRICE PER SHARE $";P(I)'BFJB
105 C(I)=D(I)*P(I)'CMDE
110 INPUT"COMMISSION CHARGE $";
CC(I)'BGAD
115 PRINT"MORE? Y/N":POKE 198,0
:WAIT 198,1:GET Z$:IF Z$="Y"THEN
I=I+1:GOTO 80'KYJP
120 I=I+1:GOTO 385'DHEA
125 PRINT"[CLEAR]";SPC(17)"[RVS]
UPDATE[RVOFF,DOWN2]"
:INPUT"FILE NAME=";N$'DIPL
130 PRINT"[CLEAR]":PRINT SPC(13)"[RVS]
T[RVOFF]APE OR [RVS]D[RVOFF]ISK
[RVOFF]"DEEG
135 POKE 198,0:WAIT 198,1:GET Z$
:IF Z$="T"THEN 170'GUPL
140 OPEN 1,8,2,+N$+"S,R"DIMD
145 I=1'BCSF
150 INPUT#1,A$(I),B$(I),C(I),CC(I),
D(I)'BEGG
155 I=I+1'CDFH
160 IF ST=0 GOTO 150'DGAE
165 CLOSE 1:PRINT"[CLEAR]";
SPC(14)"FILE LOADED[DOWN]"
:GOTO 210'EKBO
170 PRINT SPC(17)"UPDATE[DOWN2]"CDLF
175 OPEN 1,1,0,N$'BINJ
180 I=1'BCSE
185 INPUT#1,A$(I),B$(I),C(I),CC(I),
D(I)'BEGO
190 I=I+1'CDFG
195 IF ST=0 GOTO 185'DGIM
200 CLOSE 1:PRINT"[CLEAR]"
:PRINT SPC(14)"FILE LOADED[DOWN]"
"EGQD
205 PRINT SPC(11)"[RVS]
PRESS STOP ON TAPE[RVOFF]"CDTI
210 PRINT SPC(7)"[RVS]UPDATE BEFORE
PRINTING OUT[RVOFF]"CCWG
215 PRINT SPC(8)"[DOWN2]
1=UPDATE INVESTMENT"CCYJ
220 PRINT SPC(8)"2=ADD AN
INVESTMENT"CCVE
225 PRINT SPC(8)"3=DELETE AN
INVESTMENT"CCDK
230 PRINT SPC(8)"4=FILE COMPLETE"CCIE
235 PRINT SPC(8)"5=ERROR
CORRECTION"CCVK
240 PRINT SPC(8)"6=STOCK SOLD"CCSE
245 PRINT SPC(8)"7=CAP GAIN DATA"CCJK
250 INPUT"YOUR CHOICE";Z'BCLF
255 ON Z GOTO 260,445,450,385,490,770,
935'CDWM
260 FOR X=1 TO I-1'EEHF
265 E(X)=((C(X)*.1)+C(X))/D(X)'EWEQ
270 E1=INT(E(X)*100)/100'EOAI
275 IF E(X)>=E1+.005 THEN
E(X)=E1+.001'HUDQ
280 IF E(X)<=E1+.005 THEN E(X)=E1'GOAL
285 F(X)=((C(X)*.2)+C(X))/D(X)'EWGQ
290 F1=INT(F(X)*100)/100'EOCK
295 IF F(X)>=F1+.005 THEN
F(X)=F1+.001'HUHS
300 IF F(X)<=F1+.005 THEN F(X)=F1'GQEE
305 G(X)=((C(X)*.3)+C(X))/D(X)'EWIJ
310 G1=INT(G(X)*100)/100'EOED
315 IF G(X)>=G1+.005 THEN
G(X)=G1+.001'HULL
320 IF G(X)<=G1+.005 THEN G(X)=G1'GQIG
325 H(X)=((C(X)*.4)+C(X))/D(X)'EWKL
330 H1=INT(H(X)*100)/100'EOGF
335 IF H(X)>=H1+.005 THEN
H(X)=H1+.001'HUPN
340 IF H(X)<=H1+.005 THEN H(X)=H1'GQMI
345 PRINT"[CLEAR]";SPC(5)"COMPUTING
CAPITAL GAIN (LOSS)[DOWN2]"
:PRINT A$(X)'DJCS
350 INPUT"CURRENT PRICE PER SHARE=";
CP(X)'BGHK
355 CG(X)=(CP(X)*D(X))-C(X)'DULN
360 PG(X)=(CG(X)/C(X))*100'DTAJ
365 TC=C(X)+TC'CIRL
370 PR=CG(X)+PR'CJKH
375 NEXT'BAEJ
380 TG=(PR/TC)*100'DLRJ
385 PRINT"[CLEAR]":PRINT
SPC(8)"1=PRINT HARD COPY[DOWN]"
:PRINT SPC(8)"2=SAVE TO TAPE[DOWN]"
"FGSX
390 PRINT SPC(8)"3=SAVE TO DISK[DOWN]"
:PRINT SPC(8)"4=PRINT TO SCREEN
[DOWN]":EGMS
395 PRINT SPC(8)"5=RERUN PROGRAM"
:PRINT SPC(8)"[DOWN]
6=ERROR CORRECTION":INPUT Z'FHOA
400 ON Z GOTO 590,405,675,710,765,
490'CYAE
405 PRINT SPC(9)"[RVS]LOAD DATA TAPE
[RVOFF]"CCUI
410 INPUT"FILE NAME=";N$'BDQC
415 OPEN 1,1,2,N$'BIPG
420 FOR Y=1 TO I-1'EEID
425 PRINT#1,A$(Y);R$(Y);B$(Y);R$(Y);C(Y);R$(Y);
CC(Y);R$(Y);D(Y)'BQGO
430 NEXT Y'BBSB
435 PRINT SPC(13)"FILE COMPLETE[DOWN2]

```


64 USERS ONLY/THE INVESTOR

```

" 'CDVL
440 CLOSE 1:GOTO 210'CFNE
445 GOTO 80'BCPH
450 PRINT SPC(15)"[CLEAR]
DELETE AN INVESTMENT[DOWN]" 'CDUL
455 FOR X=1 TO I-1:PRINT SPC(10)X;
A$(X):NEXT'HQDP
460 INPUT"NUMBER TO DELETE";Z'BCJJ
465 FOR X=Z TO I'DDJL
470 A$(X)=A$(X+1):B$(X)=B$(X+1)
:C(X)=C(X+1):CC(X)=CC(X+1)
:D(X)=D(X+1)'KFRX
475 NEXT'BAEK
480 PRINT"MORE TO DELETE? Y/N"
:POKE 198,0:WAIT 198,1:GET Z$
:IF Z$="Y"THEN 450'HVPU
485 GOTO 915'BDOM
490 PRINT SPC(12)"[CLEAR,RVS]
ERROR CORRECTION[RVOFF]" 'CDEF
495 FOR X=1 TO I-1:PRINT X;A$(X)
:NEXT'GNFS
500 PRINT"[DOWN2]CORRECTING
INVESTMENT#";:INPUT M%'CEXH
505 PRINT SPC(8)"[RVS]1[RVOFF]
NAME"'CCMH
510 PRINT SPC(8)"[RVS]2[RVOFF]
DATE BOUGHT"'CCSF
515 PRINT SPC(8)"[RVS]3[RVOFF]
# SHARES"'CCSJ
520 PRINT SPC(8)"[RVS]4[RVOFF]
PRICE"'CCSF
525 PRINT SPC(8)"[RVS]5[RVOFF]
COMMISSION"'CCPL
530 PRINT"CORRECTING ";A$(M%);
:INPUT C'CKHI
535 ON C GOTO 540,550,560,570,580'CUUM
540 PRINT A$(M%)"-CHANGE NAME TO"
:INPUT A$(M%)'CNOK
545 GOTO 385'BDPJ
550 PRINT A$(M%):PRINT"-CHANGE DATE
MM/DD/YY ";B$(M%);" TO"
:INPUT B$(M%)'DWRQ
555 GOTO 385'BDPK
560 PRINT A$(M%):PRINT"-CHANGE # OF
SHARES ";D(M%);" TO"
:INPUT D(M%)'DUYQ
565 GOTO 385'BDPL
570 PRINT A$(M%):PRINT"-CHANGE PRICE
$"P(M%);" TO":INPUT P(M%)'DTWQ
575 C(M%)=(D(M%)*P(M%)):GOTO 385'DVYR
580 PRINT A$(M%):PRINT"-CHANGE
COMMISSION COST $"CC(M%);" TO"
:INPUT CC(M%)'DVOU
585 GOTO 385'BDPN
590 PRINT"[CLEAR]";SPC(9)"[RVS]
PRINTING A HARD COPY"'CDXP
595 OPEN 4,4:CMD 4'CFLP
600 PRINT TD$:PRINT'CEOC
605 FOR Y=1 TO I-1'EEII
610 PRINT#4,Y;A$(Y);" BGHT ON ";B$(Y);
"@$";(C(Y)/D(Y));'CENL
612 PRINT#4,"/SHR";"[SPACE2]#SHRS=";
D(Y)'BIWI
615 PRINT#4,"CURRENT PRICE=$";CP(Y)
:PRINT#4,"COMMISSION COST=$";
CC(Y)'CRCT
620 PRINT#4,"10%PROFIT @$";E(Y)
:PRINT#4,"20%PROFIT @$";F(Y)'CPGM
625 PRINT#4,"30%PROFIT @$";G(Y)
:PRINT#4,"40%PROFIT @$";H(Y)'CPOR
630 PRINT#4,"CURRENT CAPITAL GAIN=$";
CG(Y)'BIQL
635 PRINT#4,"AMOUNT INVESTED[SPACE5]
=$";C(Y)'BHJP
640 PRINT#4,"CURRENT VALUE[SPACE7]=$";
(C(Y)+CG(Y))'COSN
645 PRINT#4,"CURRENT PERCENT GAIN=";
PG(Y);"%"'BJIR
650 PRINT#4:NEXT'CCKG
655 PRINT#4:PRINT#4,"TOTAL AMOUNT
INVESTED =$";TC'CHUT
660 PRINT#4,"TOTAL CAPITAL GAIN
[SPACE4]=$";PR'BFSN
665 PRINT#4,"TOTAL PERCENT GAIN
[SPACE4]="TG;"%":PRINT'CGLT
670 PRINT#4,CHR$(12):PRINT#4:CLOSE 4
:PRINT"[CLEAR]":GOTO 210'GPRO
675 PRINT"[CLEAR]";SPC(5)"[RVS]
WRITING INVESTMENT DATA TO DISK
[RVOFF]" 'CDVX
680 INPUT"FILE NAME=";N$'BDQL
685 OPEN 1,8,2,"@0:"+N$+"S,W"'DIKS
690 FOR Y=1 TO I-1'EEIM
695 PRINT#1,A$(Y);R$;B$(Y);R$;C(Y);R$;
CC(Y);R$;D(Y)'BQGX
700 NEXT'BAEB
705 CLOSE 1:PRINT"[CLEAR]"
:GOTO 210'DGQJ
710 PRINT"[CLEAR]HAVE YOU UPDATED?
[SPACE2]Y/N":POKE 198,0
:WAIT 198,1'DMYM
712 GET Z$:IF Z$="N"THEN 260'EILI
715 PRINT"[CLEAR]";SPC(8)"[RVS]
COPY IN YOUR RECORD BOOK[RVOFF]
"'CDDQ
720 FOR Y=1 TO I-1'EEIG
725 PRINT"[DOWN]";Y;A$(Y)
:PRINT"BGHT ON ";B$(Y);" @$";
(C(Y)/D(Y));"/SHR"'DDVT
730 PRINT"[SPACE2]#SHRS=";D(Y)
:PRINT"PRICE=$";CP(Y)'CMFL
732 PRINT"COMMISSION COST=$";
CC(Y)'BGGM
735 PRINT"10% PROFIT @$";E(Y)
:PRINT"20% PROFIT @$";F(Y)'CLLS
740 PRINT"30% PROFIT @$";G(Y)
:PRINT"40% PROFIT @$";H(Y)'CLTO
745 PRINT"PRESS RETURN TO
CONTINUE"'BAFR
750 POKE 198,0:WAIT 198,1:GET Z$'DOJK
755 NEXT'BAEL
760 PRINT"[CLEAR]":GOTO 210'CEFJ
765 RUN'BAMM
770 PRINT"[CLEAR]HAVE YOU CREATED A
CAPITAL GAIN FILE FOR THIS YEAR?
[SPACE2]Y/N[DOWN2]" 'BAPX

```


64 USERS ONLY/THE INVESTOR

```

775 POKE 198,0:WAIT 198,1:GET Z$
:IF Z$="Y"THEN 935'GUEV
780 FOR X=1 TO I-1:PRINT X,
LEFT$(A$(X),8),:NEXT
:PRINT CHR$(13)'JXHT
785 PRINT"[DOWN]WHICH INVESTMENT HAS
BEEN SOLD";:INPUT Z'CDNY
790 N=N+1'CDPM
795 AG$(N)=A$(Z):BG$(N)=B$(Z)
:CD(N)=C(Z):DG(N)=D(Z)'ESPC
797 CA(N)=CG(Z):GG(N)=CC(Z)'CVIX
800 INPUT"SOLD @$";SA(N)'BGYF
805 GC(N)=(SA(N)*DG(N))-CD(N)
:AG=AG+GC(N)'FHMR
810 INPUT"DATE SOLD MM/DD/YY";
SD$(N)'BHKJ
815 PRINT SPC(7)"CAPITAL GAIN DATA
FOR YEAR"'CCGQ
820 INPUT"FILE NAME=";N$'BDQH
825 PRINT SPC(10)"[CLEAR]SAVE TO [RVS]
T[RVOFF]APE OR [RVS]D[RVOFF]
ISK"'CDER
830 POKE 198,0:WAIT 198,1:GET Z$
:IF Z$="D"THEN 875'GULN
835 OPEN 2,1,3,N$'BIRM
840 FOR X=1 TO N'DDXI
845 PRINT#2,AG$(X);R$;BG$(X);R$;CD(X);
R$;DG(X);R$;CA(X);R$;SA(X);R$;
GG(X)'BNUB
850 PRINT#2,SD$(X);R$;AG'BOFK
855 FOR Y=Z TO I'DDKO
860 A$(Y)=A$(Y+1):B$(Y)=B$(Y+1)
:C(Y)=C(Y+1):CC(Y)=CC(Y+1)
:D(Y)=D(Y+1)'KFCB
865 E(Y)=E(Y+1):NEXT Y:NEXT X'ENWS
870 CLOSE 2:GOTO 915'CFBL
875 OPEN 2,8,3,"@0:"+N$+"S,W"'DIMT
880 FOR X=1 TO N'DDXM
885 PRINT#2,AG$(X);R$;BG$(X);R$;CD(X);
R$;DG(X);R$;CA(X);R$;SA(X);R$;
GG(X)'BNUF
890 PRINT#2,SD$(X);R$;AG'BOFO
895 FOR Y=Z TO I'DDKS
900 A$(Y)=A$(Y+1):B$(Y)=B$(Y+1)
:C(Y)=C(Y+1):CC(Y)=CC(Y+1)
:D(Y)=D(Y+1)'KFCV
905 E(Y)=E(Y+1):NEXT Y:NEXT X'ENWN
910 CLOSE 2'BBJE
915 PRINT SPC(3)"[CLEAR,DOWN]
SAVE THIS REVISED INVESTMENT
DATA"'CCGU
920 PRINT SPC(13)" [RVS]T[RVOFF]
APE OR [RVS]D[RVOFF]ISK "'CDYL
925 POKE 198,0:WAIT 198,1:GET Z$
:IF Z$="T"THEN I=I-1:GOTO 405'JYMV
930 I=I-1:GOTO 675'DHHJ
935 PRINT"[CLEAR]CAPITAL GAIN DATA
FOR THIS YEAR":PRINT'CBOV
940 INPUT"FILE NAME=";N$'BDQK
945 PRINT"[CLEAR]";SPC(13)"[RVS]T
[RVOFF]APE OR [RVS]D[RVOFF]ISK"
:POKE 198,0:WAIT 198,1:GET Z$'FTYY
950 IF Z$="T"THEN OPEN 2,1,0,N$
:GOTO 960'FOOO
955 OPEN 2,8,3,+N$+"S,R"'DIOR
960 R=1'BCCK
965 INPUT#2,AG$(R),BG$(R),CD(R),DG(R),
CA(R),SA(R),GG(R),SD$(R),AG'BFBX
970 R=R+1'CDXM
975 IF ST=0 THEN 965'DGTS
980 CLOSE 2'BBJL
985 PRINT"[CLEAR]";SPC(5)"ADD MORE
INVESTMENTS SOLD[SPACE2]Y/N"
:POKE 198,0:WAIT 198,1'EPJF
990 GET Z$:IF Z$="Y"THEN PRINT"[CLEAR]
":N=R-1:GOTO 780'INMV
995 PRINT"PRINT TO [RVS]S[RVOFF]
CREEN OR [RVS]P[RVOFF]RINTER"
:POKE 198,0:WAIT 198,1:GET Z$'EPHG
1000 IF Z$="S"THEN 1055'DGDV
1005 OPEN 4,4:CMD 4'CFLA
1010 PRINT#4,"ANNUAL CAP. GAIN DATA
AS OF ";TD$'BGGC
1012 PRINT#4,"SAVE FOR TAX
RECORDS"'BCAC
1015 FOR X=1 TO R-1:PRINT#4'FGWD
1020 PRINT#4,AG$(X);" BGHT ON ";
BG$(X);" @$";(CD(X)/DG(X));'CGRF
1022 PRINT#4,"/SHR";" #SHR=";
DG(X)'BJBC
1025 PRINT#4,"SOLD @$";SA(X);" ON ";
SD$(X)'BQDG
1027 PRINT#4,"COMMISSION COST=$";
GG(X)'BICJ
1030 PRINT#4,"CAPITAL GAIN FOR ";
AG$(X);"=$";(SA(X)*DG(X))-CD(X)
:PRINT#4'EFIK
1035 NEXT'BAEB
1040 PRINT#4,"ANNUAL CAPITAL GAIN
[SPACE2]=$";AG'BFNE
1045 PRINT#4,CHR$(12):CLOSE 4'DIDF
1050 PRINT"[CLEAR]":GOTO 210'CEFA
1055 PRINT"[CLEAR]ANNUAL CAP. GAIN
DATA AS OF ";TD$'BEDM
1057 PRINT"COPY IN YOUR RECORD
BOOK"'BAFM
1060 FOR X=1 TO R-1:PRINT'FFVD
1065 IF X>3 THEN PRINT:PRINT"PRESS
RETURN TO CONTINUE"'FDOU
1067 POKE 198,0:WAIT 198,1:GET Z$'DOJK
1070 PRINT AG$(X);" BGHT ON ";BG$(X)
:PRINT"@$";(CD(X)/DG(X));"/SHR";
'DFCM
1075 PRINT"[SPACE2]#SHR=";DG(X)'BGDI
1080 PRINT"SOLD @$";SA(X);" ON ";
SD$(X):PRINT"COMMISSION COST=$";
GG(X)'CVYO
1085 PRINT"CAPITAL GAIN FOR ";AG$(X);
"=$";(SA(X)*DG(X))-CD(X)
:NEXT'ECUT
1090 PRINT:PRINT"ANNUAL CAPITAL GAIN
=$";AG'CEWJ
1095 PRINT:PRINT"PRESS RETURN TO
CONTINUE"'CBKP
1100 POKE 198,0:WAIT 198,1:GET Z$
:PRINT"[CLEAR]":GOTO 210'FTRB END

```


Magic Lantern

Advanced Animation for the Commodore 128

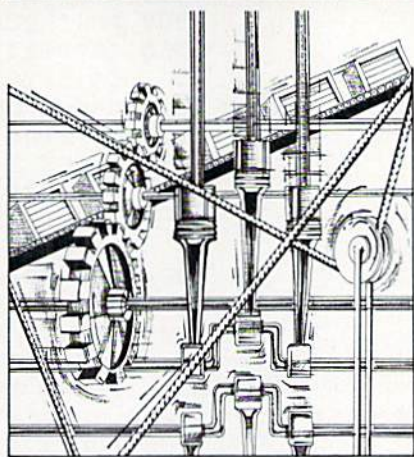
Magic Lantern is an advanced animation demonstration for the Commodore 128. A sequence of high-resolution drawings of a cartoon-like "factory" that vary from one another only slightly is first drawn and stored in memory. When the drawings are flashed on the screen one after another, it appears as though the factory comes to life. Wheels and pulleys turn, crates slide along a conveyor, and pistons, connecting rods and levers move in a realistic fashion. Unlike sprites, which tend to be moved unchanged around the screen in most programs, here *everything* moves.

The only "secret" is that the Commodore 128 has enough memory to store several high-resolution screens. A machine-language subroutine located in the cassette buffer transfers blocks of memory from the storage locations to the bit-map display area of memory. It happens fast enough so that your eyes can't see the change taking place. Therefore, when a new picture suddenly takes the place of the old, a phenomenon called "persistence of vision" fools our brains into thinking that the cartoon factory is actually "working."

Obviously, the drawings have to be carefully related to one another. In the factory drawn in the demonstration, certain parts remain fixed at all times: the bases of the equipment, the boiler, pulley supports. Then, for each of eight different pictures, the spokes of the flywheel are drawn in slightly different positions, crates are drawn a little bit to the right each time on the conveyor, the piston and main rod are moved in and out of the cylinder as required, and other gimmicks and gew-gaws are drawn in different (but carefully calculated) positions. Cartooning is painstaking work!

Notes on Running Magic Lantern

Type in the BASIC listing carefully, taking particular care with the data statements at the end that hold the machine-



A sequence of drawings that vary from one another only slightly is first drawn and stored in memory. When the drawings are flashed on the screen, one after the other, the cartoon factory comes to life.

language subroutine Poke values. As always, save the program on disk before you run it.

Now run the program. You'll see Magic Lantern start to construct the first of eight "factory" pictures. Things move along faster after the first picture is finished, because the program uses the machine-language swapping routine to save an image of the unchanging parts of the factory, making it unnecessary to redraw them.

Finally, all the drawings are finished, and the factory comes to life! In order to save you from having to watch the Magic Lantern do all that drawing again the next time you run the program, there's a little program tacked onto the end that will save the machine-language routine and all the graphic pictures to disk. To take advantage of this capability, insert a disk with at least 140 blocks free into your drive, and type (once you've stopped the program, of course!) RUN 4210. This will BSAVE those two areas of memory. Then, type in the much shorter

program, Quick Demo, which BLOADS this same information from the disk and starts the factory up again.

Using Magic Lantern to Create Animated Cartoons

It takes 9K (9,216 bytes) of memory to store a high-resolution bit-map and color memory, or 8K (8,192 bytes) if you just store the bit-map and leave everything the same color. Even leaving the color memory alone, there still wasn't enough room in Bank 0 to store the program and the eight pictures I wanted. ($8 \times 8,192 = 65,535$ bytes!) I could have stored some of the pictures easily enough in Bank 1, but I wasn't sure if I could transfer them fast enough back into the Bank 0 bit-map for the animation effect to work. (I believe each byte would have to be run through the INDFET Kernal routine that gets a byte from any bank. Some more experimentation is needed here...)

Finally, the obvious answer struck me—who needs a whole screen? Besides, it would take a lot more drawing routines to fill up all that space! I finally settled on high-resolution, split-screen mode, called by the command GRAPHIC 2,1,13. This gave me almost half the screen for my "factory" drawing, and reduced each bitmap stored to 17 pages of memory (4,352 bytes) for a total of 34,816 bytes.

Of course, the memory-swapping subroutine can be used in your own programs, too. Note line 3910. The variable NP is set equal to the number of pages of memory (256 bytes each) that you wish to save and swap. As related above, I chose to save 17 pages. If I'd included the color memory with my factory, that would have been four more pages (21). Saving the full bit-map would take 32 pages, and the full bit-map with color memory 36 pages. The value of NP is poked into memory where the machine-language routine can refer to it by line 3920.

Another important variable is defined in line 3970. SF (stands for "starts from") is the decimal value of the high byte that your save/swap is to start from. (The low high byte is always zero.) To start from color memory, set SF=28. For just the bitmap, set SF=32. There's nothing limiting you to starting your cartoon at the top of the screen—just set the value

Continued on pg. 105

128 USERS ONLY/MAGIC LANTERN

Continued from pg. 104
of SF accordingly.

The machine-language routine is called with a SYS 2816, followed by two parameters. The first value is the number of the picture you wish to display. The second is either zero or one. If the machine-language routine sees your second

parameter is zero, it will transfer the portion of memory at the bit-map (or wherever else you told it to through variable SF) to an area of memory above the BASIC program. This is used to "save" a picture for display later. Conversely, if the machine-language routine sees a value of one for the second parameter, it will

transfer the picture from memory into the bit-map area.

A close look at the listing of Magic Lantern should make it pretty clear how to use the routine. A word of caution: Watch that your BASIC program doesn't "grow up" into where you're storing your pictures! C

Before typing these programs, read "How to Enter Programs." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Magic Lantern

```
7 GOTO 210 : REM SKIP OVER
  ANIMATE'CTLL
8 : 'ABHG
10 REM ANIMATE! (DRAWINGS MUST
  ALREADY BE IN MEMORY)'BOKI
20 COLOR 0,1 : REM BLACK SCREEN'CPD
30 COLOR 1,8 : REM YELLOW
  FOREGROUND'CUCG
40 COLOR 4,1 : REM BLACK
  BACKGROUND'CTAG
50 GRAPHIC 2,1,13 : REM SET
  HI-RES/TEXT'CVFH
60 GOSUB 3820 : REM POKE IN ML'CNEG
70 : 'ABHD
80 X=0 : PRINT CHR$(147)'DIRH
90 REM ANIMATION LOOP'BNEJ
100 REM (DISPLAYS ALL EIGHT SCREENS
  SEQUENTIALLY)'BMTG
110 X=X+1 : IF X=9 THEN X=1'GINC
120 BANK 0 : SYS 2816,X,1'CLKA
130 IF X=3 OR X=7 THEN SOUND 3,15000,
  7,0,0,0,3'GVAG
140 IF X=1 THEN SOUND 2,1000,2,0,0,0,
  3'ESEF
150 GET DE$:IF DE$="" THEN 170 'EKBE
160 DE=VAL(DE$)*100'DKIF
170 FOR D = 1 TO DE : NEXT D'EGMF
180 GOTO 110 'BDDE
190 : 'ABHE
200 : 'ABHV
210 REM INITIALIZE'BKDA
220 : 'ABHX
230 COLOR 0,1 : REM BLACK
  SCREEN'CPD
240 COLOR 1,8 : REM YELLOW
  FOREGROUND'CUCH
250 COLOR 4,1 : REM BLACK
  BACKGROUND'CTAH
260 PRINT "[CLEAR]"'BATD
270 GRAPHIC 2,1,13 : REM
  HI-RES/TEXT'CSAI
280 GOSUB 3820 : REM POKE IN ML'CNEI
290 : 'ABHF
300 DEF FN R(X) = INT(RND(1)*X)+1'HLKE
310 : 'ABHX
320 REM DRAW EIGHT DIFFERENT
  PICTURES'BBBH
330 FOR PN = 1 TO 8'DEVC
340 PRINT "DRAWING PICTURE" PN'BCPG
350 GOSUB 590 : REM DRAW UNCHANGING
  PARTS'CXQJ
360 SA = 45*PN-45 : REM STARTING
  ANGLE FOR ROTATING WHEELS'EOQQ
370 GOSUB 1900 : REM POSITION
  COUNTERWEIGHT, ETC.'CGDN
380 IF PN=4 THEN GOSUB 2560
  :REM VAPOR'FNVL
390 IF PN=7 THEN GOSUB 2500
  :REM VAPOR'FNSM
400 IF PN=3 THEN GOSUB 2410
  :REM VAPOR'FNOE
410 GOSUB 2640 : REM PULLEY BELTS'CQSE
420 GOSUB 2900 : REM PULLEY MOVEMENT
  MARKS'CYDH
430 GOSUB 3460 : REM CRATE LIFTING
  MACHINE'CYWI
440 GOSUB 3070 : REM PUSHER BAR'CODG
450 IF PN=1 THEN Y=50 : GOSUB 3290
  : REM PRODUCT'GTLL
460 IF PN=2 THEN Y=55 : GOSUB 3290
  : REM PRODUCT'GTRM
470 GOSUB 3330 : REM DRAW OPERATING
  LEVER'CXPM
480 REM DRAW CRATES'BKBJ
490 CK=140 : IF PN<5 THEN CK=180'FOJN
500 Y=62 : CR=CK+5*PN'ELUE
510 FOR X=CR TO 330 STEP 40'EICE
520 GOSUB 2350 : REM PRINT CRATE AT
  X,Y'CUQH
530 NEXT'BAEC
540 BANK 0 : SYS 2816,PN,0
  : REM SAVE THIS PICTURE'DDYM
550 NEXT PN'BCGF
560 GOTO 10 : REM AND NOW,
  ON WITH THE SHOW!'CYSM
570 : 'ABHG
580 : 'ABHH
590 REM DRAW UNCHANGING PARTS'BTPO
600 IF PN<>1 THEN SYS 2816,9,1
  : RETURN'GMSG
610 REM RECALLS "STOCK" DRAWING'BOQH
620 REM (WHY REDRAW IT?)'BOUG
630 REM CONVEYOR'BIEG
640 BOX 1,170,100,330,102,0,1'BVEI
650 BOX 1,185,80,330,90'BPXI
660 FOR X=185 TO 320 STEP 20'EJIK
670 DRAW 1,X,80 TO X,90'CKPK
680 DRAW 1,X,80 TO X+20,90'DMCM
690 NEXT X'BBRJ
700 DRAW 1,175,84 TO 185,80'COBF
710 DRAW 1,175,85 TO 185,90'CODG
720 PAINT 1,177,85'BIPF
730 WIDTH 1'BCYF
```

Continued on pg. 106

128 USERS ONLY/MAGIC LANTERN

Continued from pg. 105

```
740 CIRCLE 1,177,85,8,6'BMKI
750 DRAW 0,177,85'BIUI
760 FOR X=83 TO 87 STEP 2'EGCK
770 DRAW 0,184,X : NEXT X'CJRL
780 DRAW 1,177,79 TO 330,79'COHN
790 DRAW 1,177,92 TO 330,92'COWO
800 WIDTH 2'BCAD
810 FOR X = 204 TO 330 STEP 40'EJDH
820 DRAW 1,X,88 TO X,100'CLNH
830 DRAW 1,X+2,88 TO X+2,100'ENQK
840 DRAW 1,X-2,99 TO X+4,99'EMPL
850 NEXT X'BBRH
860 REM STEAM ENGINE PARTS'BQWN
870 REM FLYWHEEL'BINL
880 WIDTH 2'BCAL
890 CIRCLE 1,70,76,26,20'BNVO
900 CIRCLE 1,70,76,25,19'BNDG
910 CIRCLE 1,70,76,4,3'BLDG
920 PAINT 1,70,76'BHJH
930 WIDTH 1'BCYH
940 REM CYLINDER'BIHJ
950 BOX 1,1,100,110,102,0,1'BTWM
960 CIRCLE 1,34,76,1,6'BLDL
970 CIRCLE 1,5,76,1,6,180,360'BSKO
980 DRAW 1,5,73 TO 20,73'CLSO
990 DRAW 1,5,76 TO 19,76'CLHP
1000 DRAW 1,5,79 TO 20,79'CLFV
1010 WIDTH 2'BCAU
1020 DRAW 1,5,69 TO 32,69'CLGX
1030 DRAW 1,5,83 TO 32,83'CLXY
1040 WIDTH 1'BCYX
1050 BOX 1,7,64,30,69'BMCB
1060 WIDTH 2'BCAA
1070 DRAW 1,7,83 TO 2,100'CLMD
1080 DRAW 1,30,83 TO 34,100'CNEF
1090 PAINT 1,15,85'BHIE
1100 REM RIVETS'BGHV
1110 WIDTH 1'BCYV
1120 FOR X=4 TO 32 STEP 3'EFNY
1130 DRAW 0,X,100:NEXT'CISA
1140 FOR X=7 TO 30 STEP 3'EFOB
1150 DRAW 0,X,85:NEXT'CHMB
1160 Y=8 : Z=30'CGKC
1170 FOR X=85 TO 100 STEP 2'EHIF
1180 DRAW 0,Y,X : DRAW 0,Z,X'CLSG
1190 Y=Y-.5 : Z=Z+.5'EJFI
1200 NEXT X'BBRU
1210 REM FLYWHEEL SUPPORTS'BQBB
1220 DRAW 1,50,100 TO 55,93'CNKB
1230 DRAW 1,60,100 TO 64,96'CNOC
1240 DRAW 1,80,100 TO 76,96'CNTD
1250 DRAW 1,90,100 TO 85,92'CNQE
1260 PAINT 1,55,95'BHND
1270 PAINT 1,82,95'BHNE
1280 FOR X=54 TO 59 STEP 2'EGYG
1290 DRAW 0,X,100'BHKG
1300 DRAW 0,X+29,100'CJGY
1310 NEXT'BAEW
1320 CIRCLE 0,70,76,27,21,145,212'BVHC
1330 REM STEAM PIPE, BOILER'BQGE
1340 BOX 1,17,40,20,65,1'BPID
1350 CIRCLE 1,11,40,6,5,0,90'BQDE
1360 CIRCLE 1,11,42,10,9,4,78'BRGG
1370 PAINT 1,17,36'BHGF
1380 CIRCLE 1,5,40,3,15,180,360'BTBI
1390 FOR X = 27 TO 53 STEP 2'EGSI
1400 DRAW 0,0,X TO 5,X'CIGA
1410 NEXT X'BBRX
1420 BOX 1,7,33,12,35,1'BOJC
1430 CIRCLE 1,7,40,3,15'BLVC
1440 DRAW 1,0,55 TO 7,55'CKUE
1450 DRAW 1, 0,25 TO 7,25'CKOF
1460 REM OVERHEAD PULLEYS'BPLI
1470 WIDTH 2'BCAF
1480 CIRCLE 1,115,10,13,10'BOCI
1490 CIRCLE 1,177,10,13,10'BOKJ
1500 DRAW 1,115,12 TO 177,12'COHC
1510 DRAW 1,115,11 TO 177,11'COFD
1520 DRAW 1,115,10 TO 177,10'CODE
1530 DRAW 1,115,12 TO 105,0'CNDE
1540 DRAW 1,115,12 TO 125,0'CNAG
1550 DRAW 1,177,12 TO 187,0'CNQH
1560 DRAW 1,177,12 TO 167,0'CNQI
1570 CIRCLE 1,146,7,4,3'BLBH
1580 PAINT 1,146,7'BHHI
1590 WIDTH 2 : DRAW 1,146,12 TO 136,
0'DQOM
1600 DRAW 1,146,12 TO 156,0'CNID
1610 CIRCLE 1,115,10,3,2'BMGD
1620 CIRCLE 1,177,10,3,2'BMOE
1630 PAINT 1,115,10'BIUE
1640 PAINT 1,177,10'BIDF
1650 REM PRODUCT CHUTE'BMPI
1660 WIDTH 1 : BOX 1,230,30,254,
46'CSRK
1670 FOR X=32 TO 44 STEP 3'EGPJ
1680 DRAW 1,232,X : DRAW 1,252,X'CPUL
1690 NEXT'BAEI
1700 FOR X=232 TO 252 STEP 3'EIIE
1710 DRAW 1,X,32 : DRAW 1,X,44'CNVF
1720 NEXT'BAEC
1730 CIRCLE 1,242,39,3,2'BMSG
1740 PAINT 1,242,39'BIHG
1750 DRAW 0,242,39'BIMH
1760 BOX 1,210,0,274,10'BOFJ
1770 FOR X=2 TO 8 STEP 3'EEQK
1780 DRAW 1, 212,X : DRAW 1,272,X'CPUM
1790 NEXT'BAEJ
1800 FOR X=212 TO 272 STEP 3'EIIF
1810 DRAW 1, X,2 : DRAW 1, X,8'CLWG
1820 NEXT'BAED
1830 DRAW 1,210,10 TO 230,30'COQI
1840 DRAW 1, 274,10 TO 254,30'COHJ
1850 DRAW 1,230,46 TO 234,50'COIK
1860 DRAW 1,254,46 TO 250,50'COML
1870 DRAW 1,234,50 TO 250,50'COFM
1880 SYS 2816,9,0 : REM SAVE "STOCK"
PIC FOR LATER RECALL'CFIT
1890 RETURN'BAQK
1900 REM DRAW CRANK, COUNTERWEIGHT
FROM SA'BEIL
1910 REM CRANK'BFDE
1920 CIRCLE 0,70,76,8,6,SA,SA+225'CUXJ
1930 CX=RDOT(0) : CY=RDOT(1)'ELTK
```

Continued on pg. 107

128 USERS ONLY/MAGIC LANTERN

Continued from pg 106

```
1940 CIRCLE 1,CX,CY,4,3'BLVJ
1950 PAINT 1,CX,CY'BHIJ
1960 WIDTH 1: CIRCLE 0,CX,CY,5,4'COFM
1970 REM COUNTERWEIGHT'BNSN
1980 CIRCLE 1,70,76,25,19,359,SA'BUTO
1990 X=RDOT(0) : Y=RDOT(1)'EJQP
2000 CIRCLE 1,70,76,25,19,SA,
SA+120'CWLA
2010 X1=RDOT(0):Y1=RDOT(1)'ELIA
2020 CIRCLE 0,70,76,23,17,SA,
SA+45'CVUB
2030 P1=RDOT(0) : P2=RDOT(1)'ELRC
2040 DRAW 1,X,Y TO X1,Y1'CKCC
2050 PAINT 1,P1,P2'BHGB
2060 WIDTH 1'BCYB
2070 CIRCLE 0,70,76,24,18,SA,
SA+120'CWIH
2080 REM DRAW SPOKES'BKUF
2090 FOR Z=0 TO 2'DDVF
2100 WIDTH 1'BCYV
2110 CIRCLE 1,70,76,26,20,SA,
SA+60*Z'DWVC
2120 X=RDOT(0) : Y=RDOT(1)'EJQB
2130 CIRCLE 1,70,76,26,20,SA+60*Z,
SA+60*Z+180'GDEI
2140 X1=RDOT(0) : Y1=RDOT(1)'ELIE
2150 WIDTH 2'BCAB
2160 DRAW 1,X,Y TO X1,Y1'CKCF
2170 P2=P2+1 : NEXT Z'DHQF
2180 REM DRAW PISTON, MAIN ROD'BSHI
2190 WIDTH 1'BCYF
2200 PX=CX-20'CGCY
2210 CIRCLE 0,PX,76,5,4'BLNA
2220 CIRCLE 1,PX,76,4,3'BLMB
2230 DRAW 0,PX-4,78 TO 34,78'DNJE
2240 WIDTH 2'BCAB
2250 DRAW 1,PX,76 TO 34,76'CMNF
2260 DRAW 1,PX,75 TO 34,75'CMLG
2270 DRAW 1,PX,77 TO 34,77'CMPH
2280 DRAW 1,PX,75 TO CX,CY-1'DNAJ
2290 DRAW 1,PX,76 TO CX,CY'CMMJ
2300 DRAW 1,PX,77 TO CX,CY+1'DNBC
2310 DRAW 0,CX,CY,1,1'BLSB
2320 DRAW 0,PX,76,1,1'BLJC
2330 DRAW 0,70,76'BHOC
2340 RETURN'BAQB
2350 REM DRAW CRATE AT X,Y'BOHG
2360 WIDTH 1'BCYE
2370 BOX 1,X,Y,X+24,Y+16'DNSJ
2380 BOX 1,X+3,Y+6,X+21,Y+10'FPXL
2390 BOX 1,X+3,Y+3,X+21,Y+13'FPXM
2400 RETURN'BAQX
2410 REM WATER VAPOR #1'BMMC
2420 WIDTH 1'BCYB
2430 RESTORE 2470'BENC
2440 FOR Z=1 TO 10'DETE
2450 READ X,Y : DRAW 1,X,Y'CJNG
2460 NEXT'BAEE
2470 DATA 40,85,39,82,42,81,37,80,39,
79'BEAL
2480 DATA 39,71,37,69,42,71,38,73,43,
68'BEBM
2490 RETURN'BAQH
2500 REM WATER VAPOR #2'BMNC
2510 WIDTH 1 : RESTORE 2550'CHUC
2520 FOR Z= 1 TO 5'DDAD
2530 READ X,Y : DRAW 1,X,Y'CJNF
2540 NEXT Z : RETURN'CCNE
2550 DATA 2,75,1,73,2,77,1,78,2,
79'BYQJ
2560 REM WATER VAPOR #3'BMOI
2570 WIDTH 1 :RESTORE 2610'CHRI
2580 FOR Z = 1 TO 8'DDDJ
2590 READ X,Y : DRAW 1,X,Y'CJNL
2600 NEXT Z : RETURN'CCNB
2610 DATA 45,60,47,62,52,59,52,69'BXEG
2620 DATA 42,90,45,87,43,85,53,80'BXCH
2630 WIDTH 2'BCAE
2640 REM DRIVE BELTS'BKFB
2650 REM MAIN BELT'BISH
2660 IF (PN AND 1) THEN 2700 'DJBK
2670 DRAW 1,103,8 TO 53,60'CMPK
2680 DRAW 1,127,12 TO 98,77'CNAM
2690 GOTO 2720 'BEIK
2700 DRAW 1,103,8 TO 54,60'CMQE
2710 DRAW 1,127,12 TO 97,77'CNZG
2720 REM TO CONVEYOR'BKQG
2730 IF (PN AND 1) THEN 2770 'DJIH
2740 DRAW 1,164,11 TO 168,84'COTJ
2750 DRAW 1,190,11 TO 186,84'COSK
2760 GOTO 2790 'BEPI
2770 DRAW 1,163,11 TO 168,84'COSM
2780 DRAW 1,191,11 TO 186,84'COTN
2790 REM BETWEEN TOP PULLEYS'BRKP
2800 IF (PN AND 1) THEN 2840 'DJGF
2810 DRAW 1,117,0 TO 175,0'CMLG
2820 DRAW 1,117,20 TO 175,20'COFI
2830 GOTO 2860 'BENG
2840 DRAW 1,120,1 TO 172,1'CMEJ
2850 DRAW 1,120,19 TO 172,19'COML
2860 REM CONVEYOR BELT "SEAM"'BMJN
2870 WIDTH 1'BCYK
2880 DRAW 0,330-PN*20,92'DMVO
2890 RETURN'BAQL
2900 REM ROTATION MARKS ON
PULLEYS'BWVK
2910 REM CONVEYOR PULLEY'BOWI
2920 WIDTH 1'BCYG
2930 IF PN=2 OR PN=6 THEN DRAW 1,177,
89'GODN
2940 IF PN=3 OR PN=7 THEN DRAW 1,172,
85'GOVO
2950 IF PN=4 OR PN=8 THEN DRAW 1,177,
81'GOYP
2960 REM TOP RIGHT PULLEY'BOSN
2970 IF PN=1 OR PN=5 THEN DRAW 1,170,
15'GOIR
2980 IF PN=2 OR PN=6 THEN DRAW 1,172,
4'GNMS
2990 IF PN=3 OR PN=7 THEN DRAW 1,185,
6'GNUT
3000 IF PN=4 OR PN=8 THEN DRAW 1,184,
16'GOUC
3010 REM TOP LEFT PULLEY'BNKA
```

Continued on pg 108

128 USERS ONLY/MAGIC LANTERN

Continued from pg 107

```
3020 IF PN=1 OR PN=5 THEN DRAW 1,115,
    18'GOKE
3030 IF PN=2 OR PN=6 THEN DRAW 1,105,
    10'GODF
3040 IF PN=3 OR PN=7 THEN DRAW 1,116,
    2'GNKG
3050 IF PN=4 OR PN=8 THEN DRAW 1,126,
    10'GOKH
3060 RETURN'BAQB
3070 REM "PUSHER" BAR'BDOF
3080 IF PN=1 THEN X=115 : Y=69
    : X1=142 : Y1=16'HWPM
3090 IF PN=2 THEN X=125 : Y=70
    : X1=143 : Y1=16'HWKN
3100 IF PN=3 THEN X=135 : Y=71
    : X1=144 : Y1=17'HWPF
3110 IF PN=4 THEN X=146 : Y=72
    : X1=146 : Y1=17'HWVG
3120 IF PN=5 THEN X=155 : Y=73
    : X1=147 : Y1=16'HWXH
3130 IF PN=6 THEN X=146 : Y=72
    : X1=146 : Y1=17'HWXI
3140 IF PN=7 THEN X=135 : Y=71
    : X1=144 : Y1=17'HWTJ
3150 IF PN=8 THEN X=125 : Y=70
    : X1=143 : Y1=16'HWQK
3160 WIDTH 1 : DRAW 1,X,Y TO 146,
    7'DNTH
3170 DRAW 1,X-1,Y TO 145,7'DLFH
3180 DRAW 1,X+1,Y TO 147,7'DLGI
3190 WIDTH 1 : DRAW 0,146,7'CKUI
3200 CIRCLE 1,X,Y,7,5'BJXY
3210 PAINT 1,X-4,Y'CGWA
3220 PAINT 1,X+4,Y'CGVB
3230 WIDTH 1 : DRAW 0,X,Y'CIMD
3240 CIRCLE 0,146,7,3,2'BLXD
3250 WIDTH 2'BCAD
3260 DRAW 1, X1,Y1 TO 115,10'CNWH
3270 WIDTH 1 : DRAW 0, X1,Y1'CKFI
3280 RETURN'BAQF
3290 REM DRAW "STUFF" FROM CHUTE'BNVL
3300 FOR Z = 1 TO 50'DEXA
3310 DRAW 1,FN R(15)+235,
    FN R(5)+Y'FQXF
3320 NEXT : RETURN'CBXB
3330 REM CHUTE OPERATION LEVER'BTEH
3340 WIDTH 1'BCYD
3350 IF PN<>8 AND PN<>1 THEN 3410'HKWK
3360 CIRCLE 1,200,33,3,2'BMGH
3370 PAINT 1,200,33 : DRAW 0, 200,
    39'CRFK
3380 DRAW 1, 242,39 TO 200,33'COHK
3390 DRAW 1, 200,33 TO 200,0'CNWK
3400 RETURN'BAQY
3410 CIRCLE 1,200,45,3,2'BMJD
3420 PAINT 1,200,45 : DRAW 0, 200,
    39'CRIG
3430 DRAW 1, 200,45 TO 242,39'COKG
3440 DRAW 1, 200,45 TO 200,0'CNAG
3450 RETURN'BAQE
3460 REM NEW CRATES'BJII
3470 WIDTH 1'BCYH
3480 ON PN GOTO 3490 ,3550,3610,3630,
    3650,3670,3720,3740'CQLQ
3490 X=135 : Y=72 : GOSUB 2350'DNAM
3500 FOR X = 1 TO 3'DDVC
3510 DRAW 1,128,87+X TO 164,87+X'EQKH
3520 NEXT X'BBRC
3530 BOX 1,144,90,146,105,1'BSGH
3540 RETURN'BAQE
3550 X=135 : Y=62 : GOSUB 2350'DNYJ
3560 FOR X = 1 TO 3'DDVI
3570 DRAW 1,128,78+X TO 164,78+X'EQKN
3580 NEXT X'BBRI
3590 BOX 1,144,81,146,105,1'BSGN
3600 RETURN'BAQB
3610 X=145 : Y=62 : GOSUB 2350'DNAG
3620 GOTO 3560'BELE
3630 X=155 : Y=62 : GOSUB 2350'DNBI
3640 GOTO 3560'BELG
3650 X=165 : Y=62 : GOSUB 2350'DNCK
3660 GOTO 3500'BEFI
3670 FOR X = 1 TO 3'DDVK
3680 DRAW 1,128,98+X TO 164,98+X'EQOP
3690 NEXT X'BBRK
3700 BOX 1,144,99,146,105,1'BSPG
3710 RETURN'BAQD
3720 REM NO ACTION HERE'BMOI
3730 RETURN'BAQF
3740 X=135 : Y=82 : GOSUB 2350'DNBK
3750 FOR X = 1 TO 3'DDVJ
3760 DRAW 1,128,98+X TO 164,98+X'EQOO
3770 NEXT X'BBRJ
3780 BOX 1,144,98,146,105,1'BSOO
3790 RETURN'BAQL
3800 : 'ABHD
3810 : 'ABHE
3820 REM POKE IN ML SWAP ROUTINE'BTDL
3830 : 'ABHG
3840 IF PEEK(2816)=134 AND
    PEEK(2817)=171 THEN RETURN
    :REM ALREADY POKED IN'JILU
3850 RESTORE 3820 'BENJ
3860 BANK 0'BCWK
3870 J=2816 : REM CASSETTE BUFFER'CUVQ
3880 READ A : IF A<0 THEN 3910 'EILP
3890 POKE J,A : J=J+1 : GOTO 3880
    'EMMR
3900 : 'ABHE
3910 NP=17 : REM NP = NUMBER OF PAGES
    TO SWAP'CCIO
3920 POKE J,NP : J=J+1'DIGK
3930 REM (TO SAVE A FULL SCREEN,
    SET NP=32)'BDLP
3940 REM (TO SAVE A FULL SCREEN PLUS
    COLOR)'BDSQ
3950 REM (SET NP=36.)'BLLM
3960 : 'ABHK
3970 SF=32 : REM TO SAVE FROM COLOR
    MEMORY SET SF=28'CJDW
3980 REM ABOVE IS HIGH BYTE OF
    ADDRESS TO SAVE 'FROM'BLSW
3990 REM EITHER START OF BITMAP ($20)
    OR START OF COLOR ($1C)'BSAA
```

Continued on pg. 109

MAGIC LANTERN

Continued from pg. 108

```

4000 POKE J,SF : J=J+1'DIBA
4010 : 'ABHW
4040 REM POKE IN ADDRESS HIGH-BYTE
TABLE'BCRI
4050 : 'ABHB
4060 A=1 : NB=NP*256'DKJG
4070 FOR X = J TO J+12'EFHG
4090 POKE X, (65280-NB*A)/256'EPBK
4100 A=A+1'CDPY
4110 NEXT X : RETURN'CCLY
4120 : 'ABHY
4130 REM MACHINE LANGUAGE DATA:'BUCC
4140 DATA 134,171,170,202,189,66,11,
133,181,169,0,133,180,133,168,
173'BJEM
4150 DATA 65,11,133,169,174,64,11,160,
0,165,171,208,18,177,168,145'BGON
4160 DATA 180,136,208,249,202,240,7,
230,181,230,169,76,29,11,96,
177'BH50
4170 DATA 180,145,168,136,208,249,202,
240,245,230,181,230,169,76,47,
11'BKFQ
4180 DATA -1'BCYF
4190 : 'ABHG
4200 : 'ABHX
4210 REM RUN THIS PART TO SAVE
COMPLETED'BBWH
4220 REM GRAPHICS AND ML TO DISK'BTAG
4230 REM (SO YOU CAN BLOAD THEM
LATER'BXWI
4240 REM TO SAVE TIME)'BLJF
4250 : 'ABHD
4260 BSAVE"GR.DATA",B0,
P30464 TO P65279'CRSL
4270 BSAVE"QUICK.ML",B0,
P2816 TO P2895'CPRM
    
```

END

Quick Demo

```

10 COLOR 0,1 : REM BLACK SCREEN'CPOC
20 COLOR 1,8 : REM YELLOW
FOREGROUND'CUCF
30 COLOR 4,1 : REM BLACK
BACKGROUND'CTAF
40 GRAPHIC 2,1,13 : REM SET
HI-RES/TEXT'CVFG
50 BLOAD "QUICK.ML",B0'BEXE
60 BLOAD "GR.DATA",B0'BEXF
70 X=0 : PRINT CHR$(147)'DIRG
80 REM ANIMATION LOOP'BNEI
90 REM (DISPLAYS EACH OF EIGHT
SCREENS SEQUENTIALLY)'BPTR
100 X=X+1 : IF X=9 THEN X=1'GINB
110 BANK 0 : SYS 2816,X,1'CLKY
120 IF X=3 OR X=7 THEN SOUND 3,15000,
7,0,0,0,3'GVAF
130 IF X=1 THEN SOUND 2,1000,2,0,0,0,
3'ESEE
140 GET DE$:IF DE$="" THEN 160 'EKAD
150 DE=VAL(DE$)*100'DKIE
160 FOR D = 1 TO DE : NEXT D'EGME
170 GOTO 100 'BDAD
    
```

END

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MiniTerm 128

Terminal Program for Commodore 128

MiniTerm 128 is a machine-language driver for all you who write terminal programs in BASIC. It runs at 300, 1200 or 2400 baud, and the OPEN statement is done in BASIC so you can set your own baud rate. The program also acts as a nice function-key terminal program because it resides from \$1300 to \$1700. This means you can BLOAD it at the start of a session and put the OPEN and SYS statements on a function key.

For example, you might use:

```
KEY2,"OPEN 5,2,2,CHR$(6)+
CHR$(0):FAST:SYS4864:SLOW
.CLOSE5
```

Using this statement, pressing F2 would open the channel to the modem, turn on FAST mode and enter the terminal program. Pressing the Commodore logo and M keys together returns you to BASIC, turns SLOW on and closes the channel to the modem. This statement can be used in both 40- and 80-column modes, but if you are in 40-column mode, you will have to delete the FAST and SLOW commands.

To allow a certain amount of flexibility, MiniTerm 128 has two ways to return to your BASIC program. If you press the Commodore and M keys, the program returns to the next command in the BA-



MiniTerm, a machine-language driver for terminal programs, runs at 300, 1200 or 2400 baud. The OPEN statement is done in BASIC so you can set your own baud rate.

SIC program. If you exit by pressing the Commodore key and English pound sign, MiniTerm 128 first places a \$ff in location \$0088. This allows you to branch to a different part of your program. Your BASIC code would then look something like that in Listing 1.

MiniTerm 128 will operate in either standard or CBM ASCII, although the default is standard ASCII. To turn on CBM ASCII, press the Commodore and C keys. To return to standard ASCII, press the Commodore and A keys. Any time you change from one ASCII to the other, the

program will print the current mode on the screen.

It bothers me when the cursor changes color because of noise in the line. If this happens to you, press the Commodore and R keys to restore the cursor to the correct color. A help screen is also included in the program, accessed using the Commodore and H keys. MiniTerm 128 will transmit any characters that are in the function keys, so your BASIC program can define those keys any way you want for transmission from terminal mode. All CTRL keys work fine.

To create MiniTerm 128, type in the Mini/Create program. This is a BASIC loader that stores its data in hex. Be sure to save a copy before you run the program. When you run the BASIC loader, the screen will clear and you will see the check sum being calculated at the top of the screen. If you entered the data correctly, the program will then BSAVE the machine language to disk as a binary file called "MiniTerm 128." When you want to use the program, simple BLOAD "MiniTerm 128," open the channel to device 2, and SYS 4864.

The program starts at \$1300. ASCII translation tables start at \$1500 and end at \$16ff. When you open the channel to the modem, make sure you use a #5 as the channel number. OPEN 5,2,2,CHR\$(6)+CHR\$(0) is the proper syntax for the OPEN statement in your BASIC program.

The machine language for MiniTerm 128 is not relocatable. However, since it sits below BASIC in Bank 0, it should not interfere with normal BASIC programs. **□**

Before typing this program, read "How to Enter Programs." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Listing 1. Sample Code

```
10 OPEN 5,2,2,CHR$(6)+CHR$(0)
:REM OPEN STATEMENT FOR 300 BAUD
20 SYS 4864:REM ENTER MINITERM 128
30 IF PEEK DEC("88") THEN 100
:REM IF EXIT WITH C= ENGLISH
:REM POUND THEN GO TO DIFFERENT ROUTINE
40 REM CONTINUE WITH NORMAL PROGRAM
FLOW
100 REM OPTIONAL PROGRAM BRANCH

Mini/Create Program
130 SCNCLR:PRINT CHR$(14)'DFBF
140 FOR I=DEC("1300") TO
```

```
DEC("16FF"))'FFJF
150 READ A$:X=DEC(A$):POKE I,X:K=K+X
:PRINT"[HOME]"K:NEXT I:TWJ
160 IF K<>96110 THEN PRINT:PRINT:PRINT
:PRINT"[RVS] [SHFT E]
RROR IN DATA STATEMENTS CHECK
LISTING ":END'JKWT
170 PRINT:PRINT:PRINT"[SPACE3,SHFT D]
ATA ENTERED CORRECTLY"
:PRINT"[SPACE3,SHFT B,SHFT S,
SHFT A,SHFT V,SHFT E]
NOW IN PROGRESS"EDYU
180 BSAVE"MINITERM 128",B0,
P(DEC("1300")) TO P(DEC("1700"))
'EPRN
190 DATA 4C,03,13,08,48,8A,48,98'BXFJ
200 DATA 48,A5,F1,85,FB,A5,F7,09'BXVB
210 DATA 64,85,F7,A9,15,85,86,A9'BXNC
220 DATA 00,85,83,85,85,85,87,85'BXSD
```

Continued on pg 111

128 USERS ONLY/MINITERM 128

Continued from pg 110

230 DATA 88,A9,16,85,84,20,7D,FF'BXXE
240 DATA 93,0E,20,6D,6C,20,44,52'BXEF
250 DATA 49,56,45,52,20,42,59,20'BXVF
260 DATA 6A,68,66,20,73,6F,66,74'BXNH
270 DATA 77,61,72,65,20,28,43,29'BXDH
280 DATA 20,31,2F,38,36,0D,63,6F'BXIJ
290 DATA 6D,6D,6F,64,6F,72,65,20'BXQK
300 DATA 6D,20,20,46,4F,52,20,4D'BXAC
310 DATA 45,4E,55,0D,63,6F,6D,6D'BXED
320 DATA 6F,64,6F,72,65,20,68,20'BXFE
330 DATA 20,46,4F,52,20,48,45,4C'BXSF
340 DATA 50,0D,00,A9,00,20,D2,FF'BXUG
350 DATA 4C,B3,13,A2,05,20,C6,FF'BXTH
360 DATA 20,E4,FF,A4,87,F0,03,4C'BXGI
370 DATA 95,13,A8,B1,83,48,20,CC'BXBJ
380 DATA FF,68,C9,00,F0,21,C9,0A'BXHK
390 DATA F0,1D,C9,0D,D0,03,4C,49'BXBL
400 DATA 14,20,D2,FF,C9,22,D0,03'BXED
410 DATA 20,42,14,48,A9,A4,20,D2'BXXE
420 DATA FF,A9,9D,20,D2,FF,68,20'BXJF
430 DATA E4,FF,C9,00,F0,BD,C9,B2'BXGG
440 DATA D0,04,A5,FB,85,F1,C9,A7'BXAH
450 DATA F0,63,C9,A8,F0,7D,C9,B4'BXJI
460 DATA D0,03,4C,5A,14,C9,BC,D0'BXJJ
470 DATA 1C,A9,FF,85,87,20,7D,FF'BXRK
480 DATA 0D,0D,63,62,6D,20,61,73'BXDL
490 DATA 63,69,69,20,6D,6F,64,65'BXRM
500 DATA 0D,00,4C,83,13,C9,B0,D0'BXAE
510 DATA 18,A9,00,85,87,20,7D,FF'BXMF
520 DATA 0D,0D,61,73,63,69,69,20'BXZG
530 DATA 6D,6F,64,65,0D,00,4C,83'BXFH
540 DATA 13,A4,87,F0,03,4C,23,14'BXZI
550 DATA A8,B1,85,48,A2,05,20,C9'BXYJ
560 DATA FF,68,20,D2,FF,48,20,CC'BXEK
570 DATA FF,68,4C,83,13,A5,F7,29'BXJL
580 DATA BF,85,F7,68,A8,68,AA,68'BXJM
590 DATA 28,60,48,A9,00,85,F4,68'BXIN
600 DATA 60,48,A9,20,20,D2,FF,68'BXEF
610 DATA 4C,A9,13,A9,FF,85,88,4C'BXBG
620 DATA 35,14,20,7D,FF,0D,0D,63'BXLH
630 DATA 3D,20,6D,20,20,20,20,20'BXSH
640 DATA 65,58,49,54,20,54,45,52'BXAJ
650 DATA 4D,49,4E,41,4C,20,4D,4F'BXSK
660 DATA 44,45,0D,63,3D,20,61,20'BXHL
670 DATA 20,20,20,20,73,54,41,4E'BXOL
680 DATA 44,41,52,44,20,61,73,63'BXNM
690 DATA 69,69,0D,63,3D,20,72,20'BXWO
700 DATA 20,20,20,20,72,45,53,54'BXAF
710 DATA 4F,52,45,20,43,55,52,53'BXDH
720 DATA 4F,52,20,43,4F,4C,4F,52'BXAI
730 DATA 0D,63,3D,20,63,20,20,20'BXBI
740 DATA 20,20,63,4F,4D,4D,4F,44'BXWK
750 DATA 4F,52,45,20,61,73,63,69'BXML
760 DATA 69,0D,63,3D,20,68,20,20'BXOM
770 DATA 20,20,20,68,45,4C,50,20'BXQM
780 DATA 53,43,52,45,45,4E,0D,0D'BXGO
790 DATA 00,4C,83,13,00,00,00,00'BXUO
800 DATA 00,00,00,00,00,00,00,00'BXHG
810 DATA 00,00,00,00,00,00,00,00'BXHH
820 DATA 00,00,00,00,00,00,00,00'BXHI
830 DATA 00,01,02,03,04,05,06,07'BXKJ
840 DATA 08,09,0A,0B,0C,0D,0E,0F'BXKL
850 DATA 10,11,12,13,08,15,16,17'BXVL

860 DATA 18,19,1A,1B,1C,1D,1E,1F'BXSN
870 DATA 20,21,22,23,24,25,26,27'BXBN
880 DATA 28,29,2A,2B,2C,2D,2E,2F'BXBP
890 DATA 30,31,32,33,34,35,36,37'BXJP
900 DATA 38,39,3A,3B,3C,3D,3E,3F'BXJI
910 DATA 40,61,62,63,64,65,66,67'BXBJ
920 DATA 68,69,6A,6B,6C,6D,6E,6F'BXIK
930 DATA 70,71,72,73,74,75,76,77'BXLL
940 DATA 78,79,7A,5B,5C,5D,5E,5F'BXGM
950 DATA 60,61,62,63,64,65,66,67'BXDN
960 DATA 68,69,6A,6B,6C,6D,6E,6F'BXIO
970 DATA 70,71,72,73,74,75,76,77'BXLP
980 DATA 78,79,7A,5B,5C,5D,7E,7F'BXKQ
990 DATA 80,81,82,83,84,85,86,87'BXTR
1000 DATA 88,89,8A,8B,8C,8D,8E,8F'BXYX
1010 DATA 90,91,92,93,94,95,96,97'BXBY
1020 DATA 98,99,9A,9B,9C,9D,9E,9F'BXHA
1030 DATA A0,A1,A2,A3,A4,A5,A6,A7'BXPB
1040 DATA A8,A9,AA,AB,AC,AD,AE,AF'BXVC
1050 DATA B0,B1,B2,B3,B4,B5,B6,B7'BXXD
1060 DATA B8,B9,BA,BB,BC,BD,BE,BF'BXEE
1070 DATA C0,41,42,43,44,45,46,47'BXCF
1080 DATA 48,49,4A,4B,4C,4D,4E,4F'BXRG
1090 DATA 50,51,52,53,54,55,56,57'BXAG
1100 DATA 58,59,5A,5B,5C,5D,DE,DF'BXFY
1110 DATA E0,E1,E2,E3,E4,E5,E6,E7'BXWA
1120 DATA E8,E9,EA,EB,EC,ED,EE,EF'BXDB
1130 DATA F0,F1,F2,F3,F4,F5,F6,F7'BXFC
1140 DATA F8,F9,FA,FB,FC,FD,FE,FF'BXLD
1150 DATA 00,01,02,03,04,05,06,07'BXKD
1160 DATA 14,09,0A,0B,0C,0D,0E,0F'BXHF
1170 DATA 10,11,12,13,14,15,16,17'BXSF
1180 DATA 18,19,1A,1B,1C,1D,1E,1F'BXSH
1190 DATA 20,21,22,23,24,25,26,27'BXBH
1200 DATA 28,29,2A,2B,2C,2D,2E,2F'BXBA
1210 DATA 30,31,32,33,34,35,36,37'BXJA
1220 DATA 38,39,3A,3B,3C,3D,3E,3F'BXJC
1230 DATA 40,C1,C2,C3,C4,C5,C6,C7'BXQD
1240 DATA C8,C9,CA,CB,CC,CD,CE,CF'BXME
1250 DATA D0,D1,D2,D3,D4,D5,D6,D7'BXOF
1260 DATA D8,D9,DA,5B,5C,5D,5E,5F'BXUG
1270 DATA 60,41,42,43,44,45,46,47'BXTG
1280 DATA 48,49,4A,4B,4C,4D,4E,4F'BXRI
1290 DATA 50,51,52,53,54,55,56,57'BXAI
1300 DATA 58,59,5A,5B,5C,5D,7E,14'BXFB
1310 DATA 00,01,02,03,04,05,06,07'BXKB
1320 DATA 14,09,0A,0B,0C,0D,0E,0F'BXHD
1330 DATA 10,11,12,13,14,15,16,17'BXSD
1340 DATA 18,19,1A,1B,1C,1D,1E,1F'BXSF
1350 DATA 20,21,22,23,24,25,26,27'BXBF
1360 DATA 28,29,2A,2B,2C,2D,2E,2F'BXBH
1370 DATA 30,31,32,33,34,35,36,37'BXJH
1380 DATA 38,39,3A,3B,3C,3D,3E,3F'BXJJ
1390 DATA 40,61,62,63,64,65,66,67'BXBK
1400 DATA 68,69,6A,6B,6C,6D,6E,6F'BXIC
1410 DATA 70,71,72,73,74,75,76,77'BXLD
1420 DATA 78,79,7A,5B,5C,5D,5E,7F'BXIE
1430 DATA 80,41,42,43,44,45,46,47'BXVE
1440 DATA 48,49,4A,4B,4C,4D,4E,4F'BXRG
1450 DATA 50,51,52,53,54,55,56,57'BXAG
1460 DATA 58,59,5A,FB,FC,FD,FE,14'BXVI

END

Sprite Puzzle for the Commodore

128

This program is not only a game, but shows the ease in which the 128 can build and manipulate sprites.

The program puts a random design on the screen, then builds an eight-piece puzzle out of the design using sprites. The sprites are then placed in the upper left corner of the screen in two rows of four. If the computer thinks the design is too simple, it makes a new one.

You get five seconds to look at the design before the eight sprites are mixed up. Your challenge is to put them back in the right order.

"Only eight pieces in the puzzle?" you say? Don't let that fool you. Designs like these can be very difficult to figure out. A photographic memory would be handy.

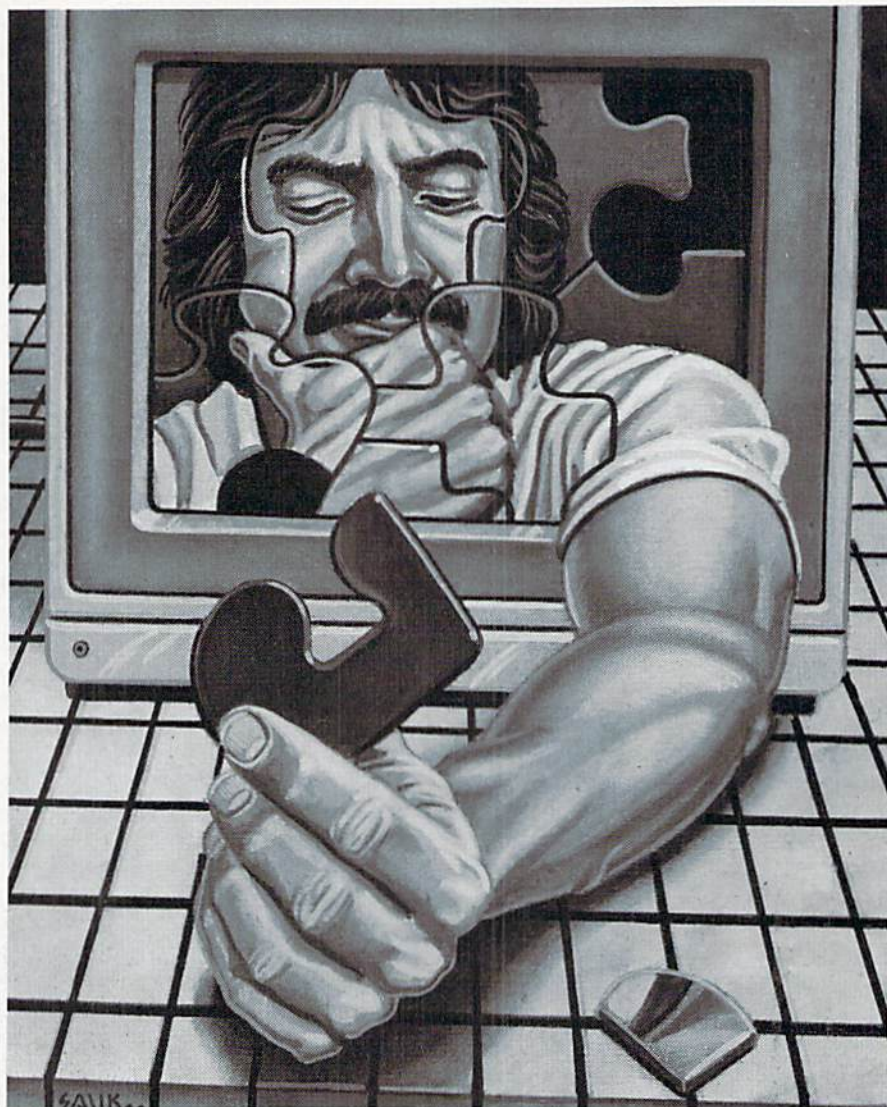
You swap two sprites by alternately pushing the two numbers of their position. If you hit the spacebar you will be shown the sprite outlines and their position numbers. Pressing the space bar again or pressing one of the numbers will remove the outline. If you press the letter C, you will be given a clue—the correct position of one misplaced sprite.

How It Works

The loop starting at line 80 makes the designs on the screen. In this case, random boxes are used for the design. You can change the number 25 in line 80 to make more or less complicated designs.

The loop at line 180 is a busy one. It makes eight sprites from the middle of the screen. The first time through the loop, line 190 makes a sprite out of the design from the indicated coordinates and places it into $A\$(1)$. Line 200 saves sprite $A\$(1)$ to storage area one. Line 210 controls the characteristics of the sprite, turning it on, expanding it, and so on. Line 220 will move the sprite to the upper left corner of the screen. Line 230 changes the variables for picking up and moving the next sprite in the loop.

After all eight sprites have been picked up, expanded, and moved to their proper locations, the loops starting at 270 will look at the sprites and see if there are any duplicates. If there are, a special procedure will have to be implemented, be-



There are only eight pieces in the puzzle, but don't let that fool you. Designs like these can be hard to figure out.

cause duplicate sprites can be interchangeable.

After the sprites are checked, line 310 will see if there are too many duplicates. If there are, a new design is made. Not only could the puzzle be too simple, but the programming necessary to check all possible combinations of duplicate sprites could cause long delays.

Line 340 clears the bit-map screen. Line 350 gives you five seconds to look at the picture. Now that you have seen the puzzle the way it is supposed to be, it is time for the loop at 370 to mix up the pieces.

The first time through, line 380 will make $P(1)$ a random number between one and eight. $P(1)$ indicates position one, upper left corner. This will be the new sprite for that position. Then the program checks to see if that sprite number is already taken. If not, line 390 will mark it as taken (D for duplicate). Let's say, for instance, $P(1)=5$. Position one will hold sprite five when we get to line 410.

If we start switching duplicate sprites later, we will need to keep track of where each sprite is, so line 400 will make

Continued on pg. 113

128 USERS ONLY/SPRITE PUZZLE

Continued from pg. 112

S(5)=1. This says sprite five is in position one. Line 410 moves the random sprite to its position. Line 420 changes the variables for the next time through the loop.

The loop at 630 will swap the sprites you have selected. Now we need to tell the variables that the sprites have been moved. Line 680 holds the numbers and

the next two lines make the swaps.

We go to the subroutine at 1050 to see if all the sprites are in their correct positions. If not, line 1080 will prepare a clue. We return and line 760 tells us if we have any duplicate sprites. If so, we have to swap them and check again. If it still isn't solved, we swap them back. DC is for Dual Check. We don't want to make a

clue with swapped sprites when we go to the Checker routine.

If you have the 1902 monitor, you can make the changes in Listing 2 so you can watch what is going on.

You can flip the switch to the 80-column screen and see where the sprite should go. But you wouldn't do that — that's cheating!

Before typing these programs, read "How to Enter Programs." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Listing 1. Sprite Puzzle

```
20 PRINT "[CLEAR]" 'BATY
30 DEF FN R(X)=INT(X*RND(0)+1)'HLJG
40 COLOR 0,13:COLOR 4,13' CJOD
50 GRAPHIC 1,1'BDHC
60 REM MAKE DESIGN'BKCF
80 FOR I=1 TO 25'DEIG
90 X1=FN R(320):Y1=FN R(200)'ERDL
100 C=FN R(16):IF C=13 THEN 100'FNYA
110 COLOR 1,C'BDJW
120 BOX,X,Y,X1,Y1'BKJA
130 X=X1:Y=Y1'CHWB
140 NEXT'BAEY
150 REM PICK UP DESIGN'BMVE
170 X=0:Y=0'CFYE
180 FOR I=1 TO 8'DDLF
190 SSHAPE A$(I),112+X,80+Y,135+X,
101+Y'FYUM
200 SPRSAV A$(I),I'BIKX
210 SPRITE I,1,7,1,1,1,1'BOEA
220 MOVSPR I,24+2*X,50+2*Y'FMXE
230 X=X+24:IF I=4 THEN X=0:Y=21'HNNG
240 NEXT'BAEA
250 REM CHECK FOR DUPLICATES'BSSG
270 FOR J=1 TO 7'DDLF
280 FOR K=J+1 TO 8'EEBH
290 IF A$(J)=A$(K) THEN DU=DU+1'FPNL
300 NEXT K,J'BDQX
310 IF DU>1 THEN Q$="Y":GOTO 1270'FKLD
320 REM SHOW & MIX THEM UP'BOHD
340 COLOR 0,1:GRAPHIC 1,1'CHAE
350 SLEEP 3'BCJD
360 X=0:Y=0'CFYF
370 FOR I=1 TO 8'DDLG
380 P(I)=FN R(8):IF D(P(I)) THEN
380'ETLL
390 D(P(I))=1'BIWI
400 S(P(I))=I'BILA
410 MOVSPR P(I),24+2*X,50+2*Y'FPJF
420 X=X+24:IF I=4 THEN X=0:Y=21'HNNH
430 NEXT'BAEB
440 GOSUB 1050'BEHD
450 REM MOVE PIECES'BKBG
470 GRAPHIC 0,1'BDGG
480 X=0:Y=0'CFYI
490 PRINT "[HOME,DOWN12]
TOGGLE SPACEBAR FOR
OUTLINE." 'BAWQ
500 PRINT " PRESS 'C' FOR CLUE" 'BAKE
510 PRINT " PRESS 'S' TO SOLVE" 'BAEF
520 PRINT "[DOWN] SWAP NUMBER? "; 'BBVF
530 GET KEY Q$'CCPE
540 IF Q$="C" THEN PRINT
:PRINT "[DOWN3] SPRITE"C1"IS AT
POSITION"C2:GOTO 490'GLPP
550 IF Q$="S" THEN 1170'DGRH
560 IF Q$=" " THEN 880'DFZI
570 PRINT Q$'BCOH
580 IF VAL(Q$)<1 OR VAL(Q$)>8 THEN
470'HNUO
590 T1=VAL(Q$)'CGSK
600 PRINT " WITH NUMBER? "; 'BBFE
610 GET KEY Q$:PRINT Q$'DFLE
620 T2=VAL(Q$)'CGTE
630 FOR I=1 TO 8'DDLF
640 IF I=T1 THEN:MOVSPR P(T2),24+2*X,
50+2*Y:H1=I'JYSP
650 IF I=T2 THEN:MOVSPR P(T1),24+2*X,
50+2*Y:H2=I'JYTQ
660 X=X+24:IF I=4 THEN X=0:Y=21'HNNN
670 NEXT'BAEH
680 J1=P(T2):J2=P(T1)'CPAM
690 P(H1)=J1:P(H2)=J2'CPBN
700 S(J1)=H1:S(J2)=H2'CPHF
710 REM CHECK IF SOLVED'BNWG
730 GOSUB 1050'BEHF
740 REM DUPLICATE SPRITES ?
RECHECK'BYKM
760 IF DU=0 THEN 470'DGVK
770 FOR J=1 TO 7'DDLK
780 FOR K=J+1 TO 8'EEBM
790 IF A$(J)=A$(K) THEN BEGIN'ELAO
800 P(S(K))=J:P(S(J))=K'CRGH
810 DC=1:GOSUB 1050:DC=0'DMDH
820 P(S(K))=K:P(S(J))=J'CRGJ
830 BEND'BBXG
840 NEXT K,J'BDQH
850 GOTO 470'BDKI
860 REM OUTLINE SPRITES'BOQM
880 PRINT "[CLEAR,SPACE5,CMDR M,SPACE5,
CMDR M,SPACE5,CMDR M,SPACE5,
CMDR M]" 'BABQ
890 PRINT'BACL
900 PRINT "[SPACE2]1[SPACE2,CMDR M,
SPACE3]2 [CMDR M,SPACE3]3 [CMDR M,
SPACE3]4 [CMDR M]" 'BAHJ
910 PRINT'BAEC
920 PRINT "[SPACE5,CMDR M,SPACE5,
CMDR M,SPACE5,CMDR M,SPACE5,
CMDR M]" 'BAJK
```

Continued on pg. 114

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SPRITE PUZZLE

Continued from pg. 113

```
930 PRINT" [SHFT D] [SHFT D] [SHFT D]
      [SHFT D] [SHFT D] [SHFT D]
      [SHFT D] [SHFT D] [SHFT D]
      [SHFT D] [SHFT D] [SHFT D]"BAJR
940 PRINT"[SPACE5,CMDR M,SPACE5,
      CMDR M,SPACE5,CMDR M,SPACE5,
      CMDR M]"BAJM
950 PRINT'BACI
960 PRINT"[SPACE2]5[SPACE2,CMDR M,
      SPACE3]6 [CMDR M,SPACE3]7 [CMDR M,
      SPACE3]8 [CMDR M]"BAXP
970 PRINT'BACK
980 PRINT"[SPACE5,CMDR M,SPACE5,
      CMDR M,SPACE5,CMDR M,SPACE5,
      CMDR M]"BAJQ
990 GET KEY QS'CCPO
1000 IF QS="C" THEN 470'DFFV
1010 IF QS<>" " THEN PRINT"[CLEAR,
      DOWN12] SWAP NUMBER? ";
      :GOTO 570'GHHE
1020 GOTO 470'BDKV
1030 REM CHECKER'BHGX
1050 FOR I=1 TO 8'DDLA
1060 IF P(I)=I THEN 1110'DJRC
1070 IF DC THEN 1090'CGFC
1080 C1=P(I):C2=I'CKKE
1090 CO=0'BDPD
1100 I=8'BCAU
1110 NEXT'BAEU
1120 IF CO THEN 1220'CGLX
1130 CO=1'BDQX
1140 RETURN'BAQX
1150 REM SOLVE IT'BHFB
1170 X=0:Y=0'CFYD
1180 FOR I=1 TO 8'DDLE
1190 MOVSPR I,24+2*X,50+2*Y'FMXJ
1200 X=X+24:IF I=4 THEN X=0:Y=21'HNNC
1210 NEXT'BAEV
1220 PRINT"[CLEAR,DOWN12,SPACE13,RVS]
      SOLVED!!"BAQC
1230 PRINT"[DOWN,SPACE9]
      PLAY AGAIN Y/N?"BAAD
1240 GET KEY QS'CCPB
1250 REM CLEAR OLD SPRITES'BPEE
1270 FOR I=1 TO 8'DDLE
1280 SPRITE I,0'BETE
1290 NEXT'BAEE
1300 IF QS="Y" THEN RUN'ECKY
1310 END'BACW
```

Listing 2. Cheater

```
295 IF A$(J)=A$(K) THEN GRAPHIC 5,0
      :PRINT"SPRITE"J"=SPRITE"K
      :GRAPHIC 0,0
1075 GRAPHIC 5,0:PRINT"SPRITE"P(I)"
      IS AT #"I:GRAPHIC 0,0
1100 REM I=8
1115 GRAPHIC 5,0:PRINT:GRAPHIC 0,0
1295 GRAPHIC 5,0:PRINT"END"
      :GRAPHIC 0,0
```

END

USER GROUPS

Although there are almost 1000 known Commodore user groups nationwide and around the world, this list includes only those that have been officially recognized by Commodore as Approved User Groups. If your group would like to apply for Approved status, contact Pete Baczor, User Group Coordinator, at Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380.

Commodore user groups provide invaluable assistance to Commodore computerists. If you are looking for people who share your computing interests, or if you need help getting started with your computer, contact the group near you.

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BEATLES
AC/DIC
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BEATLES

- A - - - - - A -

ALICE YOUR UP

AE

TIME IS UP

CRYSTAL	15
ROGER	14
ALICE	2
PATTY	0
DAVE	1

Soft Pace

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HOW TO ENTER PROGRAMS

The programs which appear in this magazine have been run, tested and checked for bugs and errors. After a program is tested, it is printed on a letter quality printer with some formatting changes. This listing is then photographed directly and printed in the magazine. Using this method ensures the most error-free program listings possible.

Whenever you see a word inside brackets, such as [DOWN], the word represents a keystroke or series of keystrokes on the keyboard. The word [DOWN] would be entered by pressing the cursor-down key. If multiple keystrokes are required, the number will directly follow the word. For example, [DOWN4] would mean to press the cursor-down key four times. If there are multiple words within one set of brackets, enter the keystrokes directly after one another. For example, [DOWN,RIGHT2] would mean to press the cursor-down key once and then the cursor-right key twice. Note: Do not enter the commas.

In addition to these graphic symbols, the keyboard graphics are all represented by a word and a letter. The word is either SHFT or CMD and represents the SHIFT key or the Commodore key. The letter is one of the letters on the keyboard. The combination [SHIFT E] would be entered by holding down the SHIFT key and pressing the E. A number following the letter tells you how many times to type the letter. For example, [SHFT A4,CMD B3] would mean to hold the SHIFT key and press the A four times, then hold down the Commodore key and press the B three times.

The following chart tells you the keys to press for any word or words inside of brackets. Refer to this chart whenever you aren't sure what keys to press. The little graphic next to the keystrokes shows you what you will see on the screen.

Syntax Error

This is by far the most common error encountered while entering a program. Usually (sorry folks) this means that you have typed something incorrectly on the line the syntax error refers to. If you get the message "?Syntax Error Break In Line 270," type LIST 270 and press RETURN.

This will list line 270 to the screen. Look for any non-obvious mistakes like a zero in place of an O or vice-versa. Check for semicolons and colons reversed and extra or missing parentheses. All of these things will cause a syntax error.

There is only one time a syntax error will tell you the wrong line to look at. If the line the syntax error refers to has a function call (e.g., FN A(3)), the syntax error may be in the line that defines the function, rather than the line named in the error message. Look for a line near the beginning of the program (usually) that has DEF FN A(X) in it with an equation following it. Look for a typo in the equation part of this definition.

Illegal Quantity Error

This is another common error message. This can also be caused by a typing error, but it is a little harder to find. Once again, list the line number that the error message refers to. There is probably a poke statement on this line. If there is, then the error is referring to what is trying to be poked. A number must be in the range of zero to 255 to be poke-able. For example, the statement POKE 1024,260 would produce an illegal quantity error because 260 is greater than 255.

Most often, the value being poked is a variable (A,X,...). This error is telling you that this variable is out of range. If the variable is being read from data statements, then the prob-

lem is somewhere in the data statements. Check the data statements for missing commas or other typos.






























If the variable is not coming from data statements, then the problem will be a little harder to find. Check each line that contains the variable for typing mistakes.

Out Of Data Error

This error message is always related to the data statements in a program. If this error occurs, it means that the program has run out of data items before it was supposed to. It is usually caused by a problem or typo in the data statements. Check first to see if you have left out a whole line of data. Next, check for missing commas between numbers. Reading data from a page of a magazine can be a strain on the brain, so use a ruler or a piece of paper or anything else to help you keep track of where you are as you enter the data.

Other Problems

It is important to remember that the 64 and the PET/CBM computers will only accept a line up to 80 characters long. The VIC 20 will accept a line up to 88 characters long and the 128 a line up to 160 characters long. Sometimes you will find a line in a program that runs over this number of characters. This is not a mistake in the listing. Sometimes programmers get so carried away crunching programs that they use abbreviated commands to get more than the standard number of characters on one line.

 "[HOME]" = UNSHIFTED CLR/ HOME	 "[PURPLE]" = CONTROL 5	 "[F1]" = F1
 "[CLEAR]" = SHIFTED CLR/HOME	 "[GREEN]" = CONTROL 6	 "[F2]" = F2
 "[DOWN]" = CURSOR DOWN	 "[BLUE]" = CONTROL 7	 "[F3]" = F3
 "[UP]" = CURSOR UP	 "[YELLOW]" = CONTROL 8	 "[F4]" = F4
 "[RIGHT]" = CURSOR RIGHT	 "[ORANGE]" = COMMODORE 1	 "[F5]" = F5
 "[LEFT]" = CURSOR LEFT	 "[BROWN]" = COMMODORE 2	 "[F6]" = F6
 "[RVS]" = CONTROL 9	 "[L. RED]" = COMMODORE 3	 "[F7]" = F7
 "[RVOFF]" = CONTROL 0	 "[GRAY1]" = COMMODORE 4	 "[F8]" = F8
 "[BLACK]" = CONTROL 1	 "[GRAY2]" = COMMODORE 5	 "[POUND]" = ENGLISH POUND
 "[WHITE]" = CONTROL 2	 "[L. GREEN]" = COMMODORE 6	 "[SHFT]" = PI SYMBOL
 "[RED]" = CONTROL 3	 "[L. BLUE]" = COMMODORE 7	 "[↑]" = UP ARROW
 "[CYAN]" = CONTROL 4	 "[GRAY3]" = COMMODORE 8	

GRAPHIC SYMBOLS WILL BE REPRESENTED AS EITHER THE LETTERS SHFT (SHIFT) AND A KEY ("[SHFT Q,SHFT J,SHFT D,SHFT S]") OR THE LETTERS CMDR (COMMODORE) AND A KEY ("[CMDR Q,CMDR G,CMDR Y,CMDR H]"). IF A SYMBOL IS REPEATED, THE NUMBER OF REPITITIONS WILL BE DIRECTLY AFTER THE KEY AND BEFORE THE COMMA ("[SPACE3,SHFT S4,CMDR M2]").

HOW TO ENTER PROGRAMS

You can enter these lines by abbreviating the commands when you enter the line. The abbreviations for BASIC commands are in your user guide.

If you type a line that is longer than the acceptable number of characters, the computer will act as if everything is ok, until you press RETURN. Then, a syntax error will be displayed (without a line number). Many people write that the computer gives them a syntax error when they type the line, or that the computer refuses to accept a line. Both of these problems are results of typing a line that has too many characters.

The Program Won't Run!!

This is the hardest of problems to resolve; no error message is displayed, but the program just doesn't run. This can be caused by many small mistakes typing a program in. First check that the program was written for the computer you are using. Check to see if you have left out any lines of the program. Check each

line of the program for typos or missing parts. Finally, press the RUN/STOP key while the program is "running." Write down the line the program broke at and try to follow the program backwards from this point, looking for problems.

If All Else Fails

You've come to the end of your rope. You can't get the program to run and you can't find any errors in your typing. What do you do? As always, we suggest that you try a local user group for help. In a group of even just a dozen members, someone is bound to have typed in the same program. The user group may also have the program on a library disk and be willing to make a copy for you. For \$9.95 per issue, you can also get all the BASIC programs in each issue, as well, from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007.

If you do get a working copy, be sure to compare it to your own version so that you can learn from your

errors and increase your understanding of programming.

If you live in the country, don't have a local user group, or you simply can't get any help, write to us. If you do write to us, include the following information about the program you are having problems with:

- The name of the program
- The issue of the magazine it was in
- The computer you are using
- Any error messages and the line numbers
- Anything displayed on the screen
- A printout of your listing (if possible)

All of this information is helpful in answering your questions about why a program doesn't work. A letter that simply states "I get an error in line 250 whenever I run the program" doesn't give us much to go on. Send your questions to:

Commodore Magazines
1200 Wilson Drive
West Chester, PA 19380
ATTN: Program Problem



HOW TO USE THE MAGAZINE ENTRY PROGRAMS

The Magazine Entry Programs on the next pages are two BASIC machine language programs that will assist you in entering the programs in this magazine correctly. There are versions for both the Commodore 64 and the Commodore 128. Once the program is in place, it works its magic without you having to do anything else. The program will not let you enter a line if there is a typing mistake on it, and better yet, it identifies the kind of error for you.

Getting Started

Type in the Magazine Entry Program carefully and save it as you go along (just in case). Once the whole program is typed in, save it again on tape or disk. Now RUN the program. The word POKING will appear on the top of the screen with a number. The number will increment from 49152 up to 49900 (4864-5545 on the 128) and just lets you know that the program is running. If everything is ok, the program will finish running and say DONE. Then type NEW. If there is a problem with the data statements,

the program will tell you where to find the problem. Otherwise the program will say "mistake in data statements." Check to see if commas are missing, or if you have used periods instead of commas. Also check the individual data items.

Once the program has run, it is in memory ready to go. To activate the program type SYS49152 (SYS4864 on the 128), and press RETURN. You are now ready to enter the programs from the magazine. To disable the Entry Program, just type KILL (RETURN) on the 64 or SYS4867 on the 128.

The checksums for each line are the same for both the 64 and 128, so you can enter your 64 programs on the 128 if you'd like.

Typing the Programs

All the BASIC program listings in this magazine that are for the 64 or 128 have an apostrophe followed by four letters at the end of the line (e.g., 'ACDF). If you plan to use the Magazine Entry Program to enter your programs, the apostrophe and letters **should** be entered along with the

rest of the line. This is a checksum that the Magazine Entry Program uses.

Enter the line and the letters at the end and then press RETURN, just as you normally would.

If the line is entered correctly, a bell is sounded and the line is entered into the computer's memory (without the characters at the end).

If a mistake was made while entering the line, a noise is sounded and an error message is displayed. Read the error message, then press any key to erase the message and correct the line.

IMPORTANT

If the Magazine Entry Program sees a mistake on a line, it **does not** enter that line into memory. This makes it impossible to enter a line incorrectly.

Error Messages and What They Mean

There are five error messages that the Magazine Entry Program uses. Here they are, along with what they mean and how to fix them.

Continued next page

HOW TO USE THE MAGAZINE ENTRY PROGRAMS

NO CHECKSUM: This means that you forgot to enter the apostrophe and the four letters at the end of the line. Move the cursor to the end of the line you just typed and enter the checksum.

QUOTE: This means that you forgot (or added) a quote mark somewhere in the line. Check the line in the magazine and correct the quote.

KEYWORD: This means that you have either forgotten a command or spelled one of the BASIC keywords (GOTO, PRINT, . .) incorrectly. Check

the line in the magazine again and check your spelling.

OF CHARACTERS: This means that you have either entered extra characters or missed some characters. Check the line in the magazine again. This error message will also occur if you misspell a BASIC command, but create another keyword in doing so. For example, if you misspell PRINT as PRONT, the 64 sees the letter P and R, the BASIC keyword ON and then the letter T. Because it sees the keyword ON, it thinks you've got too

many characters, instead of a simple misspelling. Check spelling of BASIC commands if you can't find anything else wrong.

UNIDENTIFIED: This means that you have either made a simple spelling error, you typed the wrong line number, or you typed the checksum incorrectly. Spelling errors could be the wrong number of spaces inside quotes, a variable spelled wrong, or a word misspelled. Check the line in the magazine again and correct the mistake. ■

MAGAZINE ENTRY PROGRAM—64

The Magazine Entry Programs are available on disk, along with the other programs in this magazine, for \$9.95. To order, contact Loadstar at 1-800-831-2694.

```
10 PRINT"[CLEAR]POKING -";
20 P=49152:REM $C000 (END AT
  49900/$C2EC)
30 READ A$:IF A$="END"THEN 110
40 L=ASC(MID$(A$,2,1))
50 H=ASC(MID$(A$,1,1))
60 L=L-48:IF L>9 THEN L=L-7
70 H=H-48:IF H>9 THEN H=H-7
80 PRINT"[HOME,RIGHT12]"P;
90 IF H>15 OR L>15 THEN PRINT
  :PRINT"DATA ERROR IN LINE";
  1000+INT((P-49152)/8):STOP
100 B=H*16+L:POKE P,B:T=T+B:P=P+1
  :GOTO 30
110 IF T<>86200 THEN PRINT
  :PRINT"MISTAKE IN DATA --> CHECK
  DATA STATEMENTS":END
120 PRINT"DONE":END
1000 DATA 4C,1F,C0,00,00,00,00,00
1001 DATA 00,00,00,00,00,0D,00,21
1002 DATA C1,27,C1,2F,C1,3F,C1,4C
1003 DATA C1,EA,EA,EA,4C,54,C0,A2
1004 DATA 05,BD,19,C0,95,73,CA,10
1005 DATA F8,60,60,A0,03,B9,00,02
1006 DATA D9,04,C1,D0,F5,88,10,F5
1007 DATA A0,05,B9,A2,E3,99,73,00
1008 DATA 88,10,F7,A9,00,8D,18,D4
1009 DATA 4C,EF,C0,E6,7A,D0,02,E6
1010 DATA 7B,4C,79,00,A5,9D,F0,F3
1011 DATA A5,7A,C9,FF,D0,ED,A5,7B
1012 DATA C9,01,D0,E7,20,2B,C0,AD
1013 DATA 00,02,20,74,C0,90,DC,A0
1014 DATA 00,4C,A9,C1,C9,30,30,06
1015 DATA C9,3A,10,02,38,60,18,60
1016 DATA C8,B1,7A,C9,20,D0,03,C8
1017 DATA D0,F7,B1,7A,60,18,C8,B1
1018 DATA 7A,F0,37,C9,22,F0,F5,6D
1019 DATA 03,C0,8D,03,C0,AD,04,C0
1020 DATA 69,00,8D,04,C0,4C,8E,C0
1021 DATA 18,6D,05,C0,8D,05,C0,90
1022 DATA 03,EE,06,C0,EE,09,C0,4C
1023 DATA CE,C1,18,6D,08,C0,8D,08
1024 DATA C0,90,03,EE,07,C0,EE,0A
```

```
1025 DATA C0,60,0A,A8,B9,0F,C0,85
1026 DATA FB,B9,10,C0,85,FC,A0,00
1027 DATA A9,12,20,D2,FF,B1,FB,F0
1028 DATA 06,20,D2,FF,C8,D0,F6,20
1029 DATA BC,C2,20,E4,FF,F0,FB,A0
1030 DATA 18,B9,08,C1,20,D2,FF,88
1031 DATA 10,F7,68,68,A9,00,8D,00
1032 DATA 02,4C,74,A4,4B,49,4C,4C
1033 DATA 91,91,0D,20,20,20,20,20
1034 DATA 20,20,20,20,20,20,20,20
1035 DATA 20,20,20,20,20,20,20,91
1036 DATA 0D,51,55,4F,54,45,00,4B
1037 DATA 45,59,57,4F,52,44,00,23
1038 DATA 20,4F,46,20,43,48,41,52
1039 DATA 41,43,54,45,52,53,00,55
1040 DATA 4E,49,44,45,4E,54,49,46
1041 DATA 49,45,44,00,4E,4F,20,43
1042 DATA 48,45,43,4B,53,55,4D,00
1043 DATA C8,B1,7A,D0,FB,84,FD,C0
1044 DATA 09,10,03,4C,84,C1,88,88
1045 DATA 88,88,88,B1,7A,C9,27,D0
1046 DATA 13,A9,00,91,7A,C8,A2,00
1047 DATA B1,7A,9D,3C,03,C8,E8,E0
1048 DATA 04,D0,F5,60,A9,04,4C,CA
1049 DATA C0,A0,00,B9,00,02,99,40
1050 DATA 03,F0,F0,C8,D0,F5,A0,00
1051 DATA B9,40,03,F0,E6,99,00,02
1052 DATA C8,D0,F5,20,96,C1,4C,12
1053 DATA C2,A0,09,A9,00,99,03,C0
1054 DATA 8D,3C,03,88,10,F7,A9,80
1055 DATA 85,02,A0,00,20,58,C1,20
1056 DATA 89,C1,20,ED,C1,E6,7A,E6
1057 DATA 7B,20,7C,A5,A0,00,20,80
1058 DATA C0,F0,D0,24,02,F0,06,4C
1059 DATA A8,C0,4C,CE,C1,C9,22,D0
1060 DATA 06,20,8D,C0,4C,CE,C1,20
1061 DATA BA,C0,4C,CE,C1,A0,00,B9
1062 DATA 00,02,20,74,C0,C8,90,0A
1063 DATA 18,6D,07,C0,8D,07,C0,4C
1064 DATA EF,C1,88,A2,00,B9,00,02
1065 DATA 9D,00,02,F0,04,E8,C8,D0
1066 DATA F4,60,18,AD,09,C0,69,41
1067 DATA 8D,09,C0,38,AD,0A,C0,E9
1068 DATA 19,90,06,8D,0A,C0,4C,1C
1069 DATA C2,AD,0A,C0,69,41,8D,0A
```



```

1070 DATA C0,AD,03,C0,6D,05,C0,48
1071 DATA AD,04,C0,6D,06,C0,8D,0C
1072 DATA C0,68,6D,08,C0,8D,0B,C0
1073 DATA AD,0C,C0,6D,07,C0,8D,0C
1074 DATA C0,38,E9,19,90,06,8D,0C
1075 DATA C0,4C,52,C2,AD,0C,C0,69
1076 DATA 41,8D,0C,C0,AD,0B,C0,E9
1077 DATA 19,90,06,8D,0B,C0,4C,67
1078 DATA C2,AD,0B,C0,69,41,8D,0B
1079 DATA C0,A0,01,AD,09,C0,CD,3C
1080 DATA 03,D0,20,C8,AD,0A,C0,CD
1081 DATA 3D,03,D0,17,C8,AD,0B,C0

```

```

1082 DATA CD,3E,03,D0,0E,AD,0C,C0
1083 DATA CD,3F,03,D0,06,20,CC,C2
1084 DATA 4C,4B,C0,98,48,68,4C,CA
1085 DATA C0,A9,20,8D,00,D4,8D,01
1086 DATA D4,A9,09,8D,05,D4,A9,0F
1087 DATA 8D,18,D4,60,20,A9,C2,A9
1088 DATA 81,20,DF,C2,A9,80,20,DF
1089 DATA C2,4C,D9,C2,20,A9,C2,A9
1090 DATA 11,20,DF,C2,A9,10,20,DF
1091 DATA C2,A9,00,8D,04,D4,60,8D
1092 DATA 04,D4,A2,70,A0,00,88,D0
1093 DATA FD,CA,D0,FA,60,END

```

END

MAGAZINE ENTRY PROGRAM-128

```

5 TRAP 200
10 PRINT"[CLEAR]POKING -";
20 P=4864:REM $1300 (END AT
5545/$15A9)
30 READ A$:IF A$="END"THEN 110
80 PRINT"[HOME,RIGHT12]"P;
100 B=DEC(A$):POKE P,B:T=T+B:P=P+1
:GOTO 30
110 IF T<>59314 THEN PRINT
:PRINT"MISTAKE IN DATA --> CHECK
DATA STATEMENTS":END
120 PRINT"DONE":END
200 PRINT:PRINT"DATA ERROR IN LINE";
1000+INT((P-4864)/8):END
1000 DATA 4C,1E,13,4C,3A,13,00,00
1001 DATA 8E,00,F7,00,42,41,51,57
1002 DATA 0D,00,0D,43,08,14,0E,14
1003 DATA 16,14,26,14,33,14,A9,00
1004 DATA 8D,00,FF,AD,04,03,8D,12
1005 DATA 13,AD,05,03,8D,13,13,A2
1006 DATA 4A,A0,13,8E,04,03,8C,05
1007 DATA 03,60,AD,12,13,8D,04,03
1008 DATA AD,13,13,8D,05,03,60,6C
1009 DATA 12,13,A5,7F,D0,F9,AD,00
1010 DATA 02,20,5B,13,90,F1,A0,00
1011 DATA 4C,6F,14,C9,30,30,06,C9
1012 DATA 3A,10,02,38,60,18,60,C8
1013 DATA B1,3D,C9,20,D0,03,C8,D0
1014 DATA F7,B1,3D,60,18,C8,B1,3D
1015 DATA F0,35,C9,22,F0,F5,6D,06
1016 DATA 13,8D,06,13,AD,07,13,69
1017 DATA 00,8D,07,13,4C,75,13,18
1018 DATA 6D,08,13,8D,08,13,90,03
1019 DATA EE,09,13,EE,0C,13,60,18
1020 DATA 6D,0B,13,8D,0B,13,90,03
1021 DATA EE,0A,13,EE,0D,13,60,0A
1022 DATA A8,B9,14,13,85,FB,B9,15
1023 DATA 13,85,FC,A0,00,8C,00,FF
1024 DATA A9,12,20,D2,FF,B1,FB,F0
1025 DATA 06,20,D2,FF,C8,D0,F6,20
1026 DATA 79,15,20,A3,15,20,E4,FF
1027 DATA F0,FB,A0,1B,B9,EF,13,20
1028 DATA D2,FF,88,10,F7,68,68,A9
1029 DATA 00,8D,00,02,4C,B7,4D,91
1030 DATA 91,0D,20,20,20,20,20,20
1031 DATA 20,20,20,20,20,20,20,20
1032 DATA 20,20,20,20,20,20,91,0D
1033 DATA 51,55,4F,54,45,00,4B,45
1034 DATA 59,57,4F,52,44,00,23,20
1035 DATA 4F,46,20,43,48,41,52,41

```

```

1036 DATA 43,54,45,52,53,00,55,4E
1037 DATA 49,44,45,4E,54,49,46,49
1038 DATA 45,44,00,4E,4F,20,43,48
1039 DATA 45,43,4B,53,55,4D,00,C8
1040 DATA B1,3D,D0,FB,C0,09,10,03
1041 DATA 4C,69,14,88,88,88,88,88
1042 DATA B1,3D,C9,27,D0,13,A9,00
1043 DATA 91,3D,C8,A2,00,B1,3D,9D
1044 DATA 00,0B,C8,E8,E0,04,D0,F5
1045 DATA 60,4C,5C,15,4C,C5,14,A0
1046 DATA 09,A9,00,99,06,13,8D,00
1047 DATA 0B,88,10,F7,A9,80,85,FD
1048 DATA A0,00,20,3F,14,20,AE,14
1049 DATA 20,0D,43,84,FA,A0,FF,20
1050 DATA 67,13,F0,D8,24,FD,F0,06
1051 DATA 20,8F,13,4C,8F,14,C9,22
1052 DATA D0,06,20,74,13,4C,8F,14
1053 DATA 20,9F,13,4C,8F,14,A0,00
1054 DATA B9,00,02,20,5B,13,C8,90
1055 DATA 0A,18,6D,0A,13,8D,0A,13
1056 DATA 4C,B0,14,88,60,18,AD,0C
1057 DATA 13,69,41,8D,0C,13,38,AD
1058 DATA 0D,13,E9,19,90,06,8D,0D
1059 DATA 13,4C,CF,14,AD,0D,13,69
1060 DATA 41,8D,0D,13,AD,06,13,6D
1061 DATA 08,13,48,AD,07,13,6D,09
1062 DATA 13,8D,0F,13,68,6D,0B,13
1063 DATA 8D,0E,13,AD,0F,13,6D,0A
1064 DATA 13,8D,0F,13,38,E9,19,90
1065 DATA 06,8D,0F,13,4C,05,15,AD
1066 DATA 0F,13,69,41,8D,0F,13,AD
1067 DATA 0E,13,E9,19,90,06,8D,0E
1068 DATA 13,4C,1A,15,AD,0E,13,69
1069 DATA 41,8D,0E,13,A0,01,AD,0C
1070 DATA 13,CD,00,0B,D0,20,C8,AD
1071 DATA 0D,13,CD,01,0B,D0,17,C8
1072 DATA AD,0E,13,CD,02,0B,D0,0E
1073 DATA AD,0F,13,CD,03,0B,D0,06
1074 DATA 20,89,15,A4,FA,60,98,48
1075 DATA 68,4C,AF,13,A9,04,4C,AF
1076 DATA 13,A9,00,8D,00,FF,A9,20
1077 DATA 8D,00,D4,8D,01,D4,A9,09
1078 DATA 8D,05,D4,A9,0F,8D,18,D4
1079 DATA 60,20,61,15,A9,81,20,9C
1080 DATA 15,A9,80,20,9C,15,4C,96
1081 DATA 15,20,61,15,A9,11,20,9C
1082 DATA 15,A9,10,20,9C,15,A9,00
1083 DATA 8D,04,D4,60,8D,04,D4,A2
1084 DATA 70,A0,00,88,D0,FD,CA,D0
1085 DATA FA,60,END

```

END

THE BARD'S TALE

Continued from pg. 42

tive party formation and strategy. A four-page reference card is included for those who'd rather cast spells first and ask questions later.

Unfortunately, after you save a game, the program shuts down and you have to reboot it—you can't quit and continue playing. With the exception of the 128 with a 1571 drive, which also autoloads the program, the waiting can drive an over-eager orc-slayer crazy. The game could also use more sound effects than the bard's medley and the footsteps of the party as they march through the mazes.

I usually detest mapping, but something about this game system kept pulling me back into Skara Brae for "just one more round" of dungeon-delving. It's the closest thing to the *Wizardry* experience that is available for Commodore computers.

This is a power game—swords and sorcery all the way—so I strongly recommend creating a party of dummy characters, pooling all their gold to one fighter and repeating the process until you've got enough to fully outfit the group you're going to use in the game.

Before entering a maze, decide what you're going to accomplish: map a certain area, gain enough points to promote a character, or maybe to collect a certain amount of gold. Use a teleport spell to return to the main entry when that's done, or if you start running low on hit and spell points. You'll find a few riddles to solve, but none are really difficult.

Graph paper works best for mapping. Cast a spell to determine your location, then head for the nearest corner. By marking the location of at least one corner, you'll find it much easier to get your bearings and draw an accurate map. And investigate each corner, because valuable items and clues are often found there.

The Bard's Tale is not a game for novices—it's hard. Even veteran adventurers will have to put in 100 to 200 hours to finish it. Now that's a lot of dragonslaying.

Well, I think I'd better run. I just heard about a little town in the land of Batiniq that's in desperate need of a few good adventurers. It seems there's this evil wizard...

For \$9.95, a hint booklet/clue book is available from Electronic Arts. All maps and the most requested hints are included. (800-245-4525. In California 800-562-1112.)

LORDS OF CONQUEST

Continued from pg. 40



the conflict. Before each attack, you are presented with an offensive and defensive strength ratio, complete with reinforcement and replanning electives. And if the assault is put into action, it is promptly measured and resolved, with the outcome affirmed by the placement or loss of troops.

In a matter of seconds, all the book-keeping work is completed, thereby quickening the game's tempo, accelerating the action, and actually shortening the orientation period for newcomers. And for those of you who have ever had the "pleasure" of trying to keep an interrupted 200-piece board game intact until the players can someday meet again, this program's Save feature is sure to have some added appeal. Just a tap of the button is all that is needed to file all progress to disk.

The Big Plot How to Get the Whole World in Your Hands

Lords of Conquest is an intricate game, with such a multitude of potential situations and confrontations that one can only touch upon the possible strategies in limited space. The authors offer a few personalized player hints at the back of their extensive manual. Read them over a couple of times, because they're straight from the source. Those tips, in addition to the ones I've listed below, should help push you over some early obstacles.

- As a general rule when you are picking countries in the opening round, after all the sectors with resources have been claimed, quickly grab a group of centrally located territories first, then work your way toward the perimeters. A corner or coastal country has limited attack options and, if chosen too early, can be easily isolated from its allied lands. On

No matter what level of expertise you bring to this challenge, its adjustable parameters will tailor a test to match your skill. Chance level, resource availability and type, and victory requirements are all variables which can be adapted to meet the wants of the players. Up to four people can participate, with a solo effort pitting you against a computer with nine skill levels. The program comes with 20 maps from which to choose your battlefield, covering everything from Prussia to Early Italia to the Polar Caps.

If you get tired of conquering these prefabricated nations, you can either modify an existing layout or create an entirely new face with the program's random-map generator. There's even a user-construction mode that will allow you to structure your own representations of every dimension and design, ranging from a Civil War rematch to a simulated skirmish at your office building. The possibilities are limitless.

With *Lords of Conquest*, global control can now become an afternoon's aspiration. By breaking the elements of combat down to the basics, this program has made the underlying tactical elements of war intelligible to players of all ages, while still keeping the strategic subtleties intact. Simple to learn and nearly impossible to master, it is an intriguing delight that comes with the highest of recommendations.

the other hand, a territory in the map's middle, especially one with a few friendly neighbors, can be built into a defensive stronghold, protecting the weaker lands to its rear.

- If the fate of one of your isolated or outlying countries is sealed, and it's only a matter of time before an opposing force bowls you over, do your best to trade or sacrifice any of the territory's resources that can't be moved to safety. It is better that this wealth is lost than to have it fall into the hands of the enemy.

- Since the option to move your stockpile is offered each year, it can often be used as a decoy, baiting an opponent to concentrate on an area of lesser importance while you strengthen your position at some other location.

- Always save the riskier assault for your second advance during the Conquest phase. This way, even if the forces are repulsed and your round terminated, you still have had the maximum number of attack attempts.

64 USERS ONLY/SPEEDREAD

Continued from pg 93

```
COURSE! [SHFT C]ONGRATULATIONS" 'EL
FB
94 GOTO 108'BDIK
95 GOTO 63'BCQK
96 R%=17:GOSUB 200'CIIN
97 POKE 54296,15:LIM=1:GOSUB 250
:POKE 54296,0'EAXT
98 R%=17:C%=0:GOSUB 150'DMNR
99 PRINT"[SHFT I]T SHOULD BE" 'BAKS
100 R%=19:C%=2:GOSUB 150'DMRY
101 PRINT J$(R1)'BGSW
102 R%=21:C%=0:GOSUB 150'DMIB
103 INPUT"[SHFT P]RESS [SHFT R,SHFT E,
SHFT T,SHFT U,SHFT R,SHFT N]
TO CONTINUE";M$'BDEJ
104 FOR N=16 TO 21:R%=N:GOSUB 200
:NEXT'GOFF
105 C%=INAROW:R%=Q%:GOSUB 200'DRCG
106 INAROW=0'BHCD
107 GOTO 63'BCQC
108 LIM=50:GOSUB 250:PRINT"[CLEAR]
" 'DKOH
109 X=YES+NO'CGPH
110 IF X<>0 THEN P=INT(10000*(YES/X))
/100'JTVG
111 PRINT"[DOWN]";N$:PRINT'CEQY
112 PRINT"[SHFT R]IGHT= ";YES;'BFVC
113 PRINT"[SPACE2,SHFT W]RONG= ";NO;
'BEQD
114 PRINT"[SPACE2,SHFT T]OTAL= ";
YES+NO'CGDF
115 PRINT:PRINT"[SHFT S]CORE= ";P;"%"
:PRINT'DFMG
116 PRINT:PRINT"[SHFT P]
RESS ANY KEY FOR MENU";'CCAK
117 GET L$:IF L$=""THEN 117'EIFH
118 GOTO 1'BBKE
119 CLR:PRINT"[CLEAR]" 'CBDH
120 END'BACW
150 REM MOVE CURSOR TO A POSITION'BVCG
151 C$="[RIGHT40]" 'BCKG
152 R$="[DOWN29]" 'BCVF
153 PRINT"[HOME]" 'BAVD
154 PRINT LEFT$(C$,C%);LEFT$(R$,R%);
'DQJJ
155 RETURN'BAQF
200 REM ERASE A ROW & MOVE'BOXA
201 C%=0:GOSUB 150'CHQY
202 PRINT"[SPACE40]" 'BACD
203 GOSUB 150'BDJA
204 RETURN'BAQA
250 REM PAUSE'BFND
251 FOR O=1 TO LIM:XX=SIN(45)
:NEXT'GNKJ
252 RETURN'BAQD
300 REM TIME THE PRACTICE READING'BWCD
301 PRINT"[CLEAR]":R%=12:C%=10
:GOSUB 150'EOFE
302 POKE 646,3'BFYA
303 PRINT"[SHFT P]RESS ANY KEY TO
[RVS]START[RVOFF]" 'BAWH
304 GET L$:IF L$=""THEN 304'EIDF
```

```
305 T0$=TIMES'BIWE
306 PRINT"[CLEAR]":R%=12:C%=10
:GOSUB 150'EOFJ
307 POKE 646,7'BFDF
308 PRINT"[SHFT P]RESS ANY KEY TO
[RVS]STOP[RVOFF]" 'BAYM
309 GET L$:IF L$=""THEN 309'EIIK
310 T1$=TIMES:T=VAL(T0$):GOSUB 350
:T0=T'FXGG
311 T=VAL(T1$):GOSUB 350:T=T-T0'FPFF
312 POKE 646,15:PRINT"[CLEAR]" 'CHWD
313 R%=12:C%=8:GOSUB 150'DMQF
314 INPUT"[SHFT E]NTER NUMBER OF
WORDS ";Q$'BDCJ
315 D=VAL(Q$)'CFDF
316 PRINT"[CLEAR]":R%=5:C%=0
:GOSUB 150'EMPJ
317 PRINT"ELAPSED[SPACE2]TIME[SPACE3]
SPEED" 'BAFK
318 R%=6:GOSUB 150'CHMI
319 PRINT"[SPACE2](MINUTES)[SPACE5]
(WPM)" 'BAPM
320 T=INT(100*(T/60))/100'FOMF
321 SPD=INT(D/T):R%=8'ELBF
322 C%=3:GOSUB 150:PRINT T'DJIE
323 C%=16:GOSUB 150:PRINT SPD'DMBG
324 R%=13:C%=0:GOSUB 150'DMJH
325 PRINT"[SHFT P]RESS ANY KEY TO
RETURN TO THE MENU";'BBIO
326 GET L$:IF L$=""THEN 326'EIHJ
327 GOTO 1'BBKG
350 REM CONVERT TO SECONDS'BQWH
351 HRS=INT(T/10000)'DLAH
352 T=T-(10000*HRS)'DMXI
353 MIN=INT(T/100)'DJUJ
354 SEC=T-(100*MIN)'DMDK
355 T=3600*HRS+60*MIN+SEC'FQPO
356 RETURN'BAQI
```

END

Flashcard Creator

```
1 REM USE FILE NAMES LEVEL 1 THROUGH
LEVEL 8'BGMI
2 DIM J$(500):POKE 53280,11
:POKE 53281,11:POKE 646,15
:PRINT CHR$(14)'GMOK
3 INPUT"FILE NAME ";N$'BDLE
4 FOR I=1 TO 500'DFEE
5 INPUT"ENTER STRING ";A$'BDVH
6 J$(I)=A$'BHFG
7 IF A$="/" THEN 9'DDCH
8 NEXT I'BBCG
9 OPEN 8,8,4,"@:"+N$+" ,W"'DIVL
10 FOR K=1 TO I'DDFY
11 PRINT#8,J$(K)'BHGA
12 NEXT K'BBEY
13 CLOSE 8'BBPA
14 OPEN 8,8,4,""+N$+" ,R"'DINF
15 INPUT#8,K$:IF K$<>"/"THEN PRINT K$
:GOTO 15'HMVI
16 CLOSE 8'BBPD
```

END

TECHNICAL TIPS

Continued from pg. 81

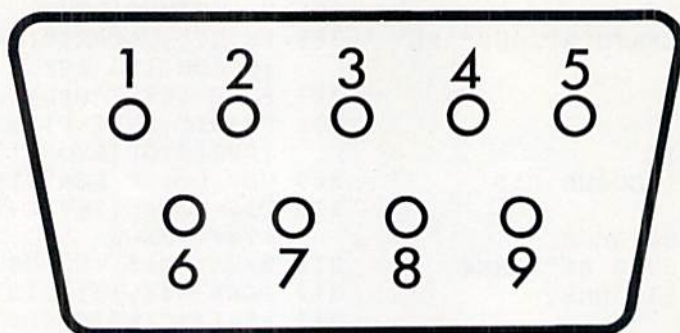


Figure 1

Table 1

Pin Connections to the Game Ports

Pin #	Port 1	Port 2	Notes
1	Joystick AO	Joystick BO	
2	Joystick A1	Joystick B1	
3	Joystick A2	Joystick B2	
4	Joystick A3	Joystick B3	
5	Paddle A2	Paddle B2	
6	Button A	Button B	Light pen on 1 50 mA max
7	+5V	+5V	
8	Ground	Ground	
9	Paddle A1	Paddle B1	

Table 2

Memory Map of Game Port Functions

Decimal	Hexadecimal	Bits	Description
53266	D013	all	Light pen x position
53267	D014	all	Light pen y position
53273	D019	3	Light pen triggered flag
54297	D419	all	Game paddle 1
54298	D41A	all	Game paddle 2
56320	DC00	7-6	Port selection for paddles
		4	Joystick A fire button
		3-0	Joystick A direction
56321	DC01	4	Joystick B fire button
		3-0	Joystick B direction
56322	DC02	all	Data Direction Register A
56323	DC03	all	Data Direction Register B

Before typing these programs, read "How to Enter Programs." The BASIC programs in this magazine are available on disk from Loadstar, P.O. Box 30007, Shreveport, LA 71130-0007, 1-800-831-2694.

Listing 1

```

100 PRINT CHR$(147)'CFBW
110 FOR I=49152 TO 49187'DLYA
120 READ A'BBYW
130 POKE I,A'BDBY
140 NEXT I'BCY
150 SR$="*****
*****" 'BDSI
160 SYS 49152'BFMC
170 A=PEEK(897)'CGXE
180 B%=A/6.38'CHNF
190 IF B%=C% THEN 160'DHXH
200 C%=B%'BEDW
210 PRINT LEFT$(SR$,B%)'CIOA
220 GOTO 160'BDGY
500 DATA 120,173,2,220,141,128,3,169,
192,141'BKGG
510 DATA 2,220,169,128,141,0,220,168,
234,136'BKJH
520 DATA 208,252,173,25,212,141,129,3,
173,128'BLPI
530 DATA 3,141,2,220,88,96'BREF
    
```

Listing 2 Modifications

```

100 PRINT CHR$(147)'CFBW
110 FOR I=49152 TO 49187'DLYA
120 READ A'BBYW
130 POKE I,A'BDBY
140 NEXT I'BCY
150 SR$="*****
*****" 'BDSI
155 S=54272'BGJH
156 POKE S+5,9: POKE S+6,0'EJQK
157 POKE S+24,15: POKE S+4,33'EMGM
160 SYS 49152'BFMC
170 A=PEEK(897)'CGXE
180 B%=A/6.38'CHNF
190 IF B%=C% THEN 160'DHXH
200 C%=B%'BEDW
210 PRINT LEFT$(SR$,B%)'CIOA
213 D%=A/3'CEJC
215 POKE S+1,D%: POKE S,0'DJRF
220 GOTO 160'BDGY
500 DATA 120,173,2,220,141,128,3,169,
192,141'BKGG
510 DATA 2,220,169,128,141,0,220,168,
234,136'BKJH
520 DATA 208,252,173,25,212,141,129,3,
173,128'BLPI
530 DATA 3,141,2,220,88,96'BREF
    
```

END

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Computer Baseball		\$40	\$27
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50 Mission Crush		\$40	\$27
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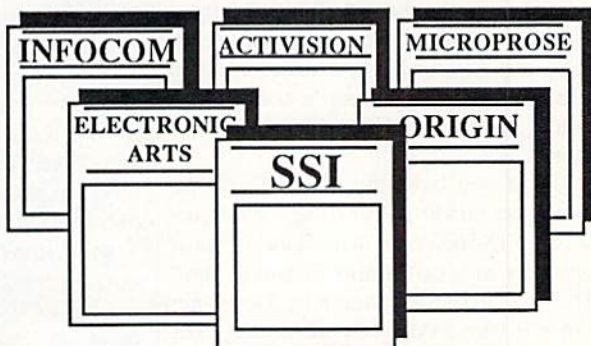
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All software is for the C-64/128. All software is disk only.

DESTRUCTION

Continued from pg. 46

Spell of Destruction is the kind of graduation prerequisite that would turn most mortal students into voluntary dropouts.

bolts, turn their seemingly solid bodies to follow an intruder.

This game uses mood music to highlight the action. Tunes of various timbres and tones have been incorporated to set the stage. A calm, placid melody might be heard when Drinn enters a hallway free of danger, and a quick, urgent strain might be played when trouble is closing in. The music is not only successful at creating atmosphere, but since every one of Drinn's opponents is accompanied by his own distinctive theme song, it can be used to identify an unseen attacker.

Now, even with its eye and ear appeal, I think it only fair to caution that this game is not for everyone. Mindscape has marketed this program under its "Alert" label, a line of software they have specifically designed for teens and adults. The young and the inexperienced should take this as a warning. The same intricate and involved design that makes this program engaging to the experienced campaigner will cause frustration among the untrained.

Also, this contest doesn't offer any save feature, which normally allows players to file any progress on disk in case of an extended castle search or unforeseen interruption. This means that each time the game is approached, you'll have to tread on some familiar ground until you reach the point of your latest demise. So when you get ready to sit for a round with Drinn, be prepared to sit around for a while.

But if you have the capacity and patience to tackle some tough mysteries, *Spell of Destruction* is the kind of game where you won't mind investing time. The road to mastery might be a long one, but it is sure to dazzle your senses, challenge your dexterity, and fully satisfy your craving for adventure. **C**

SOFTWARE REVIEWS/ACE

Continued from pg. 44

Experience modern warfare at twice the speed of sound.

as quickly as possible, because the drag it creates may cause the jet to somersault and crash.

Next you should activate the map display to identify enemy forces and their locations. Now you can activate the weapon to match the mission. For instance, if you plan to engage land forces first, you should activate your air-to-ground missiles, but if you spot enemy planes closing fast, you should activate your air-to-air missiles. This is done by tapping the F1 key until the correct weapon is displayed on the weapon's panel.

I have few complaints with the program except for the weapons selection scheme. Because only one weapon can be active at a time, the delay caused by switching between air-to-air missiles and decoy flares can be fatally slow. One way to minimize this is to fly with a weapons

man aboard. The program lets the pilot use one joystick to control the plane, while another player can use another joystick to aim and fire missiles and decoys.

The forward cannons are all-purpose weapons. They are effective against any target, but require multiple hits to destroy it. On the other hand, missiles are deadly accurate and hits always destroy the target.

The simulator's screen display is fast, accurate and believable. The Mark 2.1 can reach a top speed of 1,590 knots, climb nearly 14,000 feet in a minute, and snuff out your life in a wink. And the updating screen display accurately simulates these dizzying speeds, so be on your toes. This jet is super fast and unforgiving.

ACE is a realistic air combat simulator. If you want to do battle at head-swimming heights and stomach-turning speed, ACE is your ticket. The program delivers all it promises: great graphics, good sound effects, amazing speed and plenty of options to make it a simulator to enjoy long into the future. The program successfully mixes arcade action with strategic challenge. If you are a fan of flight simulators, war games or great arcade action, ACE is your cup of tea. **C**

Tips on How to Fly and Survive

- Spend plenty of time learning how to land, refuel, re-arm and take off. Approach the airfield low (under 500 feet) and at a slow speed (200 knots or less) with your landing gear down. As soon as the ground crew says your wheels have touched, cut your engines.

- When landing, be sure to leave room to take off. It's better to abort a landing than land without enough room to take off again. The plane will not taxi back to the beginning of the runway to begin the take-off.

- Force the enemy planes to fly over ally-controlled territory. That way, if you have to eject, you'll come down on friendly soil and be able to fly again.

- If your next target is going to be enemy aircraft, grab lots of altitude before engaging them. This serves two purposes: It insures plenty of maneuvering space and a descending plane can fly faster than an ascending plane.

- When possible, fly with a weapons man aboard. The second pair of hands and eyes makes it easier to find enemy forces, avoid enemy missiles, and maintain altitude.

- When attacking ground troops, you'll be tempted to fly slow and low—but don't. Better strategy is to dive at the target, squeeze off a few rounds, pull up, and repeat the cycle. This gives the enemy less of a target. You'll also find it easier to keep the enemy in your sights.

- If you are shot down over enemy territory, don't just give up. If you really fight the controls, you can sometimes make it back to allied territory. If you succeed, you can eject and fly again. Remember, friendly forces are always north-west, so try to glide in that direction.

- You can also refuel in the air if you wish, but I recommend you use this option only when you are caught far from one of the three allied airbases. Refueling in flight only increases your fuel, but if you land at an airfield, the ground crew will not only refuel your jet, but re-arm and repair it, too. **C**

THE EIDOLON

Continued from pg. 18

like a conventional automobile. When you're not moving the joystick, the vehicle is in neutral, and produces a slow steady idle. If you apply pressure to the stick, the motor accelerates. You hear the flapping of the Biter Bird's wings, and the turning of the Rotofly's propeller. Other noises include the sound of a fireball being expelled, the explosion as it strikes a target, and the raspy noise generated when you're trying to shoot a fireball but have used up all of your energy. All in all, the sound effects are interesting and support the graphics well.

Another plus for *The Eidolon* is its instruction manual. Game instructions are cleverly camouflaged within Dr. Agon's diary, while creature artwork was apparently inspired by the drawings of Leonardo Da Vinci.

I personally like *The Eidolon* because it contains many of the better elements found in role-playing games, simulators, and arcade games. Any way you look at it, *The Eidolon* is another major triumph for the programmers of Lucasfilm Games. G

Eidolon Strategies

Since you are in a race against time to complete each level of the game, draw a map of every labyrinth so you can locate creatures quickly and not lose time searching for them. Once you confront a creature, use the least amount of energy possible to defeat it. Don't let any of the alien characters touch you, for they will absorb your energy.

It also pays to know the power of each colored fireball. The red ones are the most destructive, gold ones replenish your power reserves, blue ones alter the flow of time, and green ones have the power to transform a creature into another form.

Above all, use common sense as you play. Remember how you defeated a Biter Bird in level one, and use that information as a basis for your attack on the creature in level two. Gather magic fireballs only when your machine can store the energy. Any energy that can't be properly stored is lost forever.

And finally, whenever you battle a dragon, do so from a distance. If you think fast enough, you can gather the dragon's fireballs, convert them to energy, and use that power against him. G

AMIGA UPDATE

Continued from pg. 71

"One thing we learned. . . is that when a new machine comes out, you do clean programming—you toe the line on 'official' programming."

is to allocate a huge chunk of memory up front, and use that for your program. This may get around the problem of memory getting fragmented as you allocate and de-allocate pieces, but it defeats the whole concept of multi-tasking.

The other way is more difficult. We do something called memory panning. Every time we do something that might take a lot of memory, we check to see how much memory is left. We also check how much memory is left from time to time, just to keep track of what's going on in the system. If you are close to running out of memory, we'll let you know, and suggest that you should close some windows or save a file.

It's possible to have a situation where you are almost out of memory, and don't have enough left for the program to put up a window that either warns you or asks for a file name to save with. We are thinking about two ways to deal with this. One is to allocate a small block of memory at the start of a program, sort of an escape hatch, so that if the program needs more memory to put up a requester we can use that block. We do that in *Animator*; and the block is called "Ripcord." The other idea is a "panic save." If the program runs out of memory, it will save the current file under a default name like Panic1.

Leeds: Will all of Aegis' software run on a 512K Amiga?

Volk: There will come a time when we will release programs that will say on the package that you need one or two megs of memory to run them. Draw is only 100K of object code, but drawing takes up a lot of memory. *Professional Draw*

will probably require you to have over one meg of memory.

Leeds: Anything else we should know about memory on the Amiga?

Volk: One thing end users should recognize is that on a multi-tasking system, the whole system is only as safe as the weakest program in the system. They are going to want quality software because if a poorly written program blows up, they will lose anything that was in memory at the time. This is one of the risks of a multi-tasking system. Developers have a much harder job on the Amiga, because they must make sure their software will not interfere with other programs running on the system.

Leeds: What advice would you give to new developers?

Volk: One product I recommend as a "must have" is the A-Time clock. Since all of the Make utilities and Backup utilities keep track of the date and time so that you can keep track of your most recent file, you need to let the system know what time it is. If you don't have accurate time on your system, you're dead in the water. Now for 50 bucks you buy this little module that sits on your printer port, and whenever you turn the system on, the correct time is there.

If someone were to ask me what does a developer need to work on the Amiga I would say the minimum system is a 512K system, two drives, the A-Time clock, and Aztec C, since it takes up less space on the floppies. Then before you add anything else, add a hard disk. Then more memory.

Not every developer needs to write in C. Microsoft's BASIC for the Amiga is very good, and I expect to see some very good commercial programs written in it. More than anything else, I would say be sure to do it right the first time, produce quality code, and test it very well before you release it. G

A review of Aegis Images, Aegis Animator and Aegis Draw appeared in the August/September, 1986, issue of Commodore Power/Play.

SOFTWARE REVIEWS

Continued from pg. 37

Championship Golf at Pebble Beach *lets experienced and novice players compete as equals.*

famous golf courses like Augusta and the Tournament Players Club.

Just remember to control your temper; tossing a putter into the Pacific Ocean will only cost you a new putter, but tossing your joystick into your monitor may electrocute you. **C**

Hints on Playing Championship Golf

- You can aim the ball by either pushing the joystick forward or pressing the five key. I found pressing the key to be much easier and more accurate than the joystick. After selecting direction, you can adjust the flight a bit by making the ball either hook or slice. I was able to get maximum accuracy and distance by directing the ball with the five key, then switching to the joystick for the actual swing.

- If you land in the trees, use a recovery wedge to get back on the fairway. Using any other club will usually cause the ball to hit another tree and cost you another swing. The recovery wedges keep the ball's flight low, below tree branches.

- If you land in the rough behind the trees, you may be better off approaching the green from the rough side rather than trying to squeeze back through the trees to the fairway. The woods and irons seem to work just as well here as on the fairway.

- Although no practice mode is included, you can practice with each club (except the driver) by simply hitting the ball up and down the fairways or across the greens. This is not as much fun as playing a game, but the practice will shave strokes from your game.

- Never try to drive over trees. The ball will almost always hit a trunk or branch and get you in trouble. Water is no problem if you make sure the club selected and your swing will carry the ball to the distant bank. **C**

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Advertiser Index	Reader Response No.	Page No.
Abacus Software	1	29, 31
Addison Wesley Publishers	2	47
Bantam Books	3	41
Batteries Included	4	13
Berkeley Softworks	5	22-23
BodyLog Inc.	6	6-7
C.O.M.B. Company	*	35, 37
CBM Corporate Amiga	*	32-33
CBM Corporate c-128 a	*	38-39
CBM Corporate c-128 b	*	76-77
CBM Software	*	C3
CMS	*	2
CompuServe	7	27
Computability	8	63
Computer Craftworks	9	50
Cosmi	10	15
Digital Solutions	11	C2-1
Digital Vision	12	109
Emerald Components	13	14
Galaxy Electronics	14	8
Get Free Software	15	48
Info Group	16	114
Ketek	17	21
Lion Heart Press	18	50
Loadstar	19	43
Micro Arts Products	20	24
Microlog	21	91
NPS Inc.	22	50
Pro Comp	23	19
Pro-Tech-Tronic	24	45
Progressive Peripherals	25	4, 5
Protecto	26	57-61
QuantumLink	27	16-17
QuantumLink, Hello, Bow	27	8, 10
QuantumLink, Books, Software	27	12, 14
Softpace	28	117
SubLogic Corporation	29	9, 25
Superior Microsystems	30	50
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Tenex Computer Express	31	51
Tevox	32	125
Tri-Micro	33	11

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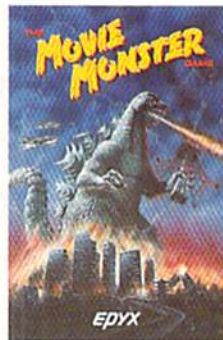
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