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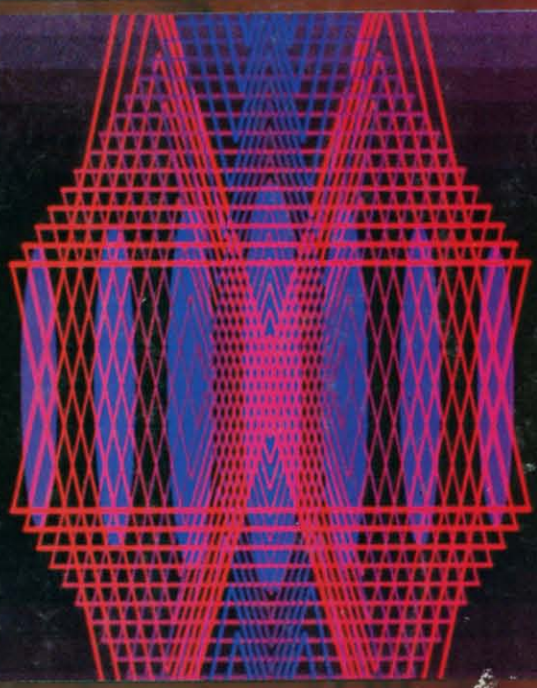

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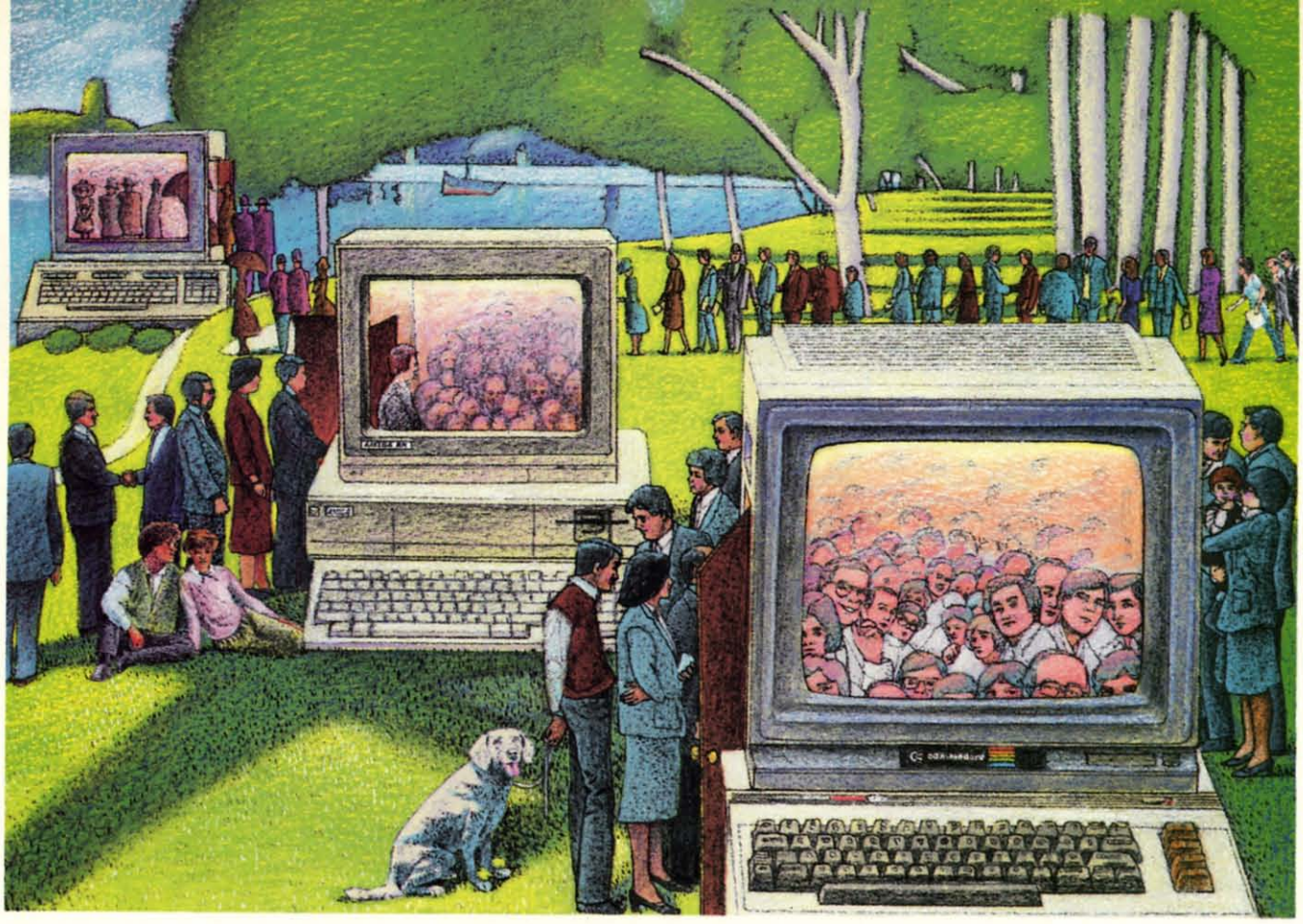

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If you own a C-64, you

The one you purchased. And the

GEOS realizes the technical potential that has been in the C-64 all along. Speed. Power. Ease of use. Sophistication. Elegant, practical applications you might 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.

To begin at the beginning. **GEOS** stands for **GRAPHIC ENVIRONMENT OPERATING SYSTEM.** Why?

GRAPHIC: Because menus and icons replace long, typed command lines. Point and click, that's it.

ENVIRONMENT: Because GEOS provides a consistent, powerful way to use your computer. Learning new applications is a snap (or should we say click).

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 Dwinelle, 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.

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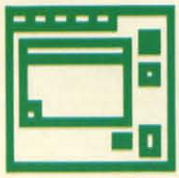
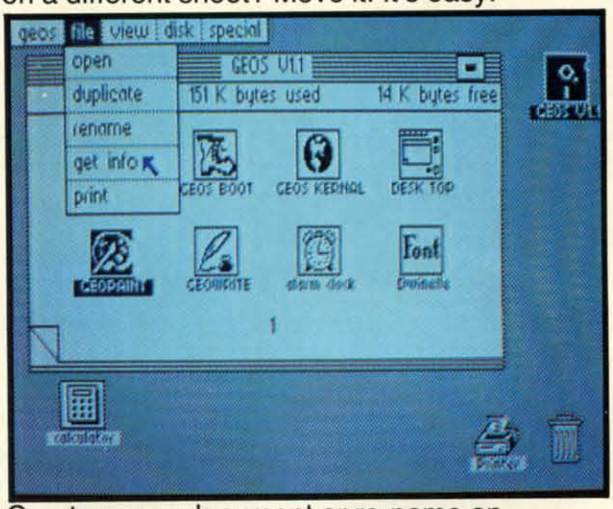
GEOS can be divided into 4 areas: two functional aspects (deskTop and Desk Accessories), and two major applications (geoPaint and geoWrite).



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.

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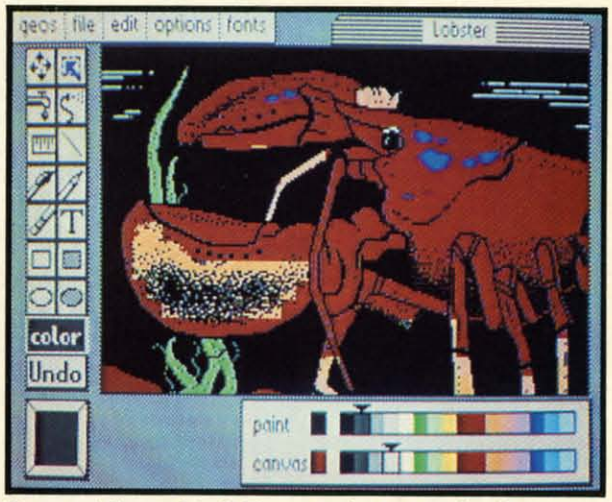
own two Machines.

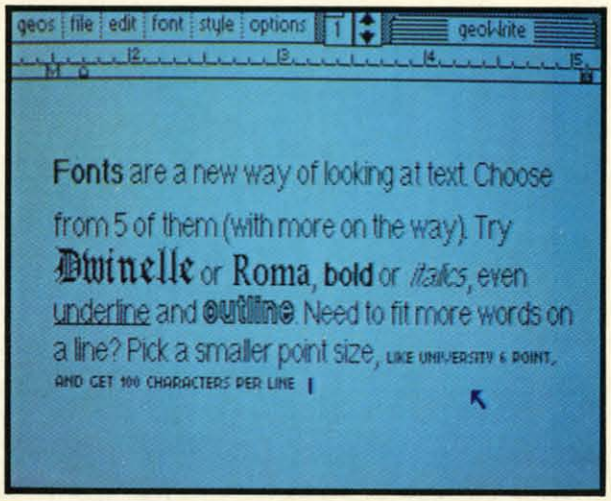
personal computer GEOS™ unlocks.



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

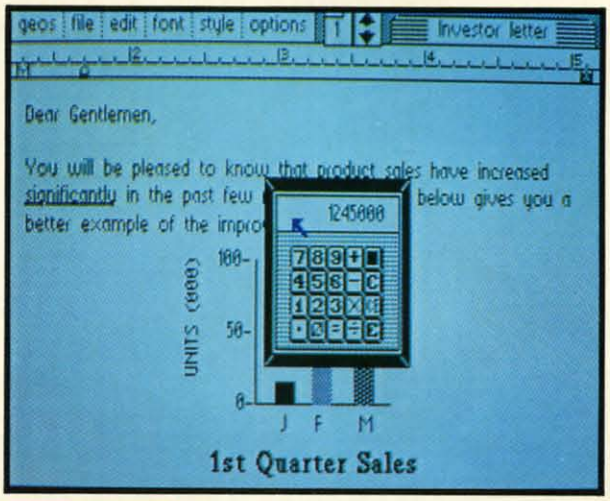
Add text if you like, in different fonts, styles or point sizes. Even change its position or layout at will.

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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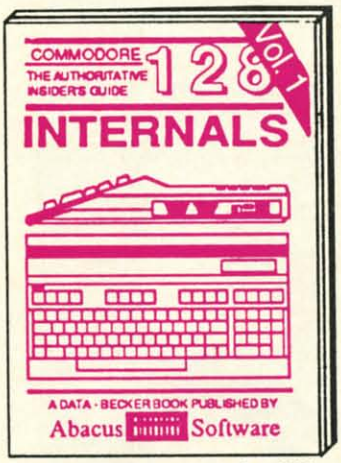
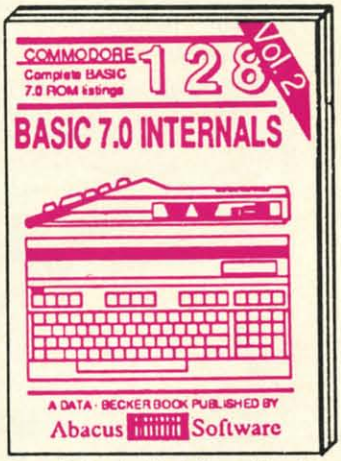
REQUIRED READING

for the Commodore 128™

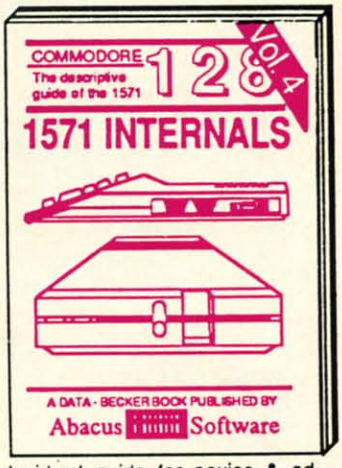


Detailed guide presents the 128's operating system, explains graphic chips, Memory Management Unit, 80 column graphics and commented ROM listings. **500pp** $19.95



Get all the inside information on BASIC 7.0. This exhaustive handbook is complete with commented BASIC 7.0 ROM listings. Coming Summer '86. $19.95

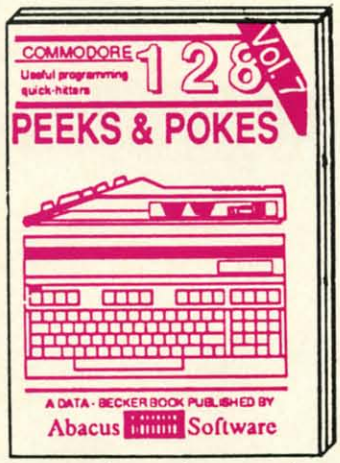
Filled with info for everyone. Covers 80 column hi-res graphics, windowing, memory layout, Kernal routines, sprites, software protection, autostarting. **300pp** $19.95



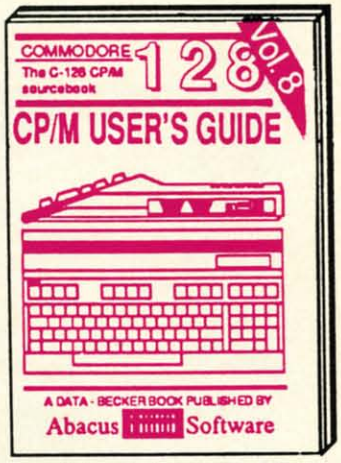
Insiders' guide for novice & advanced users. Covers sequential & relative files, & direct access commands. Describes DOS routines. Commented listings. $19.95

Learn fundamentals of CAD while developing your own system. Design objects on your screen to dump to a printer. Includes listings for '64 with Simon's Basic. **300pp** $19.95

Introduction to programing; problem analysis; thorough description of all BASIC commands with hundreds of examples; monitor commands; utilities; much more. $16.95



Presents dozens of programming quick-hitters. Easy and useful techniques on the operating system, stacks, zero-page, pointers, the BASIC interpreter and more. $16.95



Essential guide for everyone interested in CP/M on the 128. Simple explanation of the operating system, memory usage, CP/M utility programs, submit files & more. $19.95

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VIEW FROM THE BRIDGE

If the *Ahoy! Disk* gets any better, we'll have to subscribe ourselves...and we get it for free! These past four months, we've shipped nearly full, with programs provided by the COMAL Users Group occupying the space left over by our monthly lineup. This month, we've given COMAL a rest to provide another exciting commercial program.

The *Talking Disk* from Covox is more than a demo of their $89.95 Voice Master: its several programs are entertaining and educational in their own right. As detailed in the August *Scuttlebutt,* the $5.00 disk includes a talking keyboard, a calculator that converses in English, Spanish, and German, and instructions for creating voice synthesized programs. Because of the software's total length—over 400 blocks—we've had to double-side the *Ahoy! Disk* to fit it all in. But despite that, and the inclusion of a 28-page manual, the October disk costs the usual $7.95 (see page 54).

Believe us: they're not giving it away simply because they can't give it away. The disk and booklet would provide an outstanding introduction to the world of Commodore speech synthesis, even if you had to pay $5.00 for it—but you don't have to!

We'd love to devote the rest of this page to the bonuses we have planned for future disks (including a recent, nationally advertised release from a major game manufacturer)—but we're equally excited about the contents of this, the October issue of *Ahoy!*

• Though Cleveland M. Blakemore's *Vault of Terror* was easily the best adventure game we'd ever seen in 70 blocks or less, we knew what aspect of it would frighten readers the most: typing it in. To encourage the reluctant, we've run it in the same issue as Cleve's shorter *Penguins* (page 16). Once you've whet your appetite on the latter, you'll want to plunge headlong into the *Vault!* (Turn to page 58.)

• Each month when he hands in his column, we wonder: how long can Dale Rupert keep it up? Surely he'll have to run out of original, exciting topics for the *Rupert Report* one of these days! But he hasn't disappointed us yet...least of all this month, as he leads C-128 and C-64 users on *Analog to Digital Adventures.* These include building and programming an onscreen oscilloscope and an optical version of a Theremin. (Turn to page 20.)

• What would an issue of *Ahoy!* be without a Buck Childress program? Probably yellowed with age—because with the exception of one month, Buck's work has appeared in every issue dating back to December of last year. His latest program is his longest: *Quick Change,* a powerful BASIC search and replace. (Turn to page 52.)

• We gathered from last month's *Trapped* that Mike Hoyt knew how to pack an awful lot of program into a small amount of code. But we were nonetheless felled by *Attack Force.* (Seriously, Mike—do you have any experience with missionaries' heads?) (Turn to page 72.)

• If you believe reports that the Dvorak keyboard layout will eventually become the standard, you'll want to start getting your fingers in shape. To that end, we've presented C-64 and C-128 versions of *Dvorak Keyboard.* (Turn to page 57.)

• As rocks rain on his head and appropriate theme music plays, *Mountaineer Mack* must scramble to the top of six hills. (Turn to page 18.)

• In this month's *Commodore Roots,* Mark Andrews reveals *The Fastest Draw in the Industry*—that is, he reveals techniques that top pros use in writing fast assembly language programs. (Turn to page 27.)

• The answer to many a 128 user's dilemma, *128 to 64 Autoboot* allows the computer to go into 64 mode and automatically boot a program, when activated by a timer or otherwise. (Turn to page 50.)

• Operational with the C-64, Plus/4, C-16, or VIC 20, *Disk Checkup* helps 1541 users to diagnose the health of their floppy files. (Turn to page 97.)

• What better time than October to plan your holiday shopping? Our *Christmas '86 Preview* suggests a number of game packages due for release before the end of the year. This month's *Entertainment Software Section* also includes reviews of *Murder on the Mississippi, GBA Championship Basketball (Two-on-Two), Europe Ablaze, World Karate Championship, Oo-Topos,* and *Super Bowl Sunday Expansion Disk #2.* (Turn to page 41.)

We regret the absence of the *Cadet's Column* from this issue, but expectant motherhood made some demands on Cheryl Peterson that rendered her unable to meet this issue's deadline. One or the other had to be shelved for this month—and over our protests, Cheryl shelved us. So it's 30 days liberty for all cadets—until next month, when Cheryl introduces you to the Promal language.

But almost everything else you buy *Ahoy!* for is to be found between this month's covers: including an extra-long installment of *Tips Ahoy!, Reviews* of *21-Second Backup* and *IntraCourse,* Dale Rupert's *Commodares,* and more. If there's anything you're not getting enough of (within reason), please write to tell us. —***David Allikas***

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Effective immediately, the 24 hour a day *Ahoy!* Bulletin Board System can be accessed at 300 or 1200 baud, in 40 or 80 columns.

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ACTIVISION PRODUCTIVITY

Activision has branched out from the entertainment business into a line of home and personal productivity programs for the C-64. The following are the first releases in the series, dubbed *Personal Choice Software:*

The *Writer's Choice* word processor includes a 50,000 word spelling checker, help screens, and a full layout preview option that allows the writer to see what a document will look like before printing it.

Filer's Choice lets the user tailormake computer "index cards" and sort records alphabetically or numerically. A report writer makes it possible to extract information from multiple fields and combine it into one file for report generation and document production. Context-sensitive help screens address specific problems.

The *Planner's Choice* spreadsheet permits the user to select column width, while horizontal and vertical windowing allows him to view different sections simultaneously. "What-if" games are provided for experimentation and modification of data.

Titles are $39.95 each, or $99.95 for the *Personal Choice Collection* of all three.

Activision, Inc., 415-960-0410 (see address list, page 14).

MANUAL PROGRAMMING

In April's *Scuttlebutt* we announced that ShareData had licensed the C-64 rights to VPL Research's "grasp" technology, consisting of a visual programming language operated by a glove input device. ShareData has now completed and released HandCommand, a transmitting device inside a lightweight cotton glove available in three sizes for lefties or righties. The position, tilt, and bend of the hand is measured in three dimensions and translated into computer operations. The wearer can for example throw an imaginary dart and have the speed and angle measured and reflected, in real time and 3-D, on the computer screen. The product was scheduled for fall release.

ShareData, 1-800-328-6061 or 612-829-0409 (see address list, page 14).

Computer Care Kit *includes anti-static spray, disk drive cleaner, more.*
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DISK LIBRARIAN

The *Disk Librarian* comprises five C-64 programs: *Single Drive Copy V/4.0* (back up disks in a maximum of three minutes on a single 1541); *Security Seven* (back up a disk onto tape in a maximum of seven minutes); *Directory Modifier* (reorganize or add lines or comments to disk directories, lock or unlock files, and change file types or names); *Disk Directory Sorter V/4.0* (read all your disk directories into one large file for editing, sorting, searching, and printing out); and *Tape-Log* (catalog disks stored on tape with *Security Seven*). Price is $35, shipping included (except COD orders); add $5.00 if you desire a backup copy.

Software Unlimited, 503-882-7110 (see address list, page 14).

AMIGA GUIDE

Focusing on graphics and sound, the *Amiga Programming Guide* ($18.95) provides readers with a basic programming foundation. Covered are initial setup, fundamentals of Amiga BASIC, LOGO, and C, information management with AmigaDOS, communication with other PCs, and interfacing with a VCR or stereo.

Que Corporation, 317-842-7162 (see address list, page 14).

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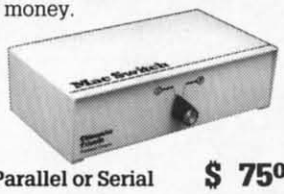

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Philips ECG, 1-800-233-8767; in PA 1-800-222-9308) (see address list, page 14).

PLUS/4 AND C-16 SOFTWARE

While the level of software support for the Plus/4 and C-16 could make even an Adam owner chuckle, a bone is thrown from time to time. Robinson Software Associates has made three available at $9.95 each plus $1.50 postage per order. *Bounty Hunter* (round up a gang of outlaws in the Old West), *Grave Robbers* (a graphic adventure requiring players to find secret treasure), and *Savings & Loan* (a home finance program that calculates principal and interest payments and amortization of loans, as well as the value of various types of savings). (See also this month's *Game Releases* heading for a Plus/4 flight simulator.)

Robinson Software Associates (see address list, page 14).

FOOTBALL HANDICAPPING

The *Professional Football Handicapping System* lets the C-64 or VIC 20 user handicap NFL games using information found in the daily paper. About five minutes is required to enter the information needed to perform the statistical analysis that will predict the winner, point spread, and total points in a game. On cassette or disk; $39.95 plus $2.00 shipping.

Software Exchange, 313-626-7208 (see address list, page 14).

SYNTHESIZER PROGRAM

The *Fastfingers* synthesizer program includes 256 preset sounds derived from the SID chip, 13 effects (glide, vibrato, wah wah, etc.), and onscreen instructions, and provides for 10 minutes of real-time recording at 60 notes per second. A 4-octave keyboard with 49 full-size keys (apparently the Mattel keyboard originally manufactured for use with Intellivision) is also available. Price of the software and manual is $24.95; with keyboard adapter $59.90; with adapter and keyboard $119.85.

See-Thru Enterprises, 519-735-2995 (see address list, page 14).

TALKING SOFTWARE

Hearsay, Inc. has released three educational games that produce speech when used with a C-64 and the Hearsay 1000 speech synthesizer/voice recognition system (see January '86 *Ahoy!*). Each $29.95, they are *Rhyme and Reason* (familiar nursery rhymes teach basics like names of animals and parts of the body), *Aqua Circus* (basic shapes, colors, counting, and simple math), and *Think Bank (Concentration*-type game that teaches arithmetic).

Hearsay, Inc., 718-232-7266 (see address list, page 14).

CP/M SOURCE

FOG, the California-based CP/M users group, is offering a library sampler of CP/M software free to C-128 users who send in the $25 yearly membership fee by December 31, 1986. In addition to Commodore's revised CPM+ operating system (the original system shipped with the 128 contained bugs that prevented the serial port from operating), the disk contains a text editors with *WordStar*-like commands, a telecommunications program designed for both the Commodore 1670 and Hayes-compatible modems, a menu-driven file utility program for making file and disk copies, viewing files, etc. (eliminating the need to memorize CP/M commands), and a disk directory manager that sorts and prints directories and shows print status. Documentation is included.

FOG, a non-profit group with 20,000 members worldwide, maintains a large library of public domain software that is available for a small copying fee. Membership includes affiliation with more than 300 local chapters, and access to a technical support hotline operating from 10 a.m. to 5:30 p.m. (Pacific time), Monday through Friday.

FOG, 415-755-2000 (see address list, page 14).

ABACUSES FOR THE 128

Three new C-128 productivity packages from Abacus, each $59.95, scheduled for September release:

In addition to the standard options

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found in most terminal programs, *SpeedTerm 128* features Xmodem and Punter file transfer protocols, VT52 and VT100 terminal emulation with cursor keys, 45K capture buffer, and user-definable function keys.

TAS-128, an enhanced version of Abacus' Technical Analysis System for stock marketing charting, lets the investor automatically download indicators from DJN/RS or Warner and then build a variety of charts on the split screen: 7 moving averages, 3 oscillators, 5 volume indicators, comparison charts, trading bands, least squares, and more. Included are macro capabilities, automatic and unattended log-on, and fast draw charts using up to four windows.

PPM-128, a 128 upgrade of *Personal Portfolio Manager,* tracks performance of stocks, bonds, or options, as well as profits and losses for tax purposes.

Abacus Software, 616-241-5510 (see address list, page 14).

MY NAME IS 128. C-128.

Developed and originally distributed by Creative Software, *I Am the C-128* ($34.95) is now available from Activision. The tutorial provides C-128 users with an introduction to programming, advancing from the basic keyboard layout to animation programs and debugging. Several practice programs are included for experimentation.

Activision, Inc., 415-960-0410 (see address list, page 14).

NORTH TO VERMONT

Though you may have thought the state produced nothing but maple syrup, *Vermont Gold* ($29.95) for the C-64 deals with various aspects of prospecting for gold in the state of Vermont, including tales and history facts about prospecting in the 1800's, how to look for and find gold in Vermont, equipment needed for prospecting and how to use it, and more.

Indian Affairs, 717-842-8467 (see address list, page 14).

GAME RELEASES

SubLOGIC has made available two new $19.95 Scenery Disks for use with their C-64 flight simulation products *(Microsoft Flight Simulator, Flight Simulator II,* and *Jet):*

The San Francisco STAR Scenery Disk takes in such Bay area highlights as Fisherman's Wharf, Alcatraz Island, and the Golden Gate, Dumbarton, and Bay Bridges. Mountains, lakes, and waterways are accurately located, and airports represented in detail, down to the hangars and refueling facilities.

The Japan Scenery Disk details the area from Tokyo to Osaka, including Mt. Fuji, the Shin Kansen bullet train, Osakajo castle, and the Tokyo Tower, Palace grounds, and canal network in downtown Tokyo.

SubLOGIC Corporation, 800-637-4983 or (in IL, AK, HI) 217-359-8482 (see address list, page 14).

Two C-64 releases from SSI, each $39.95:

Roadwar 2000, set in a post-nuclear attack age, requires the gamer (as the leader of a gang that conquers cities by collecting soldiers, vehicles, and supplies) to locate eight scientists who are crucial to the survival of the world and return them to their research base. 19 types of vehicles can be modified for different terrain, attack, defense, speed, and durability tasks. During the 50 or more hours or an average game, the road warrior interacts with numerous wanderers, rabble road gangs, mutants, cannibals, and foreign invaders.

The magically endowed *Shard of Spring,* remnant of the once-whole LifeStone created by the Red Sorcerer, must be taken back from its captor, the evil enchantress Siriadne, and returned to its home on the stricken island of Ymros. The player attempts to do this with the aid of up to five other characters, searching Ymros, fighting monsters, and exploring dungeons. Spells are cast using the five elements of nature: fire, metal, wind, ice, and spirit. The game is designed to last from 40 to 80 hours.

Strategic Simulations, Inc., 415-964-1353 (see address list, page 14).

A female version of Activision's *Alter Ego* for the C-64 allows the distaff gamer to respond to hypothetical situations according to the person-

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ality profile the program creates for her based on her responses to a series of questions. She may choose instead to let the computer select her personality for her and experience life through the eyes of an unfamiliar alter ego.

Activision, Inc., 415-960-0410 (see address list, page 14).

Through October 31, 1986, specially marked packages of IntelliCreations/Datasoft's *Mind Pursuit, The NeverEnding Story, Crosscheck,* and *Mercenary* will contain a card entitling the consumer to a free three-month subscription to *Computer Entertainer,* a 16-page newsletter containing software news and reviews. The regular subscription price for the four year old publication is $22 for 12 issues. Call 818-761-1516 for more information on *Computer Entertainer.*

IntelliCreations/Datasoft, 818-886-5922 (see address list, page 14).

The first Infocom game to recreate actual locations and events, Brian Moriarty's *Trinity* ($39.95) nonetheless leads the text-adventurer into an alternate universe where magic and physics coexist and he gets the chance to change the course of history. From a magical world overgrown with giant toadstools he progresses to the Siberian tundra, a tropical island, deep underground, outer space, and finally the New Mexico desert on July 16, 1945, the date and site of the world's first atomic explosion, codenamed Trinity.

Trinity was written with Infocom's Interactive Fiction Plus development system, allowing for more extensive stories and more sophisticated user interfaces. As a result, it is only available for Commodore computers with at least 128K: the C-128 and Amiga. The game is geared for the Standard Level player.

Infocom, Inc., 617-492-6000 (see address list, page 14).

As a reporter in search of *The Scoop* on the murder of a woman in a bungalow, you will look for clues, question witnesses, and eavesdrop on conversations. Based on the Agatha Christie story, the Telarium adventure game includes full animation and a text menu that facilitates interaction.

Ace ***includes talking onboard computer.***
READER SERVICE NO. 128

For the C-128; $32.95.

Telarium Corp., 617-494-1200 (see address list, page 14).

Spinnaker has licensed the rights from Britian's Cascade Games to distribute its *Ace* flight simulator, which it will do under its UXB label. The player/pilot's goal is to wipe out enemy air and ground forces, aided by multiple weapon systems, real-time overhead satellite mapping, and a talking onboard computer that advises on fuel levels and incoming missiles and aircraft. Additionally, a new Plus/4 version can be ordered from Cascade via check, credit card, or phone (see address list, page 14).

Spinnaker Software, 617-494-1200

www.commodore.ca

(see address list, page 14).

Video Vegas simulates casino blackjack, draw poker, slots, and keno, providing entertainment for the beginner and practice for the pro.

Baudville, 616-957-3036 (see address list, page 14).

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Gamco Industries, Inc., 1-800-351-1404 (see address list, page 14).

Designed for beginning to expert typists, *Type!* ($39.95) teaches typing with real text and sentences instead of random letter drills. An arcade-style game is included. For the C-64.

Broderbund Software, 415-479-1170 (see address list, page 14).

The Linguist ($44.95) allows C-64 users to create language drills in French, Spanish, German, English, Russian, Hebrew, Japanese, or any of 13 other languages. The student selects two languages and enters as many words, phrases, or definitions in each of the chosen languages as desired. The program then quizzes him by presenting one of the elements in the pair and asking him to fill in its equivalent in the other language.

Gessler Educational Software, 212-673-3113 (see address list, page 14).

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The Grolier *Core Collection* of productivity software, including *The Information Connection, Friendly Filer, Easy Graph,* and *EduCalc*, will be made available to schools at savings of up to $60. Additionally, the *Database Management Enrichment Collection,* consisting of *Friendly Filer,* three *Friendly Files, NoteCard Maker,* and the *Countries of the World* and *The Great Book Search* databases, will be offered for $199.

Including over 100 lesson plans, the 192-page *Grolier's Productivity Software Across the Curriculum* provides educators with a guide to tailoring Grolier's productivity software to their curriculum needs. Ordinarily $12.95, the volume will be shipped free with orders of $75 or more.

Grolier Educational Publishing, 212-696-9750 (see address list, page 14).

Bantam has put two volumes of its *Choose Your Own Adventure* series of children's books on disk for the 64 at $34.95 each. In both animated adventures, the child becomes the main

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character in the story and decides how it will evolve from a variety of plot options. *Escape* challenges the player to lead three characters out of a mazelike city and across enemy territory to home. *The Cave of Time* compels adventurers to return misplaced objects to their owners, fighting ghouls, a prehistoric mammoth, and assassins along the way.

Bantam Electronic Publishing, 212-765-6500 (see address list below).

Two educational entries in Baudville's *Hacker Jack* line: *Guitar Wizard* (learn and analyze scales, chords, and tunings for all types of fretted string instruments) and *Ted Bear's Rainy Day Games* (Concentration, Old Maid, and Go Fish). For the C-64; $29.95 to $34.95 each.

Baudville, 616-957-3036 (see address list below).

CBS has rereleased *Mastering the SAT* in an enhanced version for the C-64 and an all-new version for the Amiga. 64 users now get a full disk of additional Skill Builders exercises, an onscreen timer, a revised management system providing for up to seven students, and faster access to questions and answers. The Amiga version includes pull-down menus, windows, scrolling, and graphics.

Each version is available in a retail school package containing program disk, backup, 152-page student workbook, and teacher's notes, for $109.95 (lab pack, $329.85), or a retail package (program disk and student workbook) for $99.95.

CBS will also market *The Observatory*, under license from Lightspeed Software. The C-64 astronomy program allows students to set up a "software telescope" anywhere on earth

Continued on page 130

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CBS Interactive Learning
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Phone: 203-622-2500

Cascade Games Ltd.
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FOG
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Phone: 415-755-2000

Gamco Industries, Inc.
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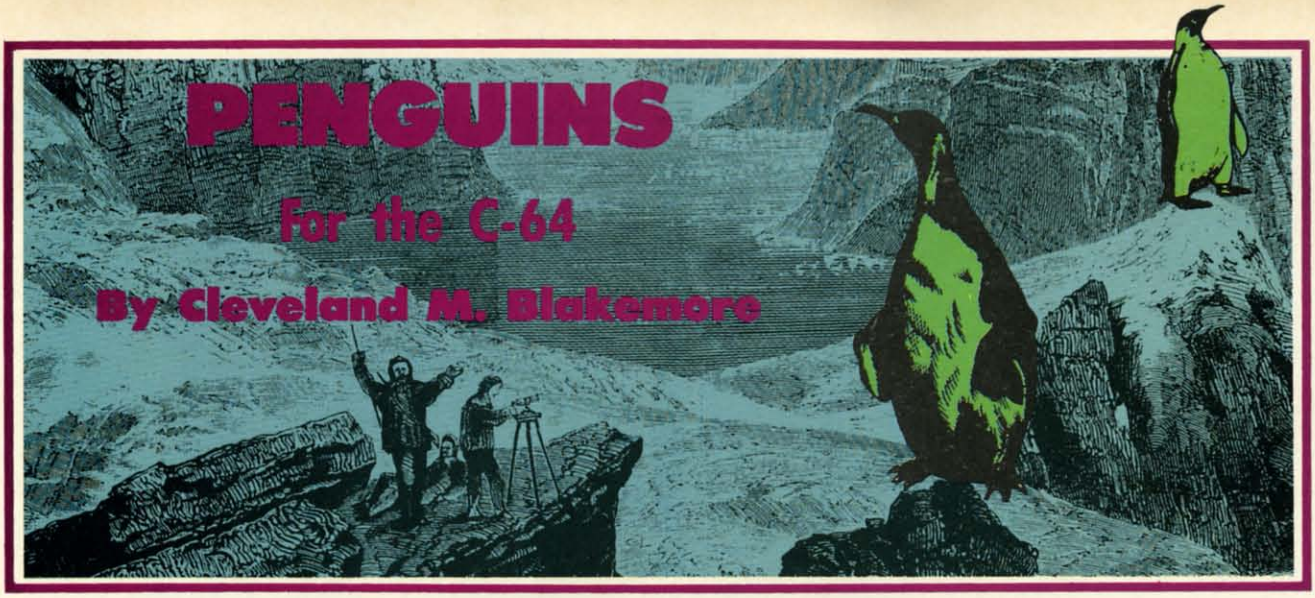

PENGUINS

For the C-64

By Cleveland M. Blakemore

Penguins is a fast action arcade game with interrupt driven music and 24 (count 'em, 24) active sprites moving during gameplay.

The object is to get the poor penguin at the bottom of the screen to one of the ice caverns at the top. You have to cross two streams full of killer whales and get past a sniffing arctic wolverine who is looking for a few drumsticks for dinner. You also have to avoid the cave with the polar bear inside once you get to the top of the screen—you can tell which one is occupied by the set of red eyes inside.

With a joystick plugged into Port 2, you can move the penguin in all directions as long as he is standing on one of the three snowbanks. When he is in the water, however, he will coast forward unless you pull back on the stick to bring him to a dead stop.

There are safe ice floes at intermittent intervals between the killer whales, and when you are touching one you will stop coasting. It is possible for you to cling to one of these until you pass close enough to a cavern to swim off.

Score is determined by the green bar just below the ice caverns. It gradually turns red from right to left, showing you how much bonus score is left before time runs out. When time runs out, you receive no bonus score upon entering one of the caverns.

Bonus score varies from 100 points to 3900 points, depending on how long it takes you to get across the screen to the safety of the caves.

When you enter an ice cave, you must avoid the razor-sharp icicles on either side of the entry walls to get inside safely. If you enter a cave touching one of the icicles, or there is a polar bear inside when you enter, your little penguin will sprout angel wings and float off the screen.

If you enter safely, a victory fanfare plays, the penguin jumps for joy, and a new penguin is positioned at the bottom of the screen. Each time you enter a cave safely, the game picks up the speed a little.

You have three penguins per game, denoted by the three check marks on the bar at the bottom of the screen. To start a new game, hit f1.

My high score so far is 24000+. It gets pretty hard after about eight penguins, because the wolverine and the killer whales really start hustling.

The interrupt divides the screen into three different colors, moves the three separate groups of killer whales, and propels the wolverine along the snowbank, along with updating the musical theme.

I hope you take the time to type in *Penguins*—it is a nice inexpensive addition to your game library. Since the game is entirely in ML, you will need *Flankspeed* to type it in. □ *SEE PROGRAM LISTING ON PAGE 110*

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MOUNTAINEER MACK

For the C-64

By Stephen Devine

Mountaineer Mack is a fast-paced mountain climbing game for one player. You will need both quick reflexes and patience as you make your way to the top of each mountain. Randomly falling rocks are only one of the obstacles to avoid.

There are three levels of play, with each level having six mountains of increasing difficulty. Not only is each succeeding mountain higher in elevation, but the rocks become "smarter." The speed of the rocks also increases with each level.

You start each new game with three men, and a man is lost when contact is made with an obstacle. Bonus points are awarded every time you reach the top of a mountain and still have all three of your men. It is calculated by multiplying 50 by the mountain number (shown in the lower left-hand corner of the screen).

Mack is controlled by a joystick plugged into Port 2. He may move up, down, left, or right, but not off the sides or bottom of the screen. When climbing upwards, the mountain slope scrolls downward and your current elevation is updated. Each step upward adds five points to your score and 20 to the current elevation. Blue sky will appear at the top of the screen when the peak is near. (The rocks cease to fall at this point.) If Mack collides with an object on the screen, he falls to the bottom. You stay on the same mountain until either the top is reached or all your men are lost. A chime will sound and the high score will flash at the end of the game if the previous high score is beaten.

Mountaineer Mack resides in memory from $2000-$2D5B. It is entered using *Flankspeed* (see page 103). After entering and saving this program, reset the computer by turning it off and on. Then type LOAD "MOUNTAINEER MACK",8,1. Next type SYS 8192 and hit RETURN. Press the fire button to begin the game. □

SEE PROGRAM LISTING ON PAGE 115

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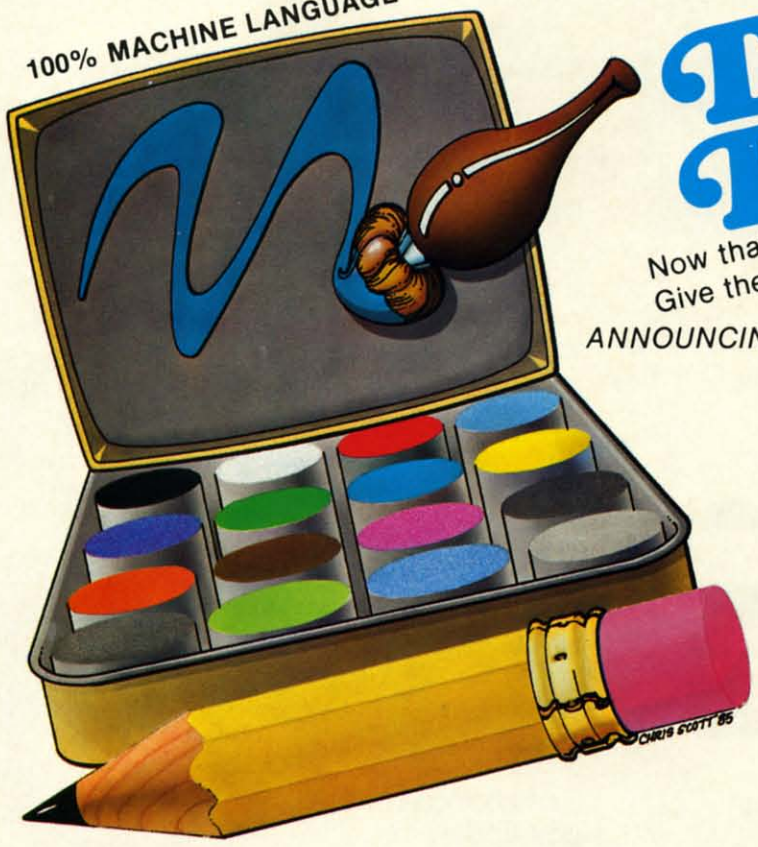

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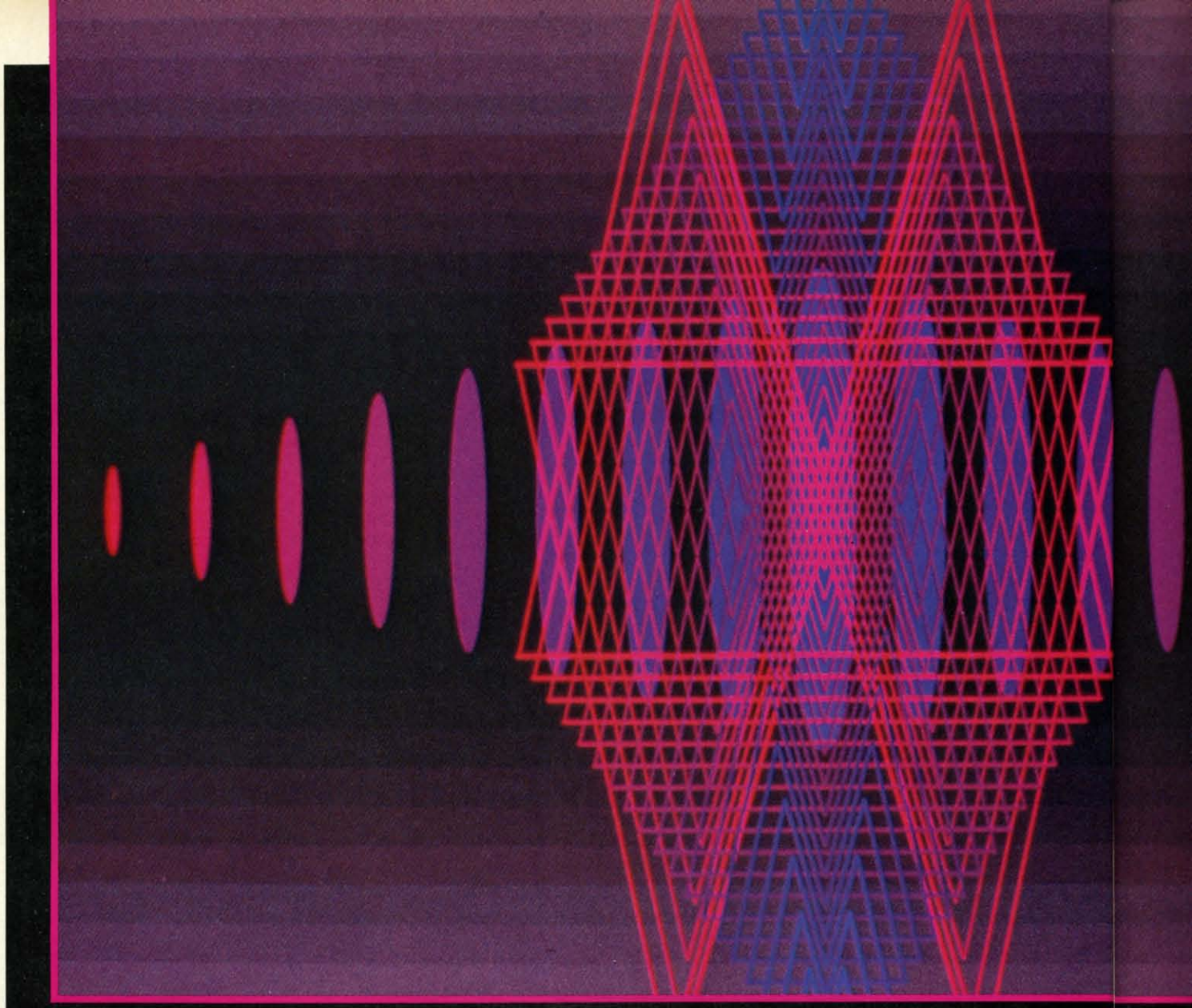

Analog to Digital

Most of the ways we have of monitoring the world are analog in nature: the electrical resistance of photocells changes in response to the amount of light on them, the height of the mercury column in a barometer rises and falls in accordance with the atmospheric pressure, the needle of a speedometer is magnetically deflected in proportion to the speed of the automobile.

Among electrical engineers are those who deal primarily with analog circuits such as amplifiers and filters, and those who deal mainly with digital circuits such as microprocessors and flip-flops. Between the two groups is the realm of analog-to-digital (A/D) and digital-to-analog (D/A) conversions.

This month we will see how to convert analog signals as they exist in the real world into digital signals where they are more readily analyzed, interpreted, and recorded in the computer. We will see how to use the C-128 (and the C-64 with additional effort) as a digital oscilloscope. Finally, to avoid the "all work and no play" syndrome, we will end up with an optical counterpart of the age-old musical instrument made famous by horror films of yesteryear, the Theremin.

The Commodore 64 and the 128 each contain a multifunction circuit called the Sound Interface Device, better known as SID. This integrated circuit has the makings of a multivoice musical synthesizer complete with oscillators, filters, and the works. An additional feature of this chip is that it contains two analog-to-digital converters. These A/D (read "A to D") converters each generate an eight-bit digital word which is proportional to the analog signal at their inputs.

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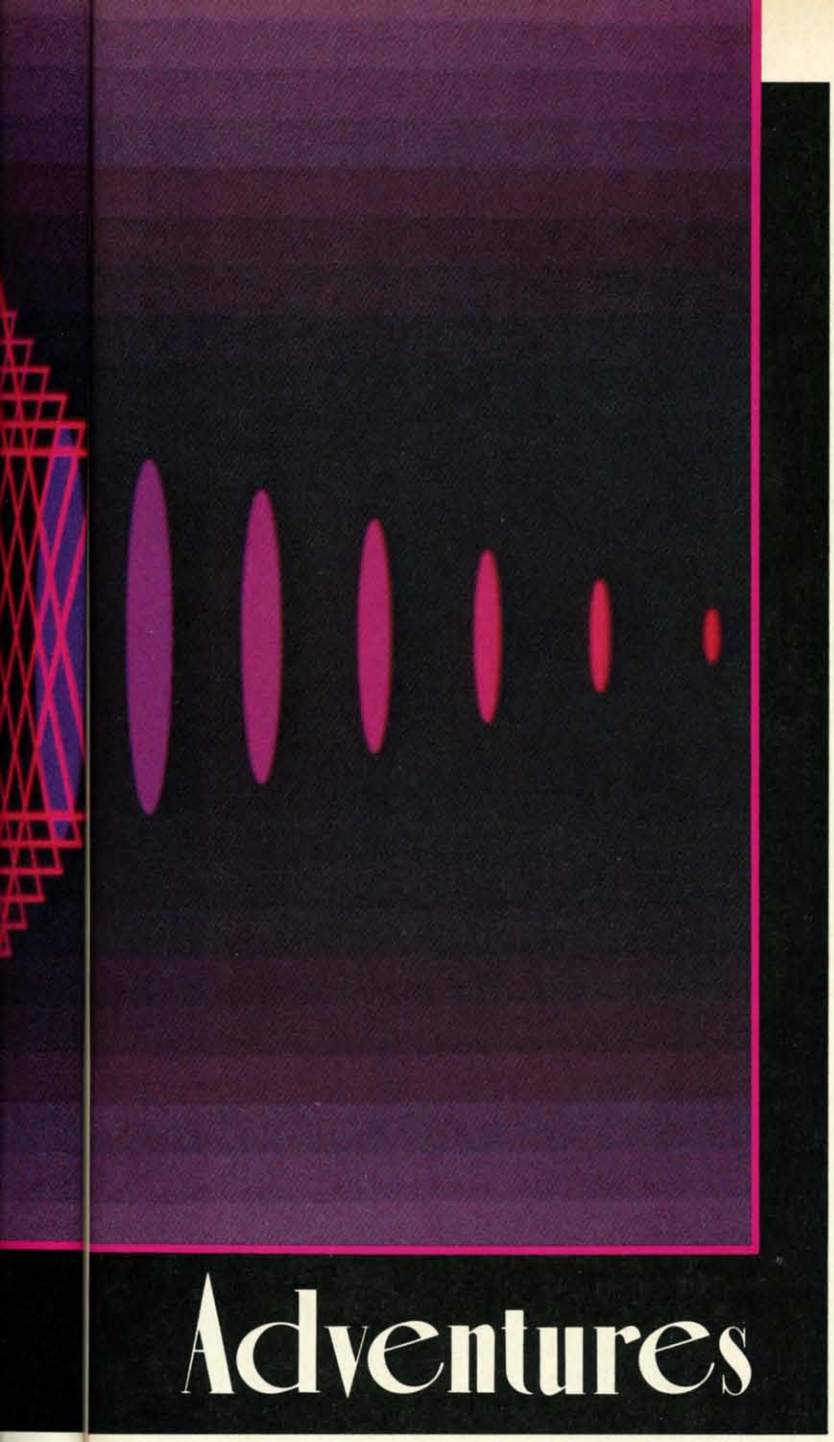

Adventures

A DIGITAL OSCILLOSCOPE AND THE MAKINGS OF AN OPTICAL MUSICAL INSTRUMENT

By Dale Rupert

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The inputs to the A/D converters are accessible through Control Ports 1 and 2 on the right side of the computer. The A/D converters are intended to be used with game paddles which are plugged into the Control Port connectors. Electronically, a paddle is a variable resistor called a potentiometer. The value of its electrical resistance may be changed by rotating or sliding the handle of the paddle. The Commodore's A/D converter can handle resistances ranging from zero ohms to about 500,000 ohms.

The paddles differ from joysticks on the Commodore computers. The joystick is digital in nature: each of its four switches is either open or closed. The paddle is an analog device: its output is a continuously variable signal.

The computer can directly read the status of each joystick switch as being at a logic high (1) or a logic low (0) level. How can a computer read a paddle which may be anywhere between logic high and logic low levels? Before the computer can read a paddle's position, an analog to digital conversion must be performed. The entire range of paddle resistances is subdivided into 256 equal parts. The A/D converter takes the paddle signal and determines a numeric value from 0 to 255 which is proportional to its resistance.

For example, assume that if the paddle is turned counterclockwise, its signal level (or resistance) is low, and when turned completely clockwise, its signal level is high. The A/D converter stores a digital value of 0 in the SID register when the paddle is counterclockwise, and a digital value of 255 when the paddle is completely clockwise. If the paddle is turned halfway between the two extremes, the A/D converter generates the value 128.

The computer can interpret the position of the paddle by the size of this digital value. The paddle's position is determined with a resolution of one part out of 256 parts. Contrast this with the joystick whose position is known with a resolution of only one part out of eight. In electronics jargon, the SID chip contains two 8-bit A/D converters. The eight bits make up one byte, and one byte ranges in value from 0 to 255.

INNER WORKINGS

For those interested in the electronic details of how the analog to digital conversion occurs, have a look at the schematic diagram for the SID chip in the *Programmer's Reference Guide* (page 610 for the C-128 and page 481 for the C-64). The paddles are shown as 470,000 ohm (470 kohm) potentiometers ("pots") coming into the POT X and POT Y inputs of the SID. A 1000 picofarad capacitor is also at each input. One side of the pot goes to +5 volts.

The SID chip momentarily brings the top of the external capacitor to ground (0 volts), removing any charge from it. At the same time, it starts an 8-bit binary counter counting fixed-rate pulses. The capacitor then begins charging up through the paddle potentiometer. The smaller the resistance of the pot, the faster the capacitor can charge up. The voltage on the capacitor increases as it charges up.

This voltage comes into a circuit in the SID called a comparator. The comparator compares the voltage on the capacitor with a fixed voltage which is nominally 2.5 volts. When the voltage on the capacitor reaches a value of 2.5 volts, the output of the comparator changes from a low level to a high level. The high level at its output causes the binary counter to stop counting. The value in the counter will be between 0 and 255, depending upon how long it took the capacitor to reach the 2.5 volt level.

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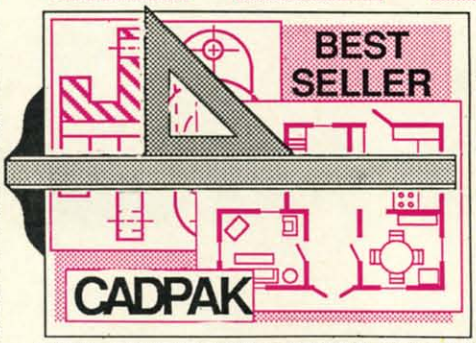

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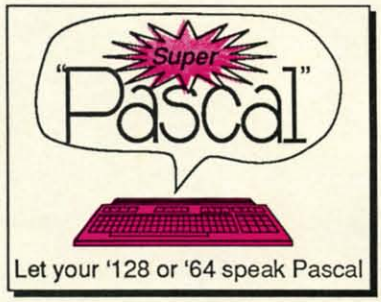

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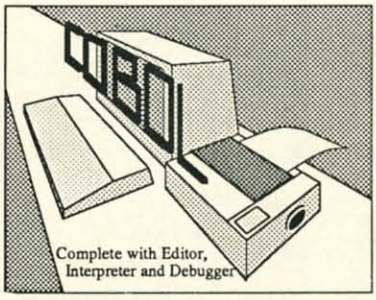

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When the resistance of the pot is very low, the capacitor reaches the 2.5 volt level very quickly, and the counter is stopped at a very low count. When the resistance of the pot is very high, the counter reaches a very high count before it is stopped.

That's all there is to it. The value in the counter is reasonably proportional to the resistance of the pot. So by reading the value of the counter which is stored in one of the SID's registers, the computer has a digital representation of the paddle's position.

Just a couple more details for the technically oriented. The actual value of the capacitor in the C-128 computer is 1800 picofarads (pF), rather than the 1000 pF shown in the SID schematic. See this for yourself in the computer schematic at the back of your *Programmer's Reference Guide* on page 722. Consequently the maximum useful pot resistance is on the order of 300,000 ohms for the C-128.

SID's two A/D converters are able to handle four paddle inputs by the process of multiplexing. In zone 6D of the schematic diagram on page 726 of the *C-128's Programmer's Reference Guide* is U2, a 4066 electronic switch. This switch selects the inputs from either Control Port 1 or Control Port 2 for conversion. BASIC 7.0 in the C-128 handles the switching, depending upon which paddle input is being read. C-64 users (and assembly language programmers) control the switching by means of bits 7 and 6 of the Complex Interface Adapter at address $DC00.

A DIGITAL OSCILLOSCOPE

With the process of analog to digital conversion understood, let's see how to use it. The program *Digital Scope* for the C-128 on page 106 reads and displays the paddle #1 input (POT X of Control Port 1) in an oscilloscopelike manner. (This program runs only on the C-128. C-64 users must provide routines to read the paddle input and to display the graphics on the screen. We will provide some additional information on this later.)

An oscilloscope (frequently called a "scope") is an electronic instrument that displays a dynamic graph of input signal level versus time. The display on the scope is a cathode ray tube (CRT), which is identical in function to the video monitor attached to your computer. On your video monitor, the electron beam which produces the image is continuously swept from left to right and from top to bottom, producing the thin scan lines (called the raster) on the screen. There is no vertical raster on a normal oscilloscope. Instead, the electron beam is continuously moved from left to right but not from top to bottom.

When there is no input signal to the scope, the electron beam repeatedly moves horizontally from left to right. This produces a horizontal line on the oscilloscope's screen. When it reaches the right edge of the screen, the beam is turned off and is rapidly brought back to the left side of the screen where the sequence is repeated.

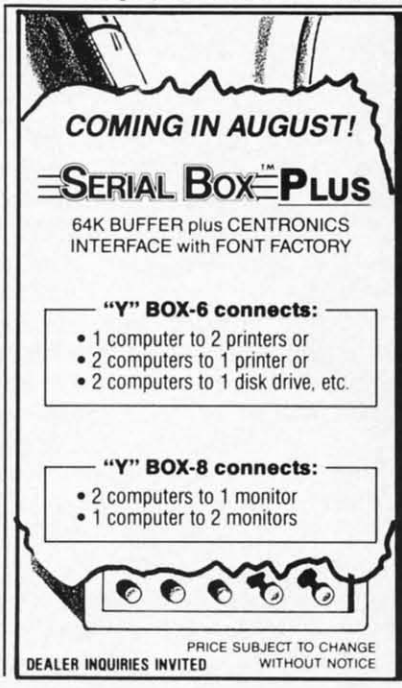
The vertical position of the electron beam is controlled by the input signal. When the input signal is large, the beam is near the top of the screen, and when the signal is small, the beam is near the bottom. The screen of the scope actually displays the combination of the vertical and horizontal motions of the electron beam.

For example, assume the input signal is very small when the beam is at the left of the screen and assume that the signal continuously increases. The image on the screen will be a diagonal line running from the lower left of the screen to the upper right. This is just what a graph would look like if you plotted input level on the vertical axis versus time on the horizontal axis. If on the next left-to-right scan of the beam the input signal remains high, the next screen image will be a horizontal line across the top of the screen. If the input signal decreases for a while and then increases again to the maximum during the next scan of the beam, the image on the screen will be "V-shaped." Some experimenting with our digital scope should clarify all this.

EXPERIMENTATION TIME

You need some hardware to perform the following experiments with the digital scope. You should have a nine-pin female D-subminiature connector (such as Radio Shack No. 276-1538 or any other similar part), a potentiometer (any type of about 500k ohms such as Radio Shack No. 271-1723, although any value of at least 10k ohms and any style can be used), and for the optically controlled musical instrument to be discussed later, you need at least one Cadmium Sulfide (CdS) photocell (such as Radio Shack No. 276-116A or 276-1657 or any other typical CdS photocells).

Solder wires at least one foot long to pins 5, 7, and 9 of the nine-pin connector. The numbers are usually visible on the connector itself. In any case, the pins are numbered



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1 to 5 from left to right across the top row, and 6 to 9 from left to right across the bottom row when you view the connector from the side to which the wires will be soldered. Refer to the I/O Pinouts in the appendix of your *User's Guide.* That picture looks just like the side of the connector to which you will solder the wires.

If you are even slightly interested in electronics experimentation, I strongly recommend buying a solderless breadboard. Even the smallest ones pay for themselves in convenience very quickly. (A typical device is Radio Shack No. 276-175, although there are many other sources for this and the other parts mentioned.) These breadboards let you make connections between components easily without solder. No serious experimenter is without at least one.

The pins with wires are now:

Pin 5 – POT Y
Pin 7 – +5 volts
Pin 9 – POT X

Connect one end of the pot to the +5 volts wire and connect the middle terminal of the pot (the "wiper") to the wire from pin 9 (POT X). The other terminal of the pot and the pin 5 wire can be left unconnected. If you have a solderless breadboard, the best way to do this is to solder two wires to the pot terminals, and plug these wires into the breadboard. Then plug the wires from the connector into the breadboard. (For those unfamiliar with the breadboard, the five holes in each vertical line are internally connected so that up to five wires can be joined together simply by plugging them all into vertically adjacent holes.)

THE SOFTWARE

The *Digital Scope* program turns the C-128 into the world's slowest digital oscilloscope. On the plus side, it is no doubt the world's least expensive digital oscilloscope. The program uses the 320 by 200 high-resolution display (GRAPHIC 1). There are numerous features built in, and you can easily modify these and add your own.

Among the features of this oscilloscope are adjustable gain (vertical size), adjustable vertical position, offscreen image locators, dual traces (two parameters displayed simultaneously), freeze-frame (pause control), and running average display.

Line 70 sets the high-resolution graphics mode and clears the screen. Line 80 sets the initial gain G which converts the 0 to 255 range of the A/D into a 0 to 190 range to fit onto the graphics screen. Increasing G is equivalent to magnifying the vertical size of the image. VY in line 90 is the vertical offset of the image. Increasing VY moves the image higher up on the screen. Line 100 prints the Y value to be plotted on the screen. If this number is outside the range of 0 to 200, the image is off the screen. This value is printed on the default text screen, not on the graphics screen. It is for reference only.

The main loop starts at line 110. The horizontal X value is defined by the FOR/NEXT loop. The vertical Y value is calculated in line 130. The computer reads the value of POT AX plugged into Control Port 1 (paddle #1). The input value is multiplied by G and added to VY to determine the corresponding screen value. The result is subtracted from 200 so that a vertical screen value of 0 is at the bottom of the screen, and 200 is at the top. Line 140 puts the dot on the screen.

The routine beginning at line 150 calculates a running average of the previous MAX number of readings. MAX is defined in line 40. A second trace is shown on the screen corresponding to this averaged (filtered) value. It is displayed as a separate trace above the current input value on the screen.

This averaging routine is the most sophisticated part of the program. The plotted Y values are kept in a circular buffer YV( ) consisting of MAX elements. The pointer PTR cycles from 0 to MAX-1. At line 160 the pointer is updated to point to the oldest element in the buffer. The sum of all the values in the buffer is kept in SUM. In line 170, the oldest value in the buffer is subtracted from SUM and the current value of Y is added. Then the current value of Y is put into the buffer, replacing the oldest value. The running average is the sum of the values in the buffer SUM divided by the number of items in the buffer MAX. This is calculated in line 190, and in line 200 it is plotted 50 units above the actual input value.

The short routine at line 210 decides if the point to be plotted is on or off the screen. If it is on, it is plotted. If it is outside the range of 0 to 200, an arrow appears either at the top or bottom of the screen showing where the image is. You may use the adjustment keys discussed below to bring the image back onto the screen.

The keyboard is checked after each horizontal position is plotted. If no keys are pressed, the next value of X is chosen in line 250. When X reaches 320 at the right side of the screen, the screen is cleared in line 260 and the next scan begins at the left side of the screen in line 120.

If a key has been pressed, execution continues at line 290. The keystroke is stored in A$. The valid keystrokes are stored in the string which is the first argument of the INSTR function. K is given a value corresponding to the position of A$ within the valid keystroke string. If a key is pressed which is not in the list, the value of K is 0 and execution continues normally. If a valid key is pressed, the appropriate subroutine is called in line 310. After returning from the subroutine, the program branches back to its proper place.

The valid keystrokes are <CURSOR UP> and <CURSOR DOWN> to move the image vertically on the screen; "+" and "–" to increase or decrease the gain (vertical magnification); "C" to Clear the screen and start the scan again from the left leaving all other parameters intact; "P" to Pause the display (any other key will continue the display); and "Z" to Zero or "reinitializE" the gain and vertical position parameters to their original values and to restart the trace. The RUN STOP key stops the program. If you break the program to change it, you may restart by typing GOTO 120 without reinitializing all the parameters.

Lines 20, 1000, and 1010 set up error-trapping. If an error occurs when a point is to be plotted off the screen, the program just continues with the next statement because of the RESUME NEXT in line 1010. When you use error trapping, the RUN STOP key no longer works. To let RUN STOP actually stop the program, a statement such as the one in line 1000 is needed. Error number 30 corresponds

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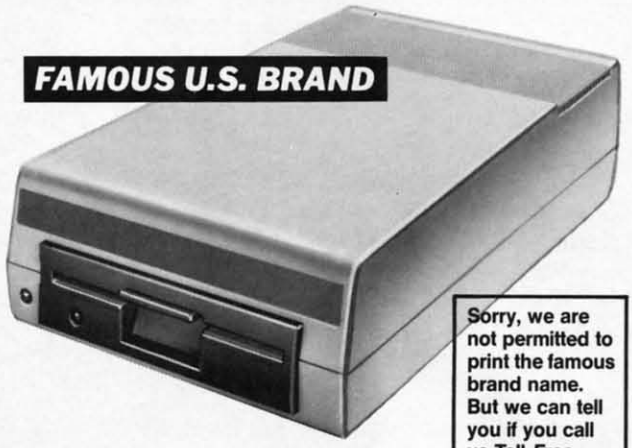

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to the RUN STOP key being pressed. If that is the case, the program ends. You may want to omit line 20 initially until you have all the SYNTAX ERRORs out of your typed-in program.

Commodore 64 users have more of a task ahead of them, although it should be enjoyable and worthwhile. You must provide a high-resolution bit-map routine to plot a point at position X,Y. A routine to do this was presented in the April 1986 edition of the *Rupert Report*. You must modify the keyboard routine of the program if dynamic input is desired.

Also, C-64 users must provide a routine to read the paddle values. A complete routine is listed on page 347 of the *C-64 Programmer's Reference Guide*. Paddle #1 and Paddle #2 (Control Port 1) can be read with the commands: P1 = PEEK(54297) : P2 = PEEK(54298). The C-64 manual says that paddles cannot be read reliably from BASIC, although it seems that the main problem is with the reading of paddles in Control Port 2.

Run this program (on the C-64 or the C-128) to display the paddle values from Control Port 1:

```
1 PRINT PEEK(54297),PEEK(54298)
2 GOTO 1
```

This gives generally consistent results on the C-128 in C-64 mode, with just a few glitches.

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THE POSSIBILITIES

There are countless ways of using this program. Experiment with changing the running average buffer length to see how more or less filtering of the input affects the output. If you put a switch in line with one side of the potentiometer, you can generate square waves by periodically opening and closing it (or simply connect and disconnect the wire to the pot).

Look at the filtered waveform to see how this low-pass filter converts a square wave into a triangle wave. You will see that if the switch is operated quickly enough, the filtered output can't keep up with the input changes, and it reaches a constant level. This is low-pass filter theory right before your very eyes! A nice thing about this simulation is that it all happens at a speed which is easily comprehended by human minds. The snail's pace of BASIC is a benefit here.

You could rig up a simple spring and lever mechanism to the shaft of the potentiometer in order to measure force or displacement. It would not require much effort to turn this program into a data-logger which stores the incoming data for future reference and interpretation. Your computer with its A/D converter is a laboratory in itself.

MAKING MUSIC

One of the more entertaining uses of this program that I have found is to replace the potentiometer with a Cadmium Sulfide photocell described earlier. The photocell acts like an optically controlled potentiometer. Increasing the amount of light on the photocell decreases its resistance and vice versa.

Add this line to the program:

```
205 SOUND 1,20000 - Y*100,2
```

Now you can change the pitch of the sound with your hand simply by covering and uncovering the photocell. The graphic display of the oscilloscope will still respond, adding a light show to this simple opto-organ. The Theremin is a registered trademark for a musical instrument which also is controlled by the movement of the player's hands. It uses body capacitance rather than light to change the pitch and volume of the music. There is something magical about playing music by simply waving your hands. Children are as fascinated by this ability as adults are.

It is very easy to add another photocell to control volume using the VOL command. For some very exotic effects, change line 205 above to let the photocell control other properties of the sound such as sweep, waveform, and pulse width. With as many as four independent photocells controlling numerous sound and screen parameters, you could create a synthesized orchestra and light show controlled by just your fingertips.

We have barely begun to explore the possibilities for using the A/D converters in the Commodore computers. No doubt many readers will not bother to buy the few components needed to begin experimenting. Those of us who do bother will know what the others are missing. Let me know of some of the applications you come up with. We will have other A/D adventures in future issues. ☐

SEE PROGRAM LISTING ON PAGE 106

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THE FASTEST DRAW IN THE INDUSTRY

Techniques Professional Programmers Use To Write Super Fast Assembly Language Programs

By Mark Andrews

We all know how fast machine language is—and now we're going to learn how to make it even faster. This month we'll reveal some of the secrets that professional programmers use when they want to write super fast assembly language programs.

Over the past few months, we've seen how hopelessly inadequate BASIC is as a tool for writing high-resolution graphics programs. Last month we translated one hi-res BASIC program into assembly language and saw how much faster it ran. Now we're going to soup up last month's program so that it runs even faster. And by the time we're finished, we'll have it running at real machine language speed.

IMPROVING THE HRDEMO.S PROGRAM

Last month's program was called HRDEMO.S, and this month's revision is called RECTANGLE.S. HRDEMO.S didn't do much; it merely drew a big empty square on a high-resolution screen. RECTANGLE.S, as its name implies, performs a similar function: it will draw either a square or a rectangle on the screen, and it will do the job much, much faster than its predecessor. In addition, it lets the programmer control the dimensions and the size of the rectangle, and even gives him control over where the rectangle will be displayed on the screen.

RECTANGLE.S, like HRDEMO.S, was written using a *Merlin 64* assembler and is designed to run on a Commodore 128 in 40-column high-resolution mode. With minor modifications, the program can be typed and assembled using any other assembler compatible with a C-128, and it can also be altered quite easily to run on a Commodore 64. The techniques needed to make these changes have been explained in previous columns, and are also discussed in my book *Commodore 64/128 Assembly Language Programming,* published by Sams.

PLOTTING A RECTANGLE

The RECTANGLE.S program appears on page 104. When the program has been typed, assembled, and saved on a disk, it can be called and executed using RECTANGLE.BAS, the BASIC program following it at the bottom of page 105.

To control the size, dimensions, and location of the rectangle drawn by the two programs, all the C-128 user has to do is change the values of the variables in lines 30 through 60 of the RECTANGLE.BAS program. The variables HST and HND are used to set the starting and ending points of the horizontal lines that are used to draw the rectangle. The starting and ending points of the rectangle's sides are determined by the variables VST and VND. So, by changing the values of these four variables, the user can choose the shape, size, and location of the rectangle displayed on the C-128's 320 dot by 200 line hi-res screen.

WHY 'RECTANGLE.S' IS FASTER

There are two main reasons why RECTANGLE.S runs so much faster than HRDEMO.S. For one thing, it doesn't have to perform as many calculations each time it plots a dot on the screen. For another, a number of the major calculations it does perform are shorter and faster.

GENERATING A BIT-MAPPED DISPLAY

To understand what has made these improvements possible, it's necessary to have some understanding of how the C-128 produces hi-res screen graphics in its 40-column mode. So here's a brief review of some facts that appeared in last month's column, together with some new information that has never, to my knowledge, appeared in print:

As you may recall from last month's column, each dot on the C-128's hi-res screen reflects the state of one bit stored in RAM. If the data bit that controls a screen dot is set to 1, its corresponding dot on the screen will be lit. But if the same bit is cleared to 0, its corresponding dot will be dark.

The bits that control the dots on the screen are all stored in a block of memory called a *screen map.* And the technique used to generate a display from a screen map is called *bit-mapping.* (There is another screen map used to control the *color* of each dot on the screen, but we won't get involved in that in this column.)

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The bit map used to generate the screen in RECTANGLE.S begins at memory address $2000, or 8192 in decimal. It is labeled SCRBAS (for "screen base") in line 19, and is referred to by that label throughout the program.

HOW BIT-MAPPING WORKS

There are 64,000 dots on a 40-column high-resolution screen, so it takes 64,000 bits—or 8000 bytes—of memory to store a screenful of bit-mapped data. But, as you may recall from last month's column, the order in which these 8000 bytes are stored in memory is very different from the order in which they are displayed on the screen.

In memory, the bytes used to create a screen map are simply stored in consecutive order, beginning with byte 0 and ending with byte 7999. But when the C-128 generates a video display, it divides the screen up into a grid of 1000 rectangles, each containing eight bytes. The eight bytes that make up each rectangle are stacked one on top of the other, like pancakes. And the 1000 eight-byte rectangles on the screen are arranged into a matrix that is 40 columns wide by 25 columns high—exactly the same arrangement that the C-128 uses to generate a 40-column text display.

This kind of screen layout makes it very easy to program a text display, since the eight-byte rectangle used to form each character displayed on the screen in the C- 128's text mode can be fetched from eight consecutive bytes in memory. But when the C-128 is in 40-column high-resolution mode, bit-mapping a dot on a screen becomes considerably more complicated. To plot a dot on a hi-res screen, a program must carry out three separate operations. First, the eight-byte rectangle in which the dot appears must be located. Then the byte (or *line*) inside that rectangle in which the dot appears must be determined. Finally, the dot's position in the *byte* in which it appears must be pinpointed. Only then can the dot be plotted on the screen.

Before any of the above operations can be carried out on a given dot, however, the dot's exact position on the screen must be determined. Since there are 40 columns of rectangles on the screen, and since there are eight horizontal dots in each column, there are 320 horizontal positions on the screen in which a dot can appear. So the horizontal position of each dot on the screen can be determined by using a set of 320 horizontal coordinates, or *X-coordinates*, which are usually numbered from 0 to 319.

Going down the screen, there are 25 rows of eight-byte rectangles. So the vertical position of each dot on the screen can be determined by using a set of 200 vertical coordinates, or *Y-coordinates*, which are usually numbered from 0 to 199.

DOT-PLOTTING FORMULAS

The first step in converting a dot's screen location into its corresponding bit in memory is to divide the dot's vertical coordinate, or Y coordinate, by 8. The result of this operation will be the row number of the eight-byte rectangle in which the dot appears. The calculation can be performed using the following formula:

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```
ROW = INT(Y/8)
```

Next, the dot's horizontal position, or X coordinate, must also be divided by 8. The result of this operation will be the column number of the eight-byte rectangle in which the dot appears. The formula used can be written:

```
COL = INT(X/8)
```

When the two operations above have been carried out, the dot's horizontal position within its eight-byte rectangle must be calculated. This formula will do that job:

```
LINE = Y AND 7
```

When all that's done, a formula like this can be used to bring all the previous formulas together and calculate the position of the byte in which the desired dot appears:

```
BYTE = ROW * 320 + COL * 8 + LINE + BASE
```

HOW IT WORKS

As in the previous formulas, the variable ROW in the above formula represents the horizontal row in which the rectangle that contains the dot appears, and the variable COL represents the vertical column in which the rectangle is situated. BASE represents the starting address of the screen map being used, and LINE represents the line number of the desired byte on a 200-line high-resolution screen (with the lines numbered 0 through 199). The ROW variable is multiplied by 320 because there are 320 dots in a screen line, and the COL variable is multiplied by 8 because there are eight lines of bytes in each screen rectangle.

ONE LAST DETAIL

After this last calculation has been carried out, one complicating factor still must be taken care of. The complication is that the eight bits of data which form each byte on the screen are also arranged in a different order in RAM from the order in which they appear on the screen. In memory, the bits that make up a byte are arranged from right to left. But on the screen, the eight dots that make up a byte are arranged in just the opposite order: from left to right.

Because of this complication, one last formula must be used to reverse the positions of the bits in a byte so that they will appear in the proper order when they are displayed on the screen. This formula is often written this way:

```
BIT = 7 - (X AND 7)
POKE BYTE, PEEK(BYTE) OR 2^BIT
```

ON WITH THE PROGRAM

Now that we know how a dot's position on a screen can be converted into its corresponding position in RAM, we're ready to see exactly how this month's RECTANGLE.S program differs from the HRDEMO.S program described in this space last month. The most important difference is this: Every time HRDEMO.S plotted a dot, it used the series of formulas presented above to calculate the dot's position on the screen. But RECTANGLE.S does not perform every

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This is the new word processor from Vizastar's author, Kelvin Lacy and is the successor to Omniwriter, which he also wrote. All the features of Omniwriter are there, plus many significant enhancements, like auto pagination, on-line help, pull-down menus, full-function calculator and more. Up to 8 'newspaper-style' variable-width columns can help with newsletters.

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single one of those calculations every time it plots a dot; instead, it consults something called a *Y-lookup table* and simply *looks up* the starting address in RAM of the screen line on which the desired dot appears. The program then calculates the dot's horizontal coordinate, or *X-offset,* and adds it to the Y-coordinate address which it has found in its Y-lookup table. And the result of this calculation is the dot's address in RAM. This procedure considerably reduces the number of calculations that must be carried out to plot a dot on a screen and can significantly increase the operating speed of a program.

The Y-lookup table used in RECTANGLE.S is set up in lines 97 through 141. As the table is created, it is stored in a block of memory that begins at memory address $8000.

Actually, two tables are set up in this section of the program; the low byte of each Y address is stored in a table that starts at memory address $8000, and the high byte of each Y address is stored in a second table that begins at $8100. This may sound like a strange way to set up an address table, but it makes good sense, since the same offset that is used to fetch the high byte of a Y address can also be used to fetch the low byte.

A CLOSER LOOK

Now let's take a closer look at how a Y-lookup table works. First, the 8502 Y register is used to create a loop in which the starting address of each line on the screen is loaded into the accumulator, beginning with line 0 and ending with line 199.

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In lines 106 through 110, each line number is divided by eight to pinpoint the row of eight-byte rectangles in which the dot appears. But this division is carried out in a streamlined way, not in the slow old-fashioned way that was used in last month's program. Instead, each time a line number is loaded into the accumulator, each bit of the number is moved three places to the right using three LSR (logical shift right) instructions. Since the bits in a binary byte progress from right to left in powers of two, the easiest way to divide a bit by 2 is to shift each bit in the byte one place to the right. Shifting each bit two places to the right is equivalent to dividing the bit by 4, a three-bit shift to the right is the same as dividing by 8, and so on. So three shifts to the right are used to divide the contents of the accumulator by 8 in the RECTANGLE.S program.

In lines 112 through 126, the row number that has just been calculated is multiplied by 320 using a multiplication subroutine that appears in lines 77 through 95. This routine looks much like the 16-bit multiplication subroutine that appeared in the HRDEMO.S program last month, but a close comparison will show that it's a few bytes shorter. And every little bit (or byte) helps when you're trying to speed up a program.

After each row number has been multiplied by 320, the product is added to the starting address of the screen map, and the sum is stored in the low-byte and high-byte lookup tables that start at $8000 and $8100. This procedure continues until both tables have been filled in.

After the program has created its Y-lookup table, it moves on to the process of drawing a rectangle on the screen—with the help, of course, of values POKEd in during the execution of the RECTANGLE.BAS program. When the necessary values have been POKEd in, the program first calculates the X offset that must be used to display each dot. It performs this calculation in much the same way that last month's program did. But then, in lines 293 through 300, it looks up the starting address of each screen line. Finally, it adds each Y line address to the appropriate X coordinate with the help of indirect (Y-register) addressing, and thus determines the location of the byte in which each desired dot appears.

ANOTHER SHORTCUT

Still another tricky shortcut is used in lines 308 through 310 of RECTANGLE.S. In these lines, the equation

```
BIT = 7 - (X AND 7)
```

is solved by using another table—a very short one that appears in line 52. Since the purpose of this formula is to reverse the order of the bits in a byte before displaying the byte on a screen, the solving of the equation can be speeded up significantly by dispensing with calculations altogether and resorting to the use of a table. I'll leave it up to you to figure out why.

Now you know how to draw lines and rectangles on a high-resolution screen at speeds matching those achieved in commercial-grade graphics programs. Next month we'll reveal some more tricks of the trade and see how joysticks, paddles, and mice can be used to control fast-action graphics on a high-resolution screen. □

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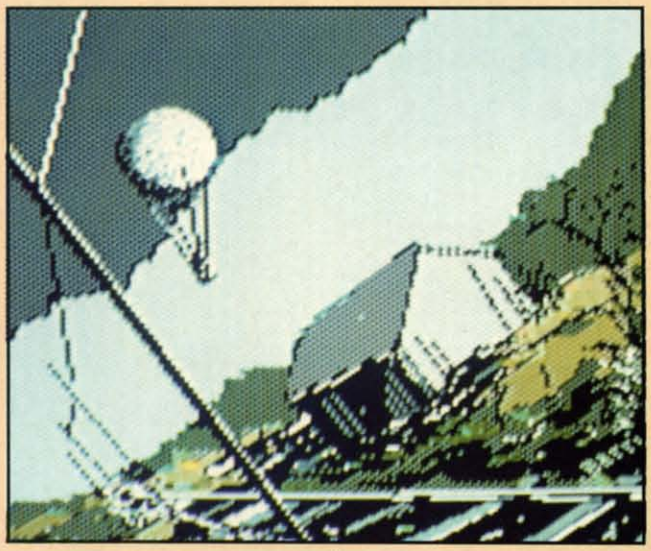

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As we write these words in late July, our thoughts naturally turn to all the places we're too busy putting out *Ahoy!* to vacation to. But we can do the next best thing, and wing around the world via an *Art Gallery* travelogue. Hovering directly above is Barri Olson's *Balloon,* rendered by the Madison, WI artist on the Koala Pad with *Koala Painter* software. The same artistic tools were employed by Alberto Valsecchi (Milano, Italy) in the creation of *Lake* at right—a masterpiece that does his Renaissance ancestors proud. At bottom left is *Rocks* by Earl Hamner (Milpitas, CA). Beside it is *Heiching* by Ma Luo (Winnipeg, Manitoba), created with *Flexidraw.* Following our noses to the right, we find the *Shaw & Ellis Clam Canning Factory* by Robert M. Ellis (Quebec, ONT), drawn from his memories of Pocologan, a small fishing village in New Brunswick. At far right (or Far East) is another by Ma Luo: *Qingzhao.*

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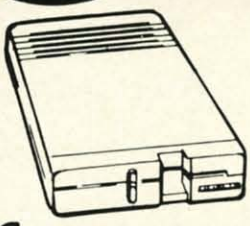

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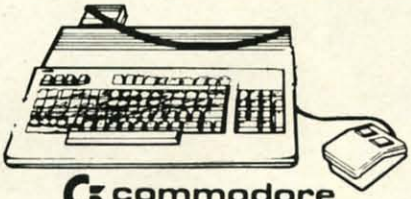

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TIPS AHOY!

Compiled by Michael R. Davila

Contributors to *Tips Ahoy!* can earn up to $50—and in some cases more—for their programming or hardware insights. Send your best to *Tips Ahoy!*, c/o *Ahoy!* Magazine, Ion International Inc., 45 West 34th Street—Suite 407, New York, NY 10001. If your tip includes a routine of more than 20 lines in length, including a copy on disk wouldn't hurt your chances of acceptance one bit. Include a stamped and self-addressed envelope if you want your submission returned. Payment is made on acceptance.

COMAL 0.14 FAST DUMP

I have good news for all the owners of Commodore 1525/MPS 801 printers! I've written a screen dump program that will dump a COMAL 0.14 high resolution screen in about 2½ minutes. It is short, fast, and easy to use. First, type in and save the BASIC loader program. Second, load and run the BASIC loader program to install the machine language program into a safe spot of memory. Last, load your copy of COMAL 0.14 and run it as usual. That's it! When you are ready to dump a screen, make sure the printer is turned on and the paper is adjusted correctly. Then enter this command: SYS 52736 <RETURN>. The picture will be printed sideways in about 2½ minutes. If you've ever used a BASIC screen dump (over an hour) or a COMAL version (about 25 minutes), you'll really like the speed improvement this program makes. The SYS command can be entered from within a running program or from the keyboard. It resides in the RS-232 buffer area ($CE00-$CFFF), so it shouldn't be affected by any normal programs that you write.

—Mark S. Lewis
Odessa, TX

```
·10 I=52736
·20 READ A
·25 IF A=256 THEN 40
·30 POKE I,A:I=I+1:GOTO20
·40 END
·52736 DATA 169,80,32,144,255,24,169,4
·52744 DATA 160,7,162,4,32,186,255,169
·52752 DATA 0,32,189,255,32,192,255,144
·52760 DATA 1,96,162,4,32,201,255,144
·52768 DATA 1,96,169,8,32,210,255,169
·52776 DATA 0,141,178,207,141,179,207,169
·52784 DATA 199,141,183,207,169,0,141,177
·52792 DATA 207,169,0,141,166,207,24,173
·52800 DATA 178,207,109,166,207,141,180,2
07
·52808 DATA 173,179,207,105,0,141,181,207
·52816 DATA 173,180,207,41,7,141,182,207
·52824 DATA 45,166,207,240,3,76,253,206
·52832 DATA 173,183,207,41,248,141,167,20
7
·52840 DATA 169,0,141,168,207,173,167,207
·52848 DATA 24,42,46,168,207,42,46,168
·52856 DATA 207,42,46,168,207,141,185,207
·52864 DATA 173,168,207,141,186,207,173,1
85
·52872 DATA 207,42,46,168,207,42,46,168
·52880 DATA 207,24,109,185,207,141,185,20
7
·52888 DATA 173,168,207,109,186,207,141,1
86
·52896 DATA 207,169,248,45,180,207,141,18
7
·52904 DATA 207,169,1,45,181,207,141,188
·52912 DATA 207,173,183,207,41,7,141,184
·52920 DATA 207,173,164,207,141,167,207,1
73
·52928 DATA 165,207,141,168,207,24,173,18
5
·52936 DATA 207,109,167,207,141,167,207,1
73
·52944 DATA 186,207,109,168,207,141,168,2
07
```


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```
•52952 DATA 24,173,187,207,109,167,207,14
1
•52960 DATA 167,207,173,188,207,109,168,2
07
•52968 DATA 141,168,207,24,173,184,207,10
9
•52976 DATA 167,207,141,167,207,169,0,109
•52984 DATA 168,207,141,168,207,173,167,2
07
•52992 DATA 133,251,173,168,207,133,252,1
20
•53000 DATA 165,1,141,189,207,169,53,133
•53008 DATA 1,160,0,177,251,141,190,207
•53016 DATA 173,189,207,133,1,88,56,169
•53024 DATA 7,237,182,207,168,185,169,207
•53032 DATA 45,190,207,141,184,207,56,173
•53040 DATA 184,207,233,1,144,13,172,166
•53048 DATA 207,185,169,207,24,109,177,20
7
•53056 DATA 141,177,207,173,166,207,201,6
•53064 DATA 240,6,238,166,207,76,62,206
•53072 DATA 24,173,177,207,105,128,32,210
•53080 DATA 255,173,183,207,208,3,76,103
•53088 DATA 207,206,183,207,76,52,206,169
•53096 DATA 13,32,210,255,173,178,207,201
•53104 DATA 59,208,10,173,179,207,201,1
•53112 DATA 208,3,76,145,207,24,173,178
•53120 DATA 207,105,7,141,178,207,173,179
•53128 DATA 207,105,0,141,179,207,76,47
•53136 DATA 206,169,15,32,210,255,169,13
•53144 DATA 32,210,255,169,4,32,195,255
•53152 DATA 32,204,255,96,0,224,0,0
•53160 DATA 0,1,2,4,8,16,32,64
•53168 DATA 128,0,0,0,0,0,0,0
•53176 DATA 0,0,0,0,0,0,0,256
```


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REPROGRAMMING THE 128 HELP KEY

If you think the HELP key on the Commodore 128 is for wimps, good news: you can reprogram it. The method is a little more complicated than the KEY command, but not much. Set A$, in line 10, to any BASIC 7.0 keyword or series of keywords. If immediate execution is desired include CHR$(13) in the manner shown. The HELP command is still available by typing it in direct mode.

—Ed Horgan
Coatesville, PA

```
10 A$="GOTO50000"+CHR$(13)
20 FOR I = 4106 TO 4339
30 IF PEEK(I)=72 AND PEEK(I+3)=80 THEN A
=I
40 NEXT
50 J=1
60 FOR I = A TO A+LEN(A$)
70 POKE I,ASC(MID$(A$,J,1)):J=J+1
80 NEXT
90 POKE 4105,LEN(A$)
```

STRINGING MACHINE CODE ROUTINES

At times it is convenient to stash short machine language routines within a BASIC program to avoid conflicts, or to leave the customary memory areas free for other uses. The program segment shown here allows a machine code routine shorter than 256 bytes to be housed within a BASIC program in such a way as to be visually readable, LISTable, EDITable, SAVEable, LOADable, and executable with no problems. It requires no DATA statements, so it does not interfere with normal use of BASIC's RESTORE command. The example code shown is the "RESTORE LN" routine by Bob Renaud published in the March '86 *Ahoy!*

Three-digit decimal machine code bytes separated by a single space are typed into strings D1$, D2$, D3$, etc. Upon running the program, the code numbers are sequentially concatenated into string MC$ by Line 200 and the subroutine in Lines 140 and 150. At any time thereafter the DATA pointer can be restored to any desired line number by a program line like line 240. This equates MC$ to itself to ensure that its text is at the bottom of the active strings area at the moment of use, so its address can be found by PEEKing locations 51 and 52. The routine is executed by a SYS call to that address, followed by a comma and the target line number.

—C.C. Stalder
Waynesville, NC

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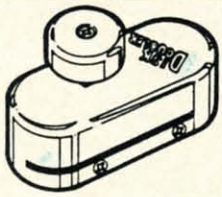

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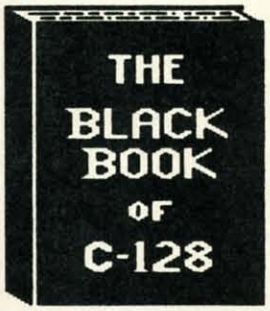

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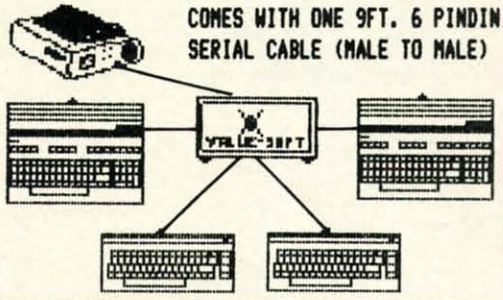

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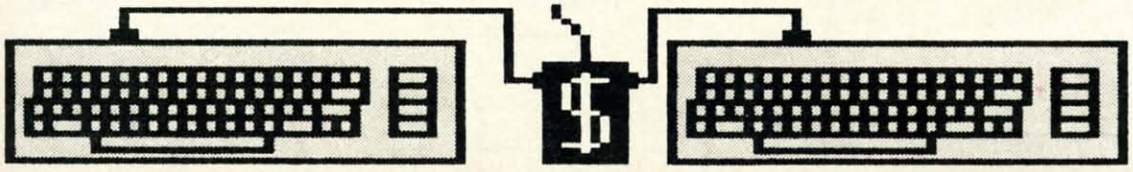

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```
100 REM "STRINGIT" PUT M.C. ROUTINE IN A
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110 :
120 GOTO170:REM JUMP PAST SUBROUTINE
130 :
140 FOR N=1 TO LEN(D0$) STEP4:MC$=MC$+CH
R$(VAL(MID$(D0$,N,3))):NEXT
150 FR=FRE(0):RETURN
160 :
170 D1$="165 020 072 165 021 072 032 253
 174 032 138 173 032 170 177 133 021"
180 D2$="132 020 032 019 166 165 095 133
 065 165 096 133 066 104 133 021 104"
190 D3$="133 020 056 165 065 233 001 133
 065 165 066 233 000 133 066 096"
200 D0$=D1$:GOSUB140:D0$=D2$:GOSUB140:D0
$=D3$:GOSUB140:END
210 :
220 REM A LINE LIKE THE FOLLOWING RESTOR
ES DATA POINTER TO SPECIFIED LINENUMBER
230 :
240 MC$=MC$:FR=FRE(0):TP=PEEK(51)+256*PE
EK(52):SYS TP,<LINENUMBER>
```

IT'S STILL RELATIVE

As most people are aware by now, the Commodore 128 has a "bug" in its ROM which prevents the pixel cursor from being offset, in a negative direction, relative to its previous location. You are supposed to be able to put a plus or minus sign in front of an X or Y coordinate in the BOX, CIRCLE, DRAW, LOCATE, PAINT, SSHAPE, and GSHAPE commands to move the pixel cursor relative to its last location. But, if you use a minus sign, an "ILLEGAL QUANTITY ERROR" is generated. However, there is an undocumented form of relative pixel cursor placement which will work with all of the above commands. (It is described in the *System Guide*, but only for option #3 of the MOVSPR command.) Whenever a coordinate is called for in the commands named above, you may substitute a distance from the current pixel location along a specified angle by separating the numbers with a semicolon instead of a comma. For example,

```
GRAPHIC 1,1:DRAW 1,45,100 TO 100;90 TO 1
30;310 TO 104;180 TO 120;90 TO 50;235 TO
144;270 TO 50;305 TO 106;90
```

will draw a very crude rendition of a sailboat. Experiment; I think you will find it to be a useful addition to your programming arsenal.

—Rick Rothstein
Trenton, NJ

EXPRESS YOURSELF WITH RESTORE

According to the Commodore 128 *System Guide*, the RESTORE command can have a line number after it to determine which DATA statement is read next. What the *Guide* doesn't say is this line number need not be a simple numerical constant, but rather can be any valid mathematical expression! For example, consider

```
RESTORE 100 + 10 * EX
```

where EX is an expression composed of any correctly posed combination of string and numeric functions that equates to integer values. If EX=0, then the DATA statement at line 1000 would be RESTOREd; if EX=1, then line 1010 would be RESTOREd; and so on. As it turns out, the RENUMBER command will work correctly with these mathematical expressions provided the first value in the expression is a constant which represents a valid line number. In the above example, RENUMBER would change the constant 1000 to the same number that line 1000 becomes. However, RENUMBER will not look beyond the first constant it finds; so changing the line number increments will probably invalidate the RESTORE expression.

—Rick Rothstein
Trenton, NJ

PRINT DOLLARS AND CENTS

Commodore 64 programmers do not have the handy PRINT USING command, one of the commonest tasks of which is to convert a numeric variable into a string for printing in dollars and cents format—a job that can be done quite nicely by this two-line subroutine:

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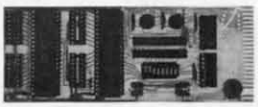

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```
1000 R$=STR$(INT(Q*1000+(SGN(Q)*5))):L=L
EN(R$)
1010 R$="$"+LEFT$(R$,L-3)+"."+MID$(R$,L-
2,2):RETURN
```

Put the number in variable Q, do GOSUB 1000, and the formatted number is returned in string variable R$, ready for printing. The subroutine can handle any positive or negative number that contains (or that rounds to a dollars and cents figure which contains) no more than eight digits plus the decimal point. —C.C. Stalder
Waynesville, NC

COMSTOP

This IRQ routine stops the operating system for an indefinite amount of time dependent on the pressing and holding the Commodore key. This is useful if you don't have a printer (or do) and want to look at a program or directory listing. Just load *Comstop* and type SYS 828 and you are ready to continue. This routine cannot be relocated in the present form. —Stephen J. O'Connor
Lake In The Hills, IL

```
·90 REMSAVE"@0:COMSTOP",8:VERIFY"@0:COMST
OP",8
·95 REM PROGRAM BY STEPHEN J. O'CONNOR
·100 FORI=828TO861:READA:CK=CK+A:POKEI,A:
NEXT
·105 IFCK<>4152THENPRINT"[CLEAR][8"[RIGHT
]"][RVSON]ERROR IN DATA STATEMENTS":STOP
·110 SYS828:PRINT"[CLEAR][12"[RIGHT]"][RV
SON]-COMSTOP ENABLED-"
·115 PRINT"[DOWN][10"[RIGHT]"]SYS 828 TO
RE-ENABLE.":NEW
·120 DATA120,169,073,141,020,003
·125 DATA169,003,141,021,003,088
·130 DATA096,165,211,208,014,032
·135 DATA159,255,240,251,173,141
·140 DATA002,201,002,208,002,240
·145 DATA242,076,049,234
```

WEDGE-O-MATIC

Ever want to bring up the directory without destroying what's already in Ol' Reliable's memory? Don't have a program that'll do this little goodie for you? Give *Wedge-o-Matic* a try. It's easy to use and works with both the 64 and VIC 20.

First load and run *Wedge-o-Matic*. Now you can load, save, and run all the programs you want (providing they don't POKE data into the cassette buffer). Whenever you want to view the directory, type SYS 828 and press RETURN. Bingo, the directory appears without launching your current program into oblivion. If you want to exit *Wedge-o-Matic* before it has finished listing the directory, press the STOP key.

As listed, *Wedge-o-Matic* works on the 64. If you're using a VIC 20, remove the REM in line 48 (just the REM statement, not the whole line). Now *Wedge-o-Matic* will automatically make the necessary POKE to become VIC 20 compatible.

—Buck Childress
Salem, OR 97309

```
·10 PRINTCHR$(147)"LOADING":PRINT
·20 FORJ=828TO923:READA:POKEJ,A:X=X+A:NEX
TJ
·30 IFX<>14168THENPRINT"ERROR IN DATA[3".
"]":END
·40 REM POKE900,221
·50 PRINT"DATA OK":PRINT:PRINT"SYS 828 TO
USE[3"."]":END
·60 DATA169,147,32,210,255,169,36,133,251
,169,5,162
·70 DATA8,160,0,32,186,255,169,1,162,251,
160,0
·80 DATA32,189,255,32,192,255,162,5,32,19
8,255,32
·90 DATA228,255,32,228,255,32,228,255,32,
228,255,32
·100 DATA228,255,72,32,228,255,168,104,17
0,165,144,240
·110 DATA8,32,204,255,169,5,76,195,255,15
2,32,205
·120 DATA189,169,32,32,210,255,32,225,255
,240,234,32
·130 DATA228,255,208,243,169,13,32,210,25
5,76,101,3
```


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CHRISTMAS '86 ENTERTAINMENT SOFTWARE PREVIEW

These are the games we'll be giving and getting this holiday season.

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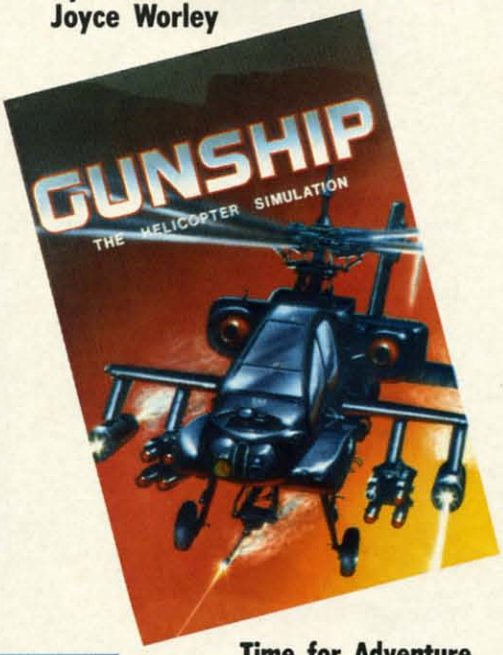
Oo-Topos 47
Super Bowl Sunday Expansion Disk #2.....48

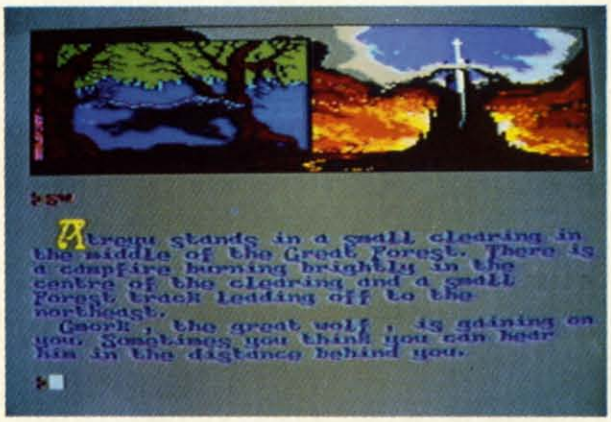
By Arnie Katz, Bill Kunkel, and Joyce Worley



The supply of new game and recreational software slowed to a trickle during the first half of 1986. Things are looking a lot brighter for this fall and winter, however. Publishers have stepped up their new program introductions in response to strong Commodore 64 and 128 sales.

There never seem to be enough entertainment programs for the Commodore. That makes the new crop, expected to reach stores in time for Christmas and Chanukah giving, especially welcome.

Some of the recommendations listed below have been mentioned in recent installments of *Scuttlebutt*; most are announced here for the first time. All should contribute to a festive holiday season.



PartyWare *(top left) generates personalized banners, hats, cards, etc.*
READER SERVICE NO. 268

Gunship *(top right) simulates the peril-paved flight of an Apache copter*
READER SERVICE NO. 269

The NeverEnding Story *(bottom) teams kid-venturers with Falkor the dragon.*
READER SERVICE NO. 270

Time for Adventure

Fantasy role-playing games allow the computerist to create characters and guide them through a series of experiences. Although there's generally a plot which serves as a framework, there's usually a lot of room to wander, explore, and get into mischief. Among new fantasy role-play disks are two sequels to game-systems which made their debuts earlier this year.

Now *Alternate Reality* fans can find out what lurks beneath the city in *Alternate Reality: The Dungeon* (Intellicreations/Datasoft). The gamer can take high-level characters into a four-level labyrinth to fight monsters and gain fabulous treasures.

Bard's Tale II: The Arch-Mage's Tale (Electronic Arts) has seven cities and a new character class, the

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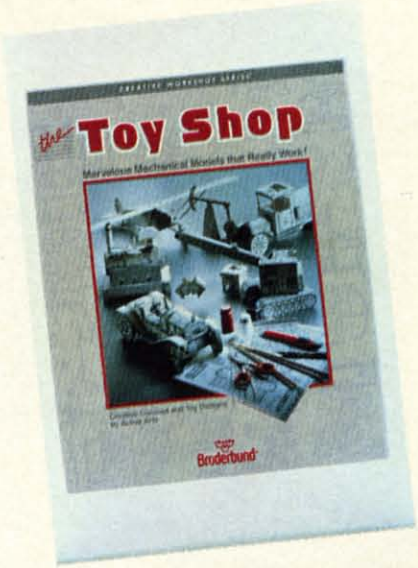


Toy Shop *creates 20 working models.*
READER SERVICE NO. 271

Arch-Mage with a book of 30 incantations. Characters generated with the original program can continue their exploits here.

Fairlight (Mindscape, $29.95) is a three-dimensional role-playing fantasy game with breathtaking visuals. The beautiful kingdom has lost its magic. It can only be restored if a hero retrieves the Book of Light.

The literary quality of the prose is a major strong point of several text adventures coming soon. If an adventure game has nothing but text on the screen, let it always be as luminous as in *Thomas M. Disch's Amnesia* (Electronic Arts, $39.95). Science fiction author Disch worked closely with the Cognetics design team to produce a sprawling game with 4,000 different locations, including the entire New York City subway system. The plot is a search for the hero's own identity.

Portal (Activision) is finally nearing completion, according to the publisher. It is described as an icon-driven computer science fiction novel. Rob Swigart is the author.

The latest in the series of all-text computer novels which began with *Mindwheel* is *Breakers* (Broderbund-Synapse, $39.95). It's a complex science fiction story, and it is said to have a higher excitement level than a couple of the earlier titles.

Infocom's legion of devoted fans should be particularly pleased by the company's next trio of releases. The format remains the same, but the subject matter is more varied. *Trinity,* written by Brian Moriarty, is a time travel story. The adventurer must reshape history so an atom bomb does not destroy London.

Leather Goddesses of Phobos is a spicy satire of 1930s pulp science fiction by Steve Meretzky. The Leather Goddesses want to turn earth into a sexual playground, but you've got to stop them anyway. It's a sequel, of sorts, to *Starcross.*

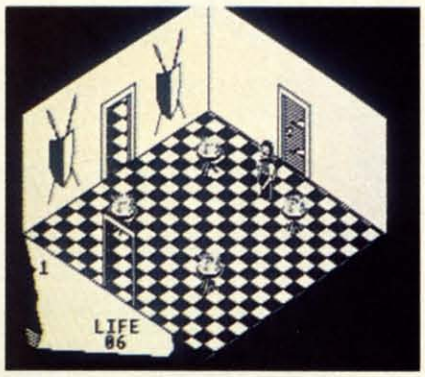
Infocom hopes *Moonmist* will prove especially interesting to female players, because it has an ambience similar to the Nancy Drew books. The object is to find the castle ghost while searching for treasures. This introductory level game has four variations, each with different treasures, hiding places, and dangers.

Scavenger Hunt *includes cards, board.*
READER SERVICE NO. 272

The Pawn (Firebird) features the most flexible and responsive parser ever included in a home computer adventure game. The illustrations for this fantasy adventure are equally outstanding. The same design outfit, Magnetic Scrolls, will shortly introduce an even more ambitious sequel called *Guild of Thieves,* which will appear for the Commodore sometime in 1987.

Hacker II: The Doomsday Papers (Activision) is Steve Cartwright's sequel to last year's hit adventure strategy game. This time, the government needs your help to avert disaster. The player uses the robots to break into a computer complex and get the evidence to stop a sinister scheme.

Murder Party (Electronic Arts) brings 1986's hottest parlor game craze to the home computer screen. It furnishes everything needed to host a murder party for up to seven people. The package includes invitations, clues, and complete instructions. A big advantage over similar, non-electronic products: *Murder Party* has variable culprits and clues for each play-session.



Fairlight: *3-D role-playing fantasy.*
READER SERVICE NO. 273

In *Gunslinger* (Intellicreations/Datasoft), a friend will hang in two days if you can't spring him from a Mexican jail. Meanwhile, the six Dalton brothers are out to get you in this wild west romp.

The NeverEnding Story (Intellicreations/Datasoft) is a kid-venture based on the movie and book of the same name. The goal is to save the land from the all-consuming Nothing and restore the empress with the aid of Falkor, the Luck Dragon.

Super Sports Simulations

Sports simulations are now second only to adventures in popularity among computer gamers. Both strategy and action are well-represented among titles which will reach store shelves by the holidays.

True Stat Baseball (SubLOGIC) is a statistical replay baseball game for one or two armchair managers. Among its unique features is a system of park effects. Balls which would be long outs in Dodger Stadium sail over the wall for home runs when you play in Yankee Stadium. Clever graphics even show the monuments located (until recently) out in centerfield in the House That Ruth Built.

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Championship Baseball 1986 (Activision/Gamestar) is a revamped version of *Starleague Baseball*. The strong points of the original remain intact, but now there's a closeup view of the batter and pitcher on the right-hand side of the playscreen.

Fans of action-sports simulations should put *World Games* (Epyx) on their holiday "want" lists. In the great tradition of *Summer Games I and II* and *Winter Games*, up to eight computerists travel the globe and compete in eight exciting events.

MicroRing WWF Wrestling (Micro League Sports Association) is the working title of a statistically based wrestling simulation starring Hulk Hogan and a cast of colorful rule-breakers. One or two participants use the joystick to select holds from menus, which the program then depicts onscreen in full-color, digitized animated sequences.

Championship Wrestling (Epyx) is a joystick-activated mat game for one or two computerists. The grapplers, shown in modified overhead perspective, can apply approximately 20 holds from a clothesline to an atomic drop.

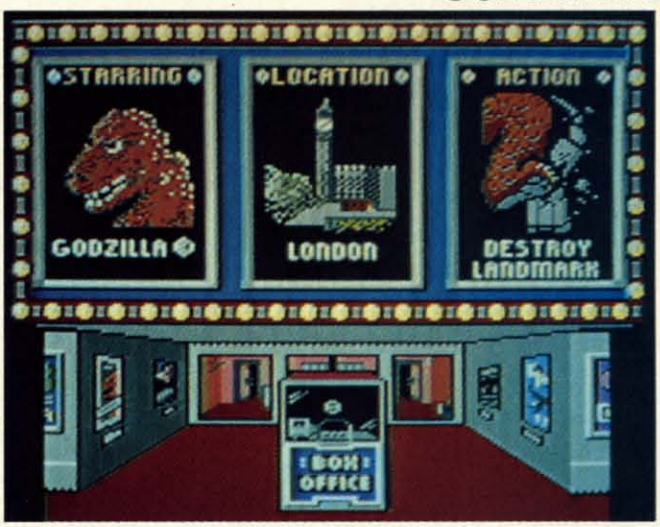
Don't laugh at the idea of a computer bowling title until you've rolled a few games of *10th Frame* (Access Software, $39.95). Up to eight keglers can enjoy this beautifully presented simulation. The gamer positions the onscreen bowler and determines the power of the swing.

Yie Ar Kung Fu (Intellicreations/Datasoft) is another entry in the martial arts sweepstakes. The onscreen fighter advances rank by rank from white belt to a final confrontation with a kung fu champion.

The first-person perspective in *Super Cycle* (Epyx) makes the player feel the full effect of the 180 mph scale speed as the bike banks into turns and sweeps past well-drawn roadside objects. The program contains progressively harder courses to test the driver's skill.

Games for Thinkers

The Movie Monster Game (Epyx) brings *Crush, Crumble & Chomp* up to date. The gamer can become Godzilla, or one of five other monsters, and devastate one or more of the world's major cities. The three-quarter perspective graphics give the game a cinematic feel.



You too can be a silver screen star!* The Movie Monster Game *allows you to devastate cities in the guise of Godzilla or one of five other gigantic scaly things.
READER SERVICE NO. 274

Crosscheck (Intellicreations/Datasoft) is a crossword/*Scrabble*-type territorial battle. An onscreen die roll tells a player how long a word to build. The first contestant to construct a chain of words from the center of the board to the home base is the winner.

Scavenger Hunt (Electronic Arts) utilizes a gameboard and a deck of cards as well as the computer. This family-oriented program by Ozark Softscape should be good at a party or family gathering.

Hacker II: ***sequel to last year's hit.***
READER SERVICE NO. 275

221B Baker Street (Intellicreations/Datasoft) challenges the detection abilities of one to four sleuths with 30 cases set in Victorian London. This is the computer version of the already hugely popular boardgame. An extra disk with 30 new cases is already in preparation.

The popularity of games with a heavy strategic component has meant a corresponding drop in real-time action contests. Pure shoot-em-ups are going to be even more rare over the next six months, but the roster of forthcoming titles includes several disks which should please the joystick jockeys.

The airbrushlike graphics in *Starglider* (Firebird) gives this combat distinctive appearance. The player pilots the only surviving attack vehicle left on the planet after an invasion from outer space. Air-to-air and air-to-ground combat matches the computerist's craft against the Ergonians' enormous flagship, the Starglider.

Tracker (Firebird) is an action-strategy contest which puts the player in charge of the Tactical Remote Assault Corps. TRAC must penetrate the automatic defenses which ring a malfunctioning computer complex. The gamer can only actively control one of the eight attack robots at a time, so it takes some quick switches to prevent the defending Cycloid fighters from overwhelming a dormant one.

Mercenary: Escape from Targ (Intellicreations/Datasoft) is a cross between a flight simulator and an adventure. The protagonist has crash landed on a planet and can explore in the air, on the surface, and underground. Excitement awaits the onscreen hero everywhere.

Wars on the C-64

Some of the most intriguing game programs scheduled for release before New Year's march to a martial

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cadence.

The player flies an Apache attack helicopter loaded with hellfire laser missiles, cannon, and rocket pods in *Gunship* (MicroProse, $34.95). Pilots seek out the enemy with laser range-finders. Day and night missions let the whirlybird face everything from guerillas to Soviet surface-to-air missiles.

The flip side of the situation depicted in *Silent Service* is the basis for *Destroyer Escort* (MicroProse). The mission is to protect unarmed flotillas of up to 39 ships as they ply the water routes between Britain and North America.

Battle of Britain/Battle for Midway (Firebird, $19.95) looks like an excellent value for armchair military strategists. One of the disk's two programs realistically simulates the titanic struggle between the RAF and the Luftwaffe, while the other makes the gamer the commander of the U.S. Pacific Fleet after Pearl Harbor.

Non-Game Entertainment

Don't wait until Christmas Day to give someone *Jingle Disk* (Hi Tech Expressions, $9.95). This cheery little item plays holiday songs and helps the computerist make personalized greeting cards.

PartyWare (Hi Tech Expressions, $14.95) is a two-disk product which composes banners, party hats, ribbons, place mats, place cards, invitations, notes, and greeting cards. It also has a party-planning checklist, game ideas, and a database which holds 60 names, addresses, birthdates, and so forth. The program can generate an animated message disk which the recipient can play on any Commodore 64. Hi Tech Expressions also offers *JollyWare*, special, festive printer paper.

Walt Disney Card & Party Shop (Bantam Electronic Publishing, $34.95) makes it easy to design stationery and greeting cards. More than 100 special graphics and 45 decorations add a special Disney touch. The art tool box allows the craftsperson to resize, transpose, and otherwise manipulate the images.

Certificate Maker (Springboard, $49.95) has a bank of 200 certificates which the user can customize and print. Border, message, and signature line are all modifiable.

Walt Disney Comic Strip Maker (Bantam Electronic Publishing, $34.95) allows young computerists to create three-panel strips which can be printed out in either color or black and white. The user selects characters, objects, backgrounds, and balloons from the disk's databanks, then puts dialogue in the word balloons.

Video Shop (Intellicreations/Datasoft), an easy-to-use tool for videophiles, provides a method for the speedy production of customized titles and introductions for homemade videotapes.

Toy Shop (Broderbund, $59.95) is a whole box of goodies on a mylar platter. It creates 20 working models and toys. Toys are customized on the screen, printed out, and attached to adhesive cardboard.

Final Thoughts

Of course, manufacturers' schedules aren't carved in stone. Development and production problems will delay a few disks.

By the same token, some unexpected releases are certain to jump into the spotlight. Competition-conscious publishers don't want to tip all their plans in advance.

In fact, computer stores will have most of the titles discussed here by the time Santa Claus is ringing his bell on every street corner. It looks like the season to be jolly for those who love entertainment software. □

MURDER ON THE MISSISSIPPI

Activision
Commodore 64
Disk; $34.95

Mayhem and mystery are passengers on the Delta Princess as it rolls down Old Man River from St. Louis to New Orleans. Sir Charles Foxworth, the renowned British sleuth, is aboard the sternwheeler, along with his trusted gentleman's man, Regis Phelps. When murder most foul is discovered, it's up to the gamer, as Sir Charles, to locate the body, question the passengers and crew, gather clues, and solve the crime.

The setting of this delightful melodrama is so appealing that gamers might be tempted to forego the mystery, and just stroll the decks of the beautiful riverboat. The Delta Princess is a quadruple-deck palace, complete with cabins, wheelhouse, salon, and staterooms. The sound of the lapping waters is realistic, and the colorful flag waving in the breeze adds a lovely note to the scene.

Sir Charles, accompanied by Regis, starts the game by wandering freely from deck to deck. But even as he meanders through the ship, poking around in unlocked rooms, someone is committing murder. Soon, if he looks carefully, the body turns up and the mystery really begins.

***Solve the* Murder on the Mississippi.**
READER SERVICE NO. 276

The titled detective must talk with the eight suspects again and again as he cross-examines testimony and compares stories.

Created by Adam Bellin, *Murder on the Mississippi* boasts what may be the best system ever devised for computer adventuring. The gamer

GBA Championship Basketball: *¾ view.*
READER SERVICE NO. 277

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employs the joystick to manipulate a series of onscreen menus. Available options permit investigation, questioning of suspects, and even automatic note-taking.

The sleuth uses joystick-selectable menus to talk to each suspect about him/herself, the victim, and other people on board. The gamer chooses a phrase like "Tell me about...", and then selects a picture of the character under investigation.

The answers become the basis of Sir Charles' notes, in one of the most unusual features of the game. The gamer points to words in the suspect's testimony with a hand-shaped cursor. Anything marked in this manner is entered on Charles' notepad. The detective can keep one line of information out of each statement and may accumulate up to three pages of notes about each person.

The notes are parts of a story which, once assembled, leads Sir Charles to the killer. If the computerist accuses an innocent, he may get Sir Charles tossed off the boat. And if the boat reaches New Orleans before the mystery is solved, the murderer gets away free.

The program provides the sleuth with quite a bit of assistance. Physical evidence is scattered around the boat, including a passkey to the locked rooms and oily rags used to clean a gun. Regis pockets the evidence on request, or it can be stored in Sir Charles' steamer trunk in his cabin. Some items must be searched very closely to extract the clues, so Charles has an examining table for eyeballing things in detail.

Charles also collects information by walking up to objects in each room and investigating them. However, it is sometimes difficult to get Charles next to the item the gamer wants to study, particularly if there are obstacles in the way.

The elegance of the setting makes the mystery more enjoyable. Every C-64 user should be thrilled by the handsome sternwheeler, the lovely staterooms and salons, and the cleverly drawn, cartoon-style characters who people the riverboat. The game is further enhanced by Ed Bogas' original music. The cheerful themes brighten Sir Charles' deck strolls, and enliven each new scene.

Murder on the Mississippi is pretty to look at, but far from simple to solve. This is one cruise you won't want to miss.

Activision, 2350 Bayshore Frontage Road, Mountain View, CA 94043 (phone: 415-960-0410).

—Joyce Worley

GBA CHAMPIONSHIP BASKETBALL (TWO-ON-TWO)

Gamestar
Commodore 64
Disk; $34.95

We moved across half-court, and I pulled back a second to steal a glimpse of the clock. Less than a minute left.

My presence immediately drew the attention of a Condor defender, while his partner covered my teammate, Magic Lyndon.

Abruptly, I broke for the net, rolling slightly to the right and inside the defender. At the top of the key I stopped, spun, and lofted the roundball in a smooth arc toward the hoop.

The shot hit the rim, but Magic, who was skywalking in the neighborhood, cleanly snatched the rebound. He swallowed up the ball and disappeared under the swarming Condor defenders.

An instant later, the ball came blasting out of the pileup and caught me in the hands—a picture perfect pass. The Condors instantly broke off mugging the Magic Man and made a beeline for yours truly.

As they reached me, I found Magic with a pinpoint pass. In the open now, he took two steps, then rattled the white string with a tomahawk jam.

The wonderful thing about the above description of action from *GBA Championship Basketball (Two-on-Two)* is that it contains no elaboration, embroidery, or poetic license. That is how the game actually *plays,* and this vignette hardly incorporates half the features of the program.

Like most Gamestar titles, *GBA Championship Basketball* offers arcade-style action with strategic overtones. Users "design" their player surrogates by assigning numerical values for each skill area. A total of eight points is divided between inside and outside shooting ability. Another eight are apportioned between dribbling and stealing, and a final eight between quickness and jumping.

In one-player games, or two-player, head-to-head contests, a draft is held and the user selects a champ to comprise the other half of his team. The 10 available players are described in the documentation, but each is clearly based on an actual NBA all-star ("Magic" Lyndon, Elgin Cutter, Kareem Ungrin, etc., with surnames taken from members of the Gamestar design group).

With two gamers, *Two-on-Two* is played either head-to-head or with both players on the same team against a computer-coached tandem. The latter is an especially refreshing experience since the players can call to one another and set up as they would on

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an actual court.

Two-on-Two is a full-court basketball simulation with half the court on-screen at any given time. Once possession changes, the computer controls the offense as it moves to mid-court. This period is allotted to play-calling, as the computerists move joysticks to select one of four offensive/defensive setups. Once the ball passes mid-court, control returns to the player on offense.

The simulation also includes fouls, traveling, and three-second violations. Once a team draws five fouls, it's free throw time. The clock is set at 24 seconds, and play elements include stealing, shot blocking, time-outs, and, of course, rebounding.

GBA Championship Basketball (Two-on-Two) features excellent graphics which display the court at a three-quarters perspective, as viewed from above center-court.

The game has only one serious flaw—the clock isn't visible during the pause or time out mode. As a result, the only way to check the time is to look from the action on the court up to the clock and back again. In an actual game, players can at least see the clock during time outs!

No review of a game subtitled *Two-on-Two* would be complete without a reference to the all-time computer hoop classic, Electronic Arts' *One-on-One*. Unlike that program, *Two-on-Two* does not let users control computerized simulacra of real NBA superstars—those players are strictly computer-guided in *Two-on-Two*. Instead, its strength lies in the level of strategy two-man teams create.

Games are part of a League context. The user contests in any of four five-team divisions. After each game, the results and subsequent standings are presented in a "sports page" format.

There's a "practice" mode and a regular game format, but period length is not programmable. Difficulty is determined by the division in which you play.

Documentation is first-rate, with complete team and player ratings, shooting percentages, and tactical tips.

Sports and action game fans will absolutely love *GBA Championship Basketball*, the first C-64 roundball simulation to go beyond the schoolyard and explore the possibilities of team play.

Gamestar/Activision, 2350 Bayshore Frontage Rd., Mountain View, CA 94043 (phone: 415-960-0410).

—Bill Kunkel

EUROPE ABLAZE

Strategic Studies Group
Commodore 64
Disk; $50.00

If it is possible for a military simulation to be too good, too detailed, too versatile—then *Europe Ablaze* probably approaches that plateau. But for those who constantly reach for new levels of complexity and strategy, for those who want to expand and enrich their wargaming, *Europe Ablaze* is a must.

Briefly, *Europe Ablaze* recreates the air war over Europe over a five-year span. It also goes beyond the stage of "Which side you wanna be, good guys or bad guys?" A player may fill any of 12 different jobs. Each side has a Commander-in-Chief, supported by five lesser commands.

The computer handles all the jobs not taken by a human. In consequence, two players can work in tandem against the computer, as well as compete against each other head to head.

One side is the Germans, trying to bomb England into submission. The other side is the American and British forces, trying to stave off the attack and launch a counteroffensive.

The game includes three different scenarios. "Their Finest Hour," Aug. 10-Sept. 4, 1940, commonly known as The Battle of Britain, is the basis of the first. The second is "Enemy Coast Ahead," July 23-Aug. 20, 1943, which involves raids by the Allies against Germany. The third is "Piercing The Reich," Feb. 3-26, 1944, where it was the Allies' turn to try to bomb Germany into surrender.

It's impossible to find serious flaws. The most this reviewer can offer is a caution: a simulation of such scope can't help but overwhelm a novice gamer or one with limited knowledge and/or experience with air battle titles.

To SSG's credit, *Europe Ablaze* comes packaged with extensive playing aids and a friendly rulebook. It's only 20 pages, mostly due to the program's easy-to-use menu-driven structure. The authors wanted the novice to be able to play at first attempt. Winning is another matter.

The instruction book includes tutorials for both the positions of C in C and Air Fleet Commander. It takes the computerist through a sample game, prompting the right menu choice to make at each step.

As C in C, the gamer decides what priority to assign to each command, then allocates missions and assigns an activity level. At the Air Fleet Commander's post, the commander must dispatch individual planes to the tasks created by Allied action.

All orders are entered through the keyboard. Most of the pertinent information is at the player's fingertips. The trick is more in knowing what data to request and at what time. Conditions for victory determination

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differ for each side. The force with the highest point total of the C in Cs wins that scenario, and the Air Fleet Commander with the highest total is the overall winner.

The gaming aids are a colorful laminated sheet with all the game menus and two full-color maps. One shows the coast of Germany and the British Isles for Scenario One. The second map depicts Germany with part of Britain for Scenarios Two and Three.

The most exciting feature of *Europe Ablaze* is the Game Design Kit. It allows users to create their own scenarios and play a fourth scenario described in the rulebook, which is set in the Mediterranean Theater in March of 1944.

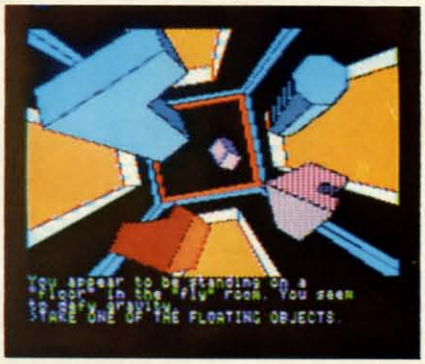
The kit includes a 42 × 36 hex grid, 24 aircraft types, 255 squadrons, 127 airbases, 63 city centers (with population, industry, communications, and ports), 63 radar stations, 63 shipping lanes, 63 flak units, identity and briefing routines, cursor selection, national doctrine, weather creation, and victory determination. If this game doesn't become one of the most often booted in your software library, you're not a true wargamer.

The 24-page Design Manual is a step-by-step guide to scenario creation. Not originally meant to be included with the game, the design kit was only created to make it easier for the game's designers to communicate with each other. But it certainly adds value to a steeply priced title.

Europe Ablaze will provide endless hours of enjoyment for dedicated wargamers. It stands as the best computer military simulation published so far in terms of historical accuracy and playability.

Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404 (phone: 415-571-7171). ***—Rick Teverbaugh***

World Karate Championship: ***a kick.***
READER SERVICE NO. 278



Oo-Topos: ***interactive sci-fi novel.***
READER SERVICE NO. 279

WORLD KARATE CHAMPIONSHIP

Epyx
Commodore 64
Disk; $25-$35

World Karate Championship is yet another home variant of Data East's coin-op arcade hit, *Karate Champ.* This version is notable for crisp programming, excellent animation, and an atmospheric soundtrack.

Like other contests based on that classic, *World Karate Championship* displays two combatants in side perspective while an onscreen karate master rates knockdowns and declares the winner of each round.

The fighters are controlled by joystick, and perform 11 different maneuvers from either direction. Fighters block kicks and punches automatically when moved backwards. Combatants leap, throw leg sweeps, deliver three kinds of punches and five types of kicks, and can somersault forwards or backwards.

In between rounds, special tests are staged in order to advance to the next level. These challenges include breaking a stack of ten boards with your head and avoiding a fusillade of spears and knives.

The sounds, musical background, and visuals on *World Karate Championship* are striking. Before each game, the user opts to begin the contest in Egypt or Australia. Each subsequent round moves to a new locale, from New York City to Mt. Fuji. These beautifully painted settings provide *World Karate Championship* with invigorating backdrops.

The musical score is appropriately Eastern, with the subtly dissonant yet haunting twang of Oriental music accompanying the smacks, thumps, and kicks of martial combat.

Documentation is excellent, but it will still take most users several hours of play to develop true mastery over the extensive repertoire of moves.

World Karate Championship may not win any awards for innovation, but in terms of delivering a quality product, this Epyx program gets a black belt.

Epyx, 1043 Kiel Court, Sunnyvale, CA 94089 (phone: 408-745-0700).
—Bill Kunkel

OO-TOPOS

Polarware/Penguin Software
Commodore 64
Disk; $17.95

Michael Berlyn's *Oo-Topos* was first published by Sentient Software for the Apple II+ back in 1981. It was one of the earliest attempts to produce an interactive science fiction novel on computer. Berlyn, a genuine SF author ("Crystal Phoenix," "The Integrated Man"), proved the ideal man for the job, and *Oo-Topos* became a cult classic.

Now Michael and his wife Muffy have updated their classic adventure to interface with the Polarware's "Comprehend" graphic novel format. Raimund Redlich and Brian Poff added some fantastic illustrations, and the whole process breathed new life into an old favorite.

The gamer guides an Astro Mega Class, Tachyon Drive Spacecraft on a vital mission (delivering a compound to neutralize the deadly "power transfusion waste" threatening the earth). The drama heightens when a tractor beam grabs and forces the craft down on the hostile world Oo-Topos. On the surface, nasty locals overpower and imprison the pilot on board.

The adventurer must escape the cabin, regain control of the ship, and complete the mission.

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The graphics are excellent, possessing a comic book vitality which is especially effective in the rendering of high-tech machinery. As much of the game is set on board a spacecraft, this is quite relevant.

Oo-Topos works very well with the Comprehend system. The action moves smoothly, there are few dead spots, and the player experiences a minimum of frustration at being unable to interface with the program. The only flaw is the parser's inability to handle uppercase letters. It is also disarming that graphic changes are done with a great flash, during which the entire screen goes black.

The documentation is extensive and well-presented. While there's plenty of extras to add context (including a letter from the President, a list of mission codes, and the operator manual for your ship), there's also a detailed explanation of the nuts-and-bolts—how to load, tips for communicating via Comprehend, and a lecture on the importance of mapping.

It's hard to know if there are many older games which could stand up under this type of modernization, but *Oo-Topos* comes through with flying colors. It's a pleasure to see its gripping story dressed up in the latest style adventure game system.

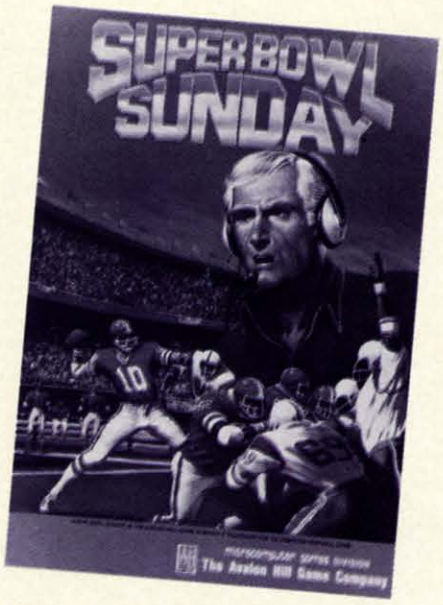
Polarware/Penguin, 830 Fourth Ave., Geneva, IL 60134 (phone: 312-232-1984). ***—Bill Kunkel***

SUPER BOWL SUNDAY EXPANSION DISK #2

Avalon Hill
Commodore 64
Disk; $20.00

Graphics, breadth of play-calling options, and statistical accuracy make *Super Bowl Sunday* the outstanding statistical replay football program in the home computer field. Its legion of fans have clamored for additional teams since the title first appeared in 1985.

The Avalon Hill Game Company is now addressing this market for supplementary disks. The company, which previously published a disk based on the complete 1984-1985 National Football League season, now offers a collection of 12 more outstanding pigskin matchups, some of which occurred prior to the dawn of the Super Bowl era. Naturally, the 24 teams can be matched against each other in any desired combination, or pitted against squads contained on other *Super Bowl Sunday* disks.



Disk #2 offers 12 high-powered teams.
READER SERVICE NO. 108

Matchups included on the disk are Detroit-Cleveland, 1953; Baltimore-New York, 1958; Buffalo-Cleveland, 1964; Green Bay-Oakland, 1967; Kansas City-Minnesota, 1969; Dallas-Miami, 1971; Miami-Washington, 1972; Pittsburgh-Minnesota, 1974; Pittsburgh-Dallas, 1975; Oakland-Minnesota, 1976; and Dallas-Denver, 1977. The simulation of the older teams isn't perfect, primarily because football itself has mutated during the intervening years, but all these high-powered clubs are fun to coach and offer a pleasing variety of offensive and defensive weapons.

Pigskin partisans can only hope that the next expansion module will be a disk which facilitates player swaps among teams. Just think of the fun of fielding a squad with Joe Montana handing off to Jim Brown and Frank Gifford!

Avalon Hill, 4517 Harford Rd., Baltimore, MD 21214 (phone: 301-254-9200). ***—Arnie Katz***

Reviewed next month:

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- **Psi 5 Trading Co.**
- **Super Cycle**
- **Frankie Goes to Hollywood**

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128 TO 64 AUTOBOOT

By Daryl Marietta Jr.

From time to time, you Commodore 128 owners have probably needed to run a C-64 program or two. However, upon turning on the machine, you may at times have forgotten to hold down the COMMODORE key to go into 64 mode, and had to either switch it manually or reset the computer and start over. Or there may have been other times when you wished you could have the machine autoboot a 64 program when turned on by a timer. Now these problems can be solved by installing the *128 to 64 Autoboot* routines on your disks.

Most 128 users already know that the machine can autoload and run a 128 program in 128 mode. The only problem is keeping a program running after switching modes. This is accomplished by setting a few key bytes to certain values in order to trick the 64 mode into thinking that a cartridge is plugged in.

The 128, upon power-up or resetting, checks for an autoboot by reading the disk at track 1, sector 0. It then prints the boot message found on the disk and loads a binary file into memory. This contains the code to make the 64 mode autoboot. The 128 then jumps into 64 mode, initializes for 64 mode, and loads the first program on the disk. Control is then passed back to the BASIC interpreter. If the first file on the disk is a 64 autorun program (which is the first file on many 64 owners' disks), the 64 continues to load its program as if you had typed LOAD":*",8,1 (RETURN).

To use the *128 to 64 Autoboot*, enter the 128-64.BAS listing on page 119. When you run this it creates the disk file 128-64.BIN. This is the only file you have to put on the autoboot disk. You can then set the 128's autoboot sector with the 1-0.BAS listing on page 120. The program asks for the boot message, which can contain control characters, and you terminate the input by using the back arrow key.

The *128 to 64 Autoboot* also works on commercial software, as long as the program does not use the 128 boot sector and allows you to put an extra file on the disk. □

SEE PROGRAM LISTINGS ON PAGE 119

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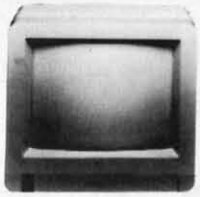

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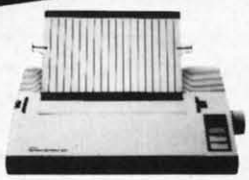

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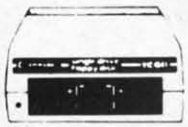

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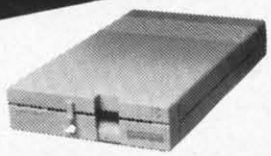

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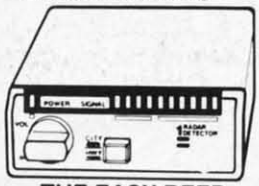

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QUICK CHANGE

For the C-64

By Buck Childress

After slaving over the computer for a seeming eternity to complete your latest program, you've discovered that several dozen lines need to be changed. Gremlins must be crawling around inside your 64, because at every opportunity *it* managed to type PIRNT instead of PRINT. And, to top it off, you're beginning to notice that your lines of data have the number 86 all over the place. You know it was supposed to be 96. Those darn gremlins. Now you'll have to spend another eternity finding and changing all of *their* mistakes. Well, it could be worse. At least you don't have a splitting headache—yet. But, somehow, you know one is on the horizon. Wouldn't it be nice if you could just take two aspirins and call the computer in the morning? Better yet, how about telling ol' Reliable what to change and letting *it* do the work?

Quick Change automatically changes anything you want, from numbers and strings to command words and graphics. Virtually anything in your BASIC program can be changed quickly and easily with *Quick Change*. Just tell *Quick Change* what to change, give the range of lines, and presto...the swap is made. You can use *Quick Change* to erase unwanted items as well.

After saving a copy of *Quick Change,* run it. The loader POKEs the machine language data into memory and checks for errors. If none are found, it's ready to use. Now load the program you want to change.

Quick Change can be switched on and off by typing SYS 50000 and pressing RETURN. The first SYS switches it on, the second switches it off, etc. A message will let you know whether it's on or off. It's a good idea to leave *Quick Change* off while you load, save, or run a program.

When you're ready to start making changes, switch *Quick Change* on. To use *Quick Change*, press any letter key (A-Z), then RETURN. (This is faster and easier than having to type a SYS number every time you want to change something.)

Quick Change asks for the old entry. You can enter up to 26 characters. They can be anything, including cursor control keys, function keys, and keyboard graphics. After you've answered and pressed RETURN, you'll be asked for the new entry. It, too, can be anything, up to 26 characters long. If you're using *Quick Change* to erase the old entry, don't give a new entry. Just press the RETURN key. "ERASE" will appear, verifying this choice.

Next you'll be asked to enter the range of lines you want the change to occur in. This is done in the same manner as when you LIST a program. For example, if you want the changes to take place through line 200, you would enter

```
-200
```

Changes from 100 to 350 would be entered

```
100-350
```

and changes from 500 to the end of your program would be like so:

```
500-
```

If for some reason you only want to change one line, say, 400, enter it like this:

```
400-400
```

Should you want the change to take place throughout the entire program, just press RETURN without entering anything.

If you make a mistake while answering a prompt, press the DELETE key. Pressing it again will take you to the previous prompt.

Quick Change is in the NORMAL mode when you first enter it. In this mode it only changes (or erases) entries that are not part of DATA or REM statements or contained in quotes. As an example, if you were changing PRINT to INPUT, it would be changed from this:

```
100 PRINT "PLEASE PRINT YOUR NAME"
```

to this:

```
100 INPUT "PLEASE PRINT YOUR NAME"
```

Pressing the CONTROL and N keys at the same time will return you to the NORMAL mode if you inadvertently switch to another.

If you want to change entries contained in quotes—including cursor control keys, function keys, and keyboard graphics—press the CONTROL and Q keys. Only items within quotation marks will be changed. Our example would be changed from this:

```
100 PRINT "PLEASE PRINT YOUR NAME"
```


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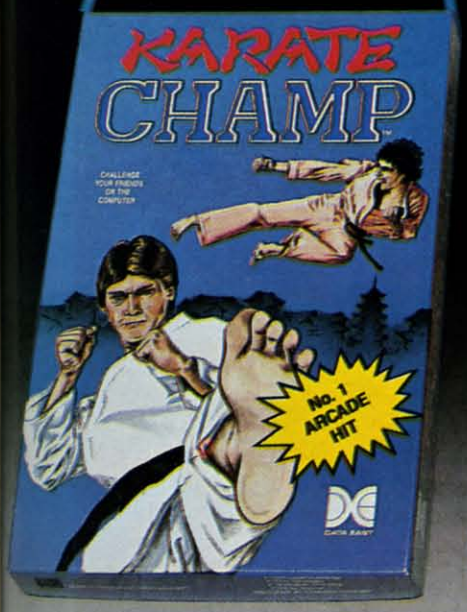

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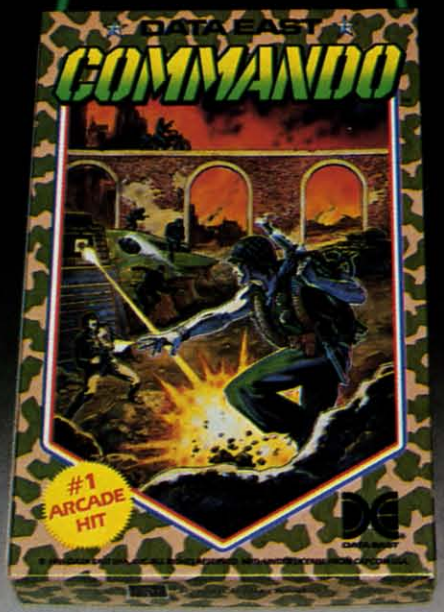

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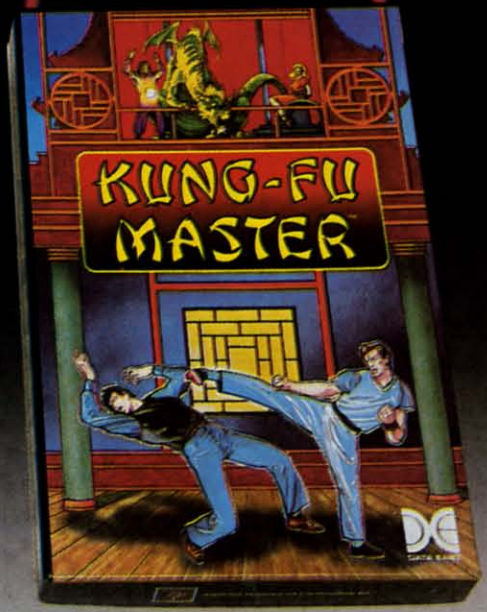

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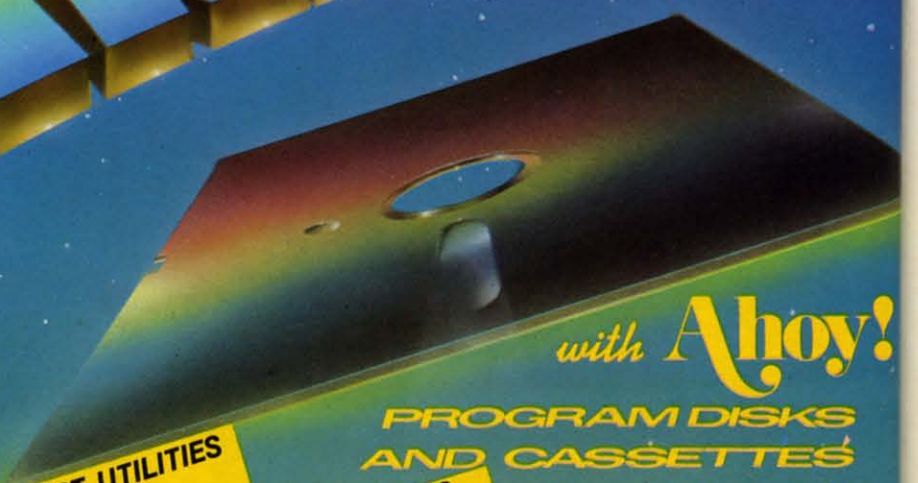

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to this:

```
100 PRINT "PLEASE INPUT YOUR NAME"
```

CONTROL and D enters the DATA mode. Now only DATA items can be changed. So, if you wanted to change data number 123 to 169,

```
200 DATA 123
```

would now be

```
200 DATA 169
```

Lines such as

```
150 PRINT 123
```

would remain unchanged.

The same is true for string data. If you ask *Quick Change* to change ABC to CBA,

```
210 DATA ABC
```

becomes

```
210 DATA CBA
```

Lines like

```
160 PRINT ABC
```

remain unscathed.

The REM mode works like the DATA mode. The difference is that only REM items can be changed. CONTROL and R brings you here.

The ALL mode is just what its name implies. It changes all occurrences of the chosen victim. CONTROL and A does the job. In the ALL mode a command to change PRINT to INPUT will change it everywhere. These lines:

```
100 PRINT "PLEASE PRINT YOUR NAME"
110 DATA PLEASE,PRINT,YOUR,NAME
120 REM "PLEASE PRINT YOUR NAME"
```

will be changed to

```
100 INPUT "PLEASE INPUT YOUR NAME"
110 DATA PLEASE,INPUT,YOUR,NAME
120 REM "PLEASE INPUT YOUR NAME"
```

Erasing is done exactly like changing. Choose the appropriate mode and whoosh...the unwanted item is zapped from the program. Suppose you wanted to eliminate "YOUR NAME" (not yours personally) from the above example. Choose the QUOTE mode and answer the OLD ENTRY? prompt with YOUR NAME, then press RETURN. Without answering the NEW ENTRY? prompt, press RETURN again, and

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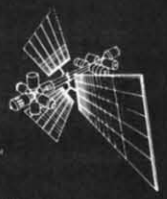

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```
100 PRINT "PLEASE PRINT YOUR NAME"
```

becomes

```
100 PRINT "PLEASE PRINT"
```

The mode you're currently in appears at the top of your screen. You can switch modes while you are answering the prompts. The various modes and their appropriate keys are listed on the screen.

Whether you're changing or erasing, remember to be accurate about defining the item. Suppose you want to change the data numbers 129 to 169. If you answer the OLD ENTRY? prompt with 2, and the NEW ENTRY? prompt with 6, every 2 in the data range you specified will be changed to a 6, whether it's 2, 22, or 92. This can easily be avoided by answering the OLD ENTRY? prompt with 129, and the NEW ENTRY? prompt with 169. As another example, if you answer the OLD ENTRY? prompt with REM and the NEW ENTRY? prompt with DATA, the following will result:

```
100 PRINT "REMEMBER TO CHANGE THE REM LI
NES"
```

will be changed to

```
100 PRINT "DATAEMBER TO CHANGE THE DATA
LINES"
```

Be specific. Answer the OLD ENTRY? prompt with THE REM or REM LINES and the NEW ENTRY? prompt with THE DATA or DATA LINES. You'll get the desired result:

```
100 PRINT "REMEMBER TO CHANGE THE DATA L
INES"
```

This becomes second nature with very little practice.

After you've answered the prompts, the screen clears and *Quick Change* displays all your answers in quotes so you can see exactly what it will be looking for, including spacing, etc. *Quick Change* also displays what it intends to do, along with the message "ARE YOU SURE? (Y/N)". Press Y for yes, or N if you're having second thoughts.

When changing a line, *Quick Change* doesn't allow excessive length. For example, if you decide to change REM to PRINT and, as a result, one of the lines will exceed 80 characters, *Quick Change* stops and displays the excessively long line. It also lists the line as it currently appears in the program so that you can make whatever corrections you might want.

Quick Change can be brought to a halt at any time by pressing the STOP key. To reuse *Quick Change,* press any letter key (A-Z), then RETURN.

Experiment with *Quick Change.* It's simple to use and zaps those gremlins fast. □

SEE PROGRAM LISTING ON PAGE 113

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DVORAK KEYBOARD

For the C-64 and C-128

By Jim Partin

If you'd like to switch your C-64's or C-128's keyboard from the standard QWERTY to the more efficient Dvorak layout, endure the old method long enough to enter *Dvorak Keyboard*. The programs use a software method to activate the Dvorak keyboard; no hardware change is necessary.

Versions are included for the C-128 (in 128 mode) and the C-64 (or 128 in 64 mode). The programs don't use machine language wedges to implement the Dvorak layout, but modify the Kernal keyboard decode tables. Because of this, the new layout will work with a large number of programs provided the programs don't A) use the RAM that holds the new Dvorak layout or B) alter the memory locations that allow the alternate keyboard layouts to exist. While most public domain or magazine published programs will work, many commercial programs will not work. Cartridges such as the Epyx *Fast Load* may also have to be disabled to work with the new layout. Refer to the illustration for the new Dvorak keyboard layout implemented by the programs. Also, be sure to save the version of the program you type, as both program versions erase themselves after activating the new Dvorak layout.

Some final safety notes are necessary before using the programs. Keep in mind that while the RUN STOP/RESTORE combination will reset the C-64 to its normal keyboard layout, the same isn't true for the C-128. If you activate the Dvorak keyboard mode on the 128 and wish to return to QWERTY mode, just hold down the RUN STOP key and hit the side reset button. When you are dumped into the monitor, hit 'X' and RETURN. If you do accidentally hit RUN STOP/RESTORE on the 64 and want to return to Dvorak mode without rerunning the program, you can simply type POKE1,53 and press <RETURN>.

With some imagination, you can figure out a way to make Dvorak keycaps for your C-64 keys. Brown masking tape is best, since it will lift off without a fight if you elect to revert to QWERT.

The Dvorak layout is becoming more popular all the time. I hope these programs will help you get a taste of the future of computer keyboards. □

SEE PROGRAM LISTINGS ON PAGE 127

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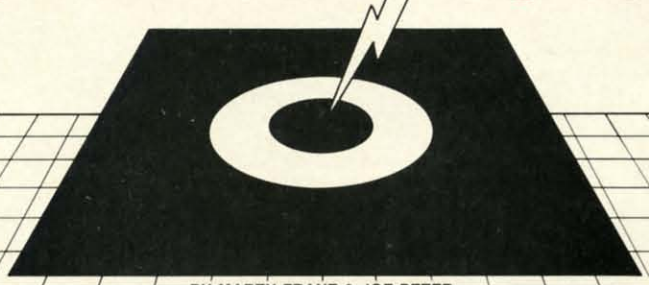

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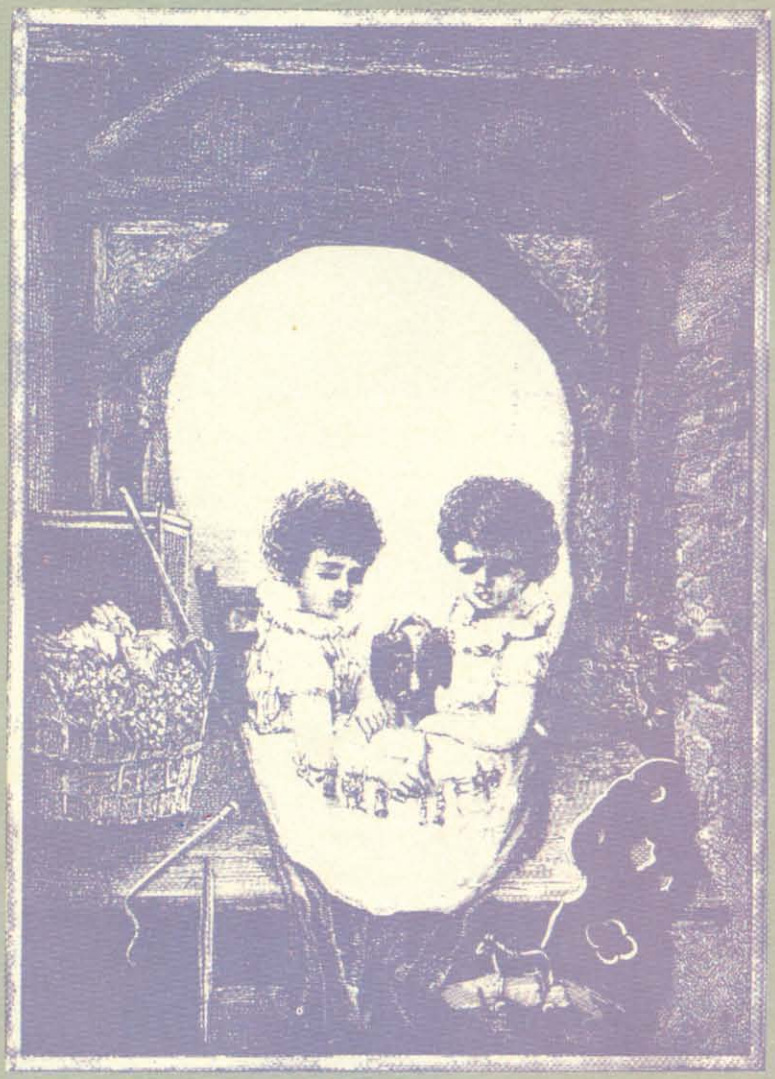

BY CLEVELAND M. BLAKEMORE

Sarnoth was once a happy, prosperous land, a country of mirth and joy where the sun shone year-round. When the new king inherited the throne, he hoped his rule would be as easy and peaceful as his father's reign before him. In the two hundredth year since the fall of Lemuria, the bad omens began. Dogs began speaking in tongues right in the royal court. The full moon seemed to burn ashen red for weeks. Babies slept fitfully, and the kingdom was plagued by oversized serpents which surfaced from out of nowhere and made off with whole cattle.

One day, while the king was arguing with his counselors in court over the source of the blight that was upon the land, there arose a massive black cloud-front that moved over the kingdom and seemed to fix itself over the castle. The people trembled with terror and many locked themselves inside their houses.

In the midst of the shifting darkness over the Castle Sarnoth, slithering shapes moved up the royal road, over the moat and into the castle. Guards rushed into the courtyard to battle with the shadowy figures, seeking to protect the king, and their screams were the only indicator that they survived for even a moment. As the sun was eclipsed, there appeared four sets of glowing eyes in the darkness before the king. The counselors fell to their knees with horror, and the court jester began cackling madly.

The largest form moved closer. "We are the Naga'an ancient race of serpents from a land you have never seen. We seek a place of refuge here in Sarnoth. I claim your crown and your castle, in return for your life."

The king was the only one who survived the massacre that followed. He was found the next morning, ragged and filthy, wandering the countryside. The castle is devoid of human life, and there are none brave enough to venture within and see just what form of creature lives there.

The purpose of your quest, adventurer, is to journey into the dungeons beneath the castle, destroy the Naga, and return the crown and kingdom of Sarnoth to their proper owner. You will need courage, luck, and wit to succeed in the *Vault of Terror.*

This game is the result of an argument I had with a teacher at the college where I study in Texas. He thought my concept of a fast, three dimensional graphic game utilizing multiple sprites, page flipping, and sprite priorities, written in less than 20k of BASIC, was utterly out of the question, not without most of it using system jumps to machine language routines.

Well, here it is. I think you will agree that it is superior to most commercial games of this type, both in speed and quality. My one regret is that I could not throw in more monsters, but the program is a typing chore as it stands. I think you can type it in over two or three sittings, however—and you will find it well worth your time.

Gameplay is relatively simple and self-explanatory. You need a high quality joystick plugged into Port 1. Remove any utilities which might interfere with program memory above 49152, as this program uses the fourth block of video RAM almost exclusively. (I found that the game does not work with *Mach 5* from Access.)

When you run the program the first time, the screen will be dark until the character set is redefined. There will be a short pause (10 seconds) as the game is initial-

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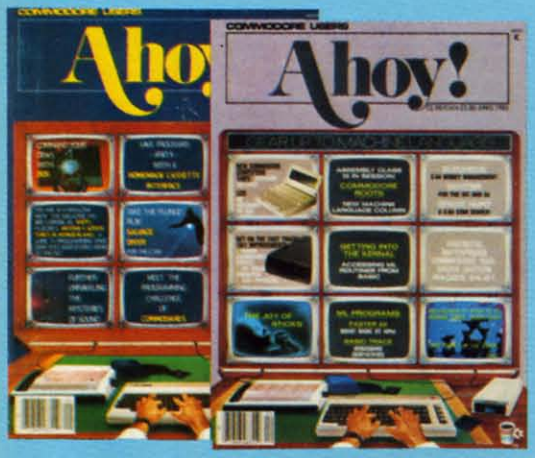

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ized, sprite data loaded, character data relocated, etc. The eight treasures in the game will appear on the screen. Remember what they look like. When the green bar appears at the bottom, with a choice of pressing f1 or f2, hit f1, since you do not have a game saved on disk yet. The title screen will disappear and you will find yourself in utter darkness, with only a red bar at the bottom of the screen, with several funny little symbols on it. The two letters on either side of the bar are your direction indicators—they show you which direction you are currently facing (N,S,E,W). Your only possession is a wooden torch. To use it, press the joystick button with the stick centered. The screen should light up, and you will find yourself looking down a long corridor, with a few turns and perhaps a coffin or a pit, with the shaft you came down above your head. To move forward, push the joystick forward. The bar at the bottom will flash the same color as the corridor, and the view will change, showing you one block forward of where you started. To turn left, push the joystick left. To turn right, push the joystick right. To go back, pull the joystick back. Whenever you move, the bar at the bottom will flash for a moment, and the new view will appear. If you have turned left or right, your direction indicators will show you your new compass bearing. Whenever you try to move through a wall, or try to enter a door backwards, there will be a little beeping sound to tell you that you can't move that way. As you wander through the vault, creepy music will play continuously in the background.

The bar at the bottom is the command bar. It has on it everything you can carry in this game. You can only carry one object of each kind. To see what you are currently carrying, simultaneously push the button and pull the joystick backwards. There will be a pause, and you should see a flashing cursor on the first object. Now simultaneously release the button and return the joystick to the center position. The cursor should remain flashing. The cursor is controlled by moving the joystick to the right (and only to the right) and releasing it when the white cursor is on the object you wish to manipulate. The bar reveals which objects you own by illuminating them in light red. You do not possess those in dark red. The object you are currently using is in yellow. If you want to pick UP an object, push the joystick up. If you want to put DOWN an object, pull the joystick down. If you possess an object (light red) and want to HOLD that object, move the cursor to it and push the button. There will always be a beep. The object will light up in yellow if you possess it, and you will be holding it. If you do not possess it, it will stay in white, and you will be holding either the torch or the last object you had. Either way, pushing the button leaves the command bar, and puts you back in control of movement. Now any time you push the button, you will USE the object you are holding (yellow).

The objects are, from left to right, torch, sword, shield, ring, rope, wand, key, gold, and the crown. Each object can be held, but using some objects, like the gold, will not have any effect. Some objects aid you just by possessing them, like the shield or the torch (which continues illuminating your way whether you hold it or not.)

You must be standing in a block to view the contents of the block. They will appear in front of you, on the floor.

Other objects have very special uses indeed, like the wand or the ring, and only display their properties when used. Basically, the purposes are as follows:

Torch: lights way, serves as makeshift weapon in absence of sword.

Sword: main weapon against monsters.

Shield: main protection. Absorbs 75% of blows.

Ring: much like that of Bilbo Baggins in *The Hobbit.* Read the book if you are not familiar with it. Without giving everything away, the ring gives you invisibility with a catch. The ring fools all the monsters except the non-organic ones. The only drawback is that your perception is weirdly altered when wearing the ring, and the dungeon appears distorted and unreal. You must take off the ring to attack anything. When you use the command bar, the ring will automatically be taken off.

Rope: used to climb down a shaft, or to indicate you want to go up if there is a LADDER and a CEILING EXIT in your block. You cannot go up without a ladder!

Continued on page 99

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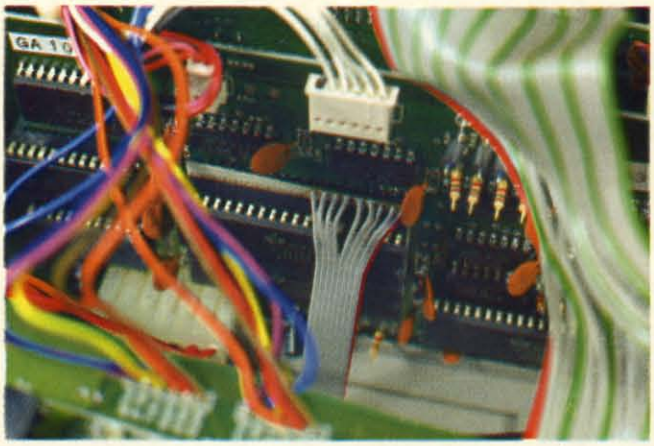
The magnetically encoded word is a fragile thing. The loss of a single bit from among the more than a million stored on the disk surface can render a program completely useless. Thus the need to back up all magnetic disks is a time-consuming but necessary evil which we will have to live with.

The 1541 disk drive is a sophisticated device with a built-in DOS and features that are not found on any other computer's disk drives. Unfortunately, when coupled with a C-64 computer, the 1541 is also one of the slowest disk drives ever made. The time needed to copy a single disk, using only Commodore's official DOS commands, is on the order of 40 minutes. This has resulted in a large number of software-based copy programs which work around the DOS's built-in limitations.

The *21 Second Backup* from VG Data Shack is a combination of hardware and software intended to assist in the duplication of Commodore 1541 formatted disks in the least possible time. It is designed for use with a Commodore 64 and one or two 1541 disk drives, or an SX-64 with its internal drive and an optional external drive. The result is the fastest 1541 disk duplication system available today. We clocked an SX-64 with an external drive at a mere 18 seconds for an unverified full disk copy!

How Fast Is Fast?

A normally formatted 1541 disk contains 35 tracks with varying amounts of data on each track. Once in the drive, the disk spins at a constant rate of 300 revolutions per minute. A simple calculation tells us that a complete data track will pass under the read/write head in just 2/10 of a second. Multiply this by 35 and double the result to permit writing it out, and we find that it should be possible to copy an entire disk in just 14 seconds.



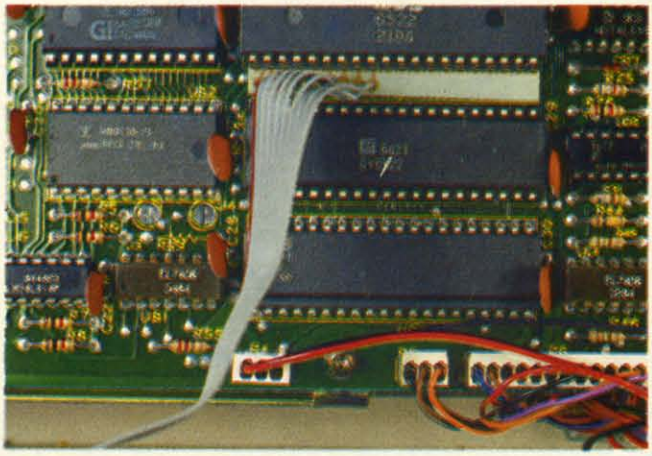
Installation of* 21 Second Backup *in an SX-64. Access to the VIA chip is more difficult than on the 1541 (below). READER SERVICE NO. 280

In the real world things are not that simple. Some time has to be allocated for the physical movement of the read/write head. In addition, numerous calculations have to be performed on the data to convert it from the eight bit codes in the computer into the 10 bit GCR codes used by the drives. However, even when all these things are taken into account, we are still a long way from the aforementioned 40 minutes. All this really makes the 18 seconds we mentioned above a real accomplishment.

A large part of the data transfer delay is associated with the fiendishly slow serial bus as implemented on the C-64. Maximum transmission speeds on this channel, without special software enhancements, are less than 700 characters per second. *21 Second Backup* sidesteps this limitation by providing its own communication path.

What It's Made Of

The key to the performance of *21 Second Backup* is a simple piece of hardware whose major components are two 6' lengths of nine conductor ribbon cable. This pair of cables are equipped with three terminations. Two of these are low profile, 40 pin dual in-line integrated circuit sockets (40 pin DIP sockets to those who know about these things). Each DIP socket is mounted on a paper thin printed circuit board upon which the nine conductors terminate. The third terminal consists of a 24 pin printed circuit edge card connector which mates to the user port on the C-64.



Installation in the 1541 requires opening up the drive and prying out a 40 pin chip. The connection does not interfere with any disk drive operations.

The secret of *21 Second Backup* lies inside each and every 1541 disk drive. Among other things, every

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1541 is equipped with a pair of 6522 Versatile Interface Adapter large scale integrated circuits (VIA chips). The VIA is a specialized chip designed to handle serial and parallel communications among the various components of a microcomputer. Each VIA has two complete bidirectional eight-bit data ports. Of these four eight-bit ports, the 1541 only utilizes three. In fact, the fourth port is not even connected to anything inside the disk drive.

If you haven't guessed it by now, the 40 pin DIP sockets on *21 Second Backup's* cables hook up to the unused port inside the 1541. To accomplish this you will have to open up your disk drive and pry out the appropriate VIA chip from its socket (remember there are two VIAs in every drive). The 40 pin DIP socket is then pushed into the one on the 1541's circuit board and the VIA chip is reinstalled into the 40 pin DIP socket. The installation actually extends the 1541's VIA socket while permitting access to the unused parallel port.

The computer end of the cable goes directly to the C-64's user port. This port is internally connected to a 6526 Complex Interface Adapter (CIA chip) which is actually a big brother to the 6522 VIAs in the disk drive. If you have been following along until this point you will not be surprised to learn that the C-64's user port sports an eight-bit bidirectional data port originating from the built-in CIA.

The result is a fully wired eight-bit parallel bidirectional channel between the C-64 and one or two 1541 disk drives. In fact, since the VIA and CIA are tied directly to the microprocessor's data bus, this channel is as fast as the 6502 in the 1541 and the 6510 in the C-64 can be programmed to read and write data. This is very fast indeed.

What It Can Do

21 Second Backup provides three high speed full disk copy utilities on its accompanying disk. The first utility is the basic copier which will duplicate unprotected disks as well as most basic copy protection schemes.

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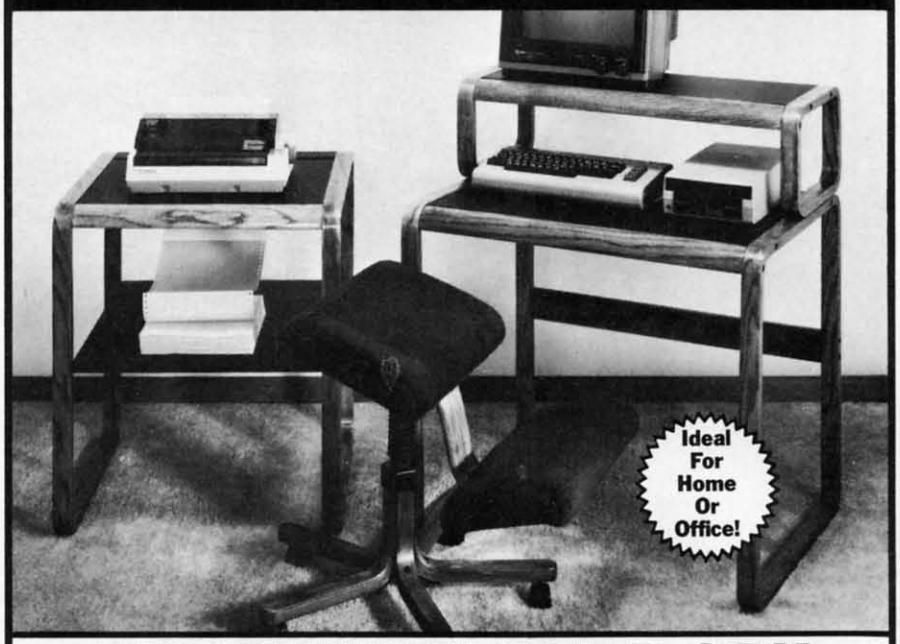

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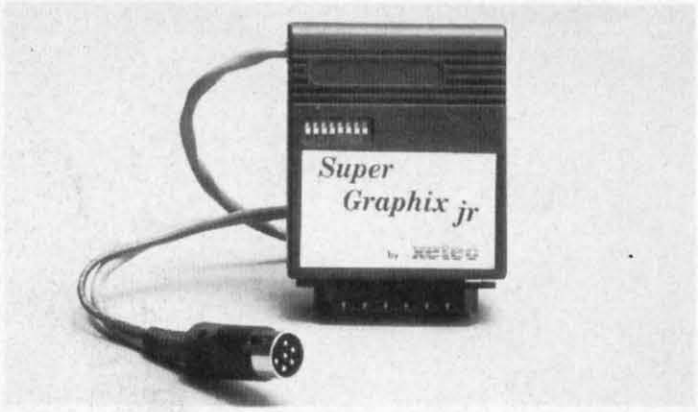

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As mentioned above, this can be done in as little as 18 seconds, with verify off, using two disk drives. If you are using only one disk drive, most of your time will be spent on the five pairs of disk swaps required to copy a disk. The actual single drive disk time is less than 35 seconds.

If the verify option is turned on, the two drive copy time increases to 30 seconds. We are not certain just what is verified by the latter option. We found the program would copy a disk to a second drive without a disk in it and nary a peep that anything was amiss.

The second utility is a "super" copier which handles the newer synchronization copy protection schemes. This copier analyzes the entire disk, out to track 40, to determine the type of protection before doing the actual copying. The third utility is similar to the second with the inclusion of half-tracking. All the copiers function automatically with no user-settable parameters other than the selection of the copier and the verify toggle.

The addition of the external parallel channel between the 1541 and the C-64 should give *21 Second Backup* the ability to copy more forms of copy protection than any purely software driven nibble copier. Interestingly enough, the *21 Second Backup* program disk is copy protected and it will not copy itself! Not unexpectedly, there are several forms of copy protection on the market which are resistant to any and all 1541 copy schemes due to the built-in limitations of the disk drive's hardware.

As with other nibble copiers, *21 Second Backup* relies on parameter files to handle these uncopyable schemes. The parameter list provided with Version 4.1 of *21 Second Backup* contained only a single entry for Accolade Software. Interestingly enough, it did not work on the copy of *Fight Night* upon which we tried it.

VG Data Shack justifies the limitations on what *21 Second Backup* will copy by saying that "(allowing the program to copy everything) would quickly accelerate the advance of copy protection." We feel that this

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statement makes as much sense as putting copy protection on a copy program.

Installation Notes

We remind you that installing *21 Second Backup* does require you to open up the 1541 disk drive and pry out a 40 pin chip. If you are using an SX-64 you will have to open up the computer itself. Access to the disk drive VIA chip on the SX-64 is far more difficult than on the 1541 disk drive. *21 Second Backup* also expects both disk drives to be device number eight. This may be cumbersome to 1541 users who have modified their second drive as a permanent device nine by cutting the printed circuit trace.

The connections to the paper thin printed circuit boards on which the 40 pin DIP sockets are mounted are fragile. The spacing between socket pins is only 1/10 of an inch. Perform the installation carefully while paying particular attention to pin alignment. The 40 pin DIP sockets use open frame construction. When removing the VIA chips, take care to avoid damaging the disk drive's printed circuit traces which run under the socket.

The VIA chip can be damaged by static electricity discharging from your body. We haven't the space to expand on the ways of controlling static electricity. Note that hot and muggy summer days, without air conditioning, will reduce static buildup. In any case, avoid direct contact with the VIA's pins.

The connection to the disk drives never gets in the way of any 1541 operations, since the disk drive VIA port used by *21 Second Backup* does not really exist as far as the 1541 DOS is concerned. The connection to the computer's user port will have to be removed to permit the use of accessories such as modems.

Once *21 Second Backup* is started up the disk drive motor spins continuously. The drive cannot be turned off, as this would wipe out the custom code which is downloaded to the disk drive's RAM. We have some reservations with regard to the ability of the disk drive's motor or its power supply to continuously operate in this fashion for long periods of time. We would appreciate hearing from anyone with experience in this matter.

The latest version of the 1541 disk drive is not fully compatible with *21 Second Backup.* It cannot be used to load the program; however, it may be used as the destination drive in a two-drive setup. The new drive may be recognized by the brief spin of the disk which is performed immediately after insertion.

Conclusions

21 Second Backup is definitely the fastest dual drive copy program available for any disk drive. In view of the built-in limitations of the 300 RPM speed, we do not expect to see anything faster. The copiers worked reliably and consistently. However, the built-in verify routines seem to need some work. The package is well worth considering by anyone who frequently needs to duplicate entire disks.

VG Data Shack, 5625 Grand Allee Blvd., Loc (5), Brossard, Quebec, Canada J4Z 3G3 (phone: 514-445-9663). *—Morton Kevelson*

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The C-64 version of *IntraCourse*

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is supplied on four disks. This indicates the amount of text the programs have to choose from as they question, analyze, and compare you. *IntraCourse* is totally menu-driven and offers five primary options.

First, you'll want to create your sexual profile by answering 50 to 100 multiple choice questions. Depending on your answers to specific questions, the program may branch to other questions that explore the detail of your previous answers. Answers that might be characterized as traditional will result in the shortest series of questions.

Questions are shown two at a time with answers picked by the arrow keys. For each pair of questions, you must confirm that your answers are correct. You cannot review or revise your answers any time after that without redoing the whole profile—a 15 to 30 minute process.

Using the multiple choice format has inherent limitations. When you're asked if you do...never, occasionally, often, or always, the format works. When you must choose which of a series of descriptive words or sentences best fits you, there may be no answer you like (or no answer you don't like), yet you must choose one. Do you, for instance, think sex is based on challenge, conquest, love, intimacy, or lust? Pick one. Do not qualify or amplify your answer. Are you satisfied with that answer?

The second option in *IntraCourse* is to analyze your sexual profile. With Epyx's *Fast Load* or another disk speedup program, this analysis will take only a minute or so before it begins to appear on the screen or printer. A full analysis runs from 3 to 15 pages and covers sexual style, sexual personality, special sexual behaviors, and sexual dysfunction. At the end of each section, you'll be referred to published references where you can read more. Citations for over four dozen of these references are listed in the *IntraCourse* manual.

With only 50 to 100 of your answers to draw on, the *IntraCourse* analysis may occasionally surprise you. Based on as few as one or two of your responses on certain topics, the analysis will apply a label to your behavior and then tell you what that label implies clinically. While entering various "personalities," I was surprised that one behavior which I said occurred "rarely" was listed in my analysis as a major dysfunction. According to the program, that particular dysfunction, if it occurs at all, must occur more than 50 percent of the time. I haven't figured out why "rarely" was offered as an answer.

IntraCourse's third option lets you compare your sexual profile to published statistics. Fourteen of your specific answers are compared to national statistics and a bar chart is shown onscreen. You'll see what proportion of people do...never, occasionally, often, or always, and which group you fit into.

Fourth, you can compare your sexual profile with someone else's for compatibility. You'll see twelve bar graphs showing where you fall in ranges like dominant/submissive, comfort/discomfort, and intimate/distant. Then you'll see a compatibility analysis for you and the chosen "other."

This analysis uses the paired terms, but never really describes or defines them. In about two pages, it will focus on the different styles, preferences, and biases of the two people, and make general suggestions on how best to adapt. If you like crowds, and your "other" is more solitary, it may suggest that you each cultivate nonsexual relationships with friends more like you. Although a print option is offered for the compatibility profile, I could never get it to print.

Just for fun, I asked for a compatibility profile on two of my hypothetical characters—Mr. Macho and Mr. Milktoast. Both are avowed and dedicated heterosexual males. On a score of 0 (incompatible) to 100 (highly compatible), I expected them to get about a 3. When this unlikely pair scored over 70 percent compatibility I nearly slid out of my chair.

The fifth major option on the *IntraCourse* main menu is to access a sex dictionary. It is supposed to define scientific and popular terms you may encounter in the program. I could never get the dictionary option to work. I would either be returned to the main menu or, if I tried to get to the dictionary from the analysis module, the program would crash.

I started by saying you could perceive *IntraCourse* as educational, therapeutic, or recreational. As an educational program, it will almost certainly teach you a few new terms (though perhaps for old activities). And it will tell you how you compare statistically. Are you in the 7 percent group or the 93 percent group? It may be important to know.

As a therapeutic device, it's not. Right there, at the bottom of page 13 in the manual, it says (and I paraphrase): What we've told you is for information and entertainment, it's not necessarily accurate, and you should see a professional if you want a professional diagnosis. There's something about computers, though. They're credible. We look at computer printouts and we don't question them. *IntraCourse* analyses cannot be read that seriously.

If you're a psychological hypochrondriac, you'll find out that you may be things you didn't even know existed. *IntraCourse* encourages you to be honest and open; it even provides password security. You may tell your C-64 things you'd only tell your dog otherwise—and only when he's asleep.

As an entertainment program, *IntraCourse* has real potential. If you'd like to sit down with a group of friends and let the computer suggest who "really" ought to be paired up with whom, you could have some fun. Or spend an evening by yourself trying on personalities and seeing which ones are the most interesting.

IntraCorp, Inc., 13500 SW 88th Street, Suite 185, Miami, FL 33186 (phone: 1-800-INTRACO or 305-382-6567). ***—Richard Herring***

All the programs in this issue of *Ahoy!* are available on disk. See page 54 for details.

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ATTACK FORCE

For the C-64

By Mike Hoyt

In the distant future, the earth has been captured by aliens who need to mine it for precious minerals their civilization depends on for survival. They do not care for the welfare of the humans, whom they treat as beasts.

A few humans escaped and mounted an attack on the alien bases. But the aliens were prepared for an offensive, having surrounded themselves with heavily armored fortresses. And so earth's only hope of liberation was lost.

But hope was revived when your fleet of Omega fighters arrived to exterminate these evil aliens. You must penetrate nine fortresses and destroy all the alien command bases, using your four Omega fighters. If you succeed, the earth will be free again. However, if you fail....

HOW TO PLAY

Enter the program listing on page 106 and save it to tape or disk. Type RUN press RETURN. In a few moments you will be presented with a screen allowing you to select the difficulty level using the f1 key. The difficulty level determines which fortress you start at. Press the f3 key when you are ready to begin.

At the front of each fortress you will be told how many bases you have left to destroy before you can advance to the next fortress. After the warning alarm stops, you begin your raid.

You have complete control over your ship's motion. Using a joystick in Port 2, you can move the Omega fighter in eight directions, as well as fire your twin lasers by pressing the joystick trigger.

There are many obstacles in your way. These include electro-barriers, walls, bombs, and the aliens' defense saucers. You must maneuver around the walls and the electro-barriers, but you can destroy the saucers with your lasers. The bombs pose yet another problem. You cannot see them, but you can hear a whistle as they fly toward you. The scanner at the lower right of your screen shows about where the next bomb will land (a red dot).

The bases, which are towers, can be easily destroyed with a single blast from your lasers. When you destroy enough bases, you will receive a bonus for the amount of fuel you have left (if the fuel runs out, your ship crashes). Then you will proceed to the next fortress with a full tank. □ *SEE PROGRAM LISTING ON PAGE 106*

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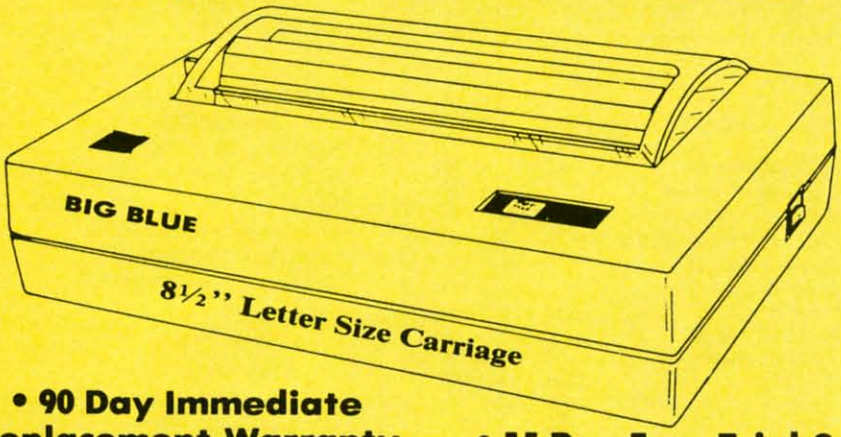

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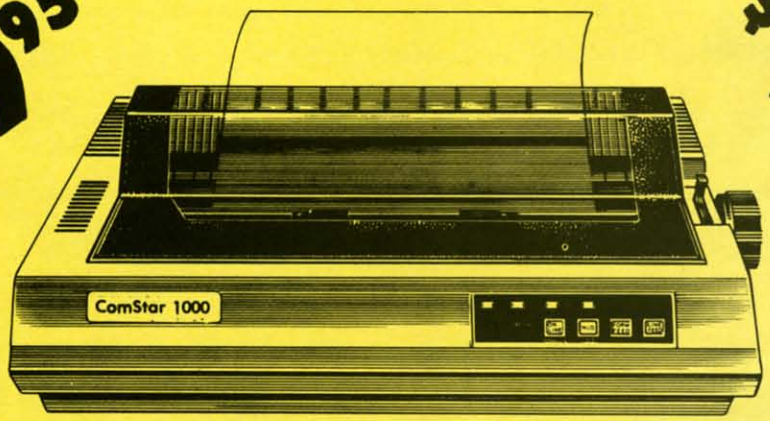

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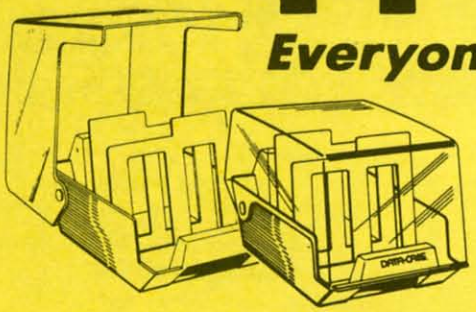

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