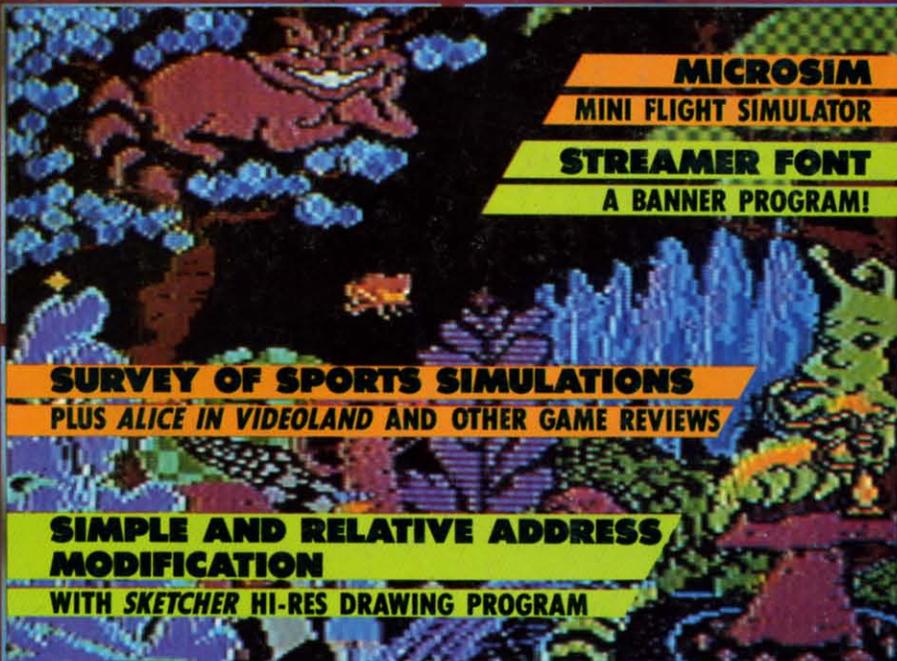


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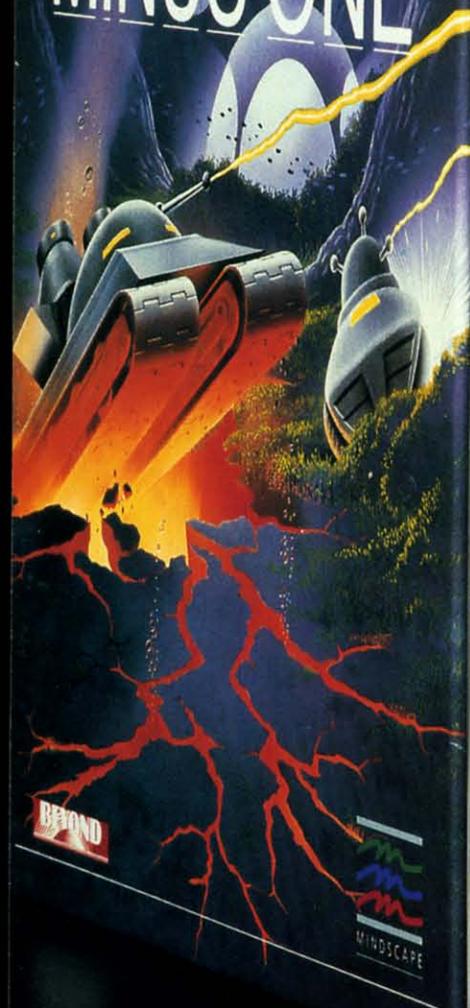
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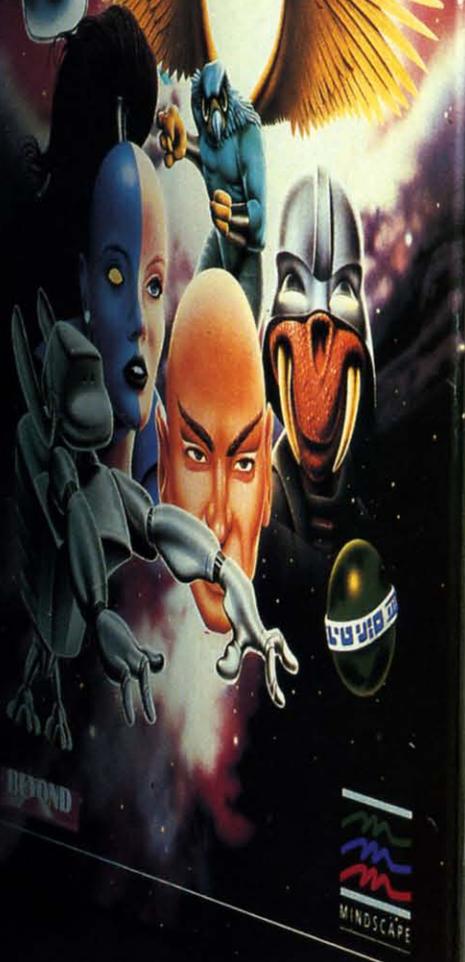


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Ahoy!

DEPARTMENTS

A View from the Bridge... <i>of the January issue of Ahoy!</i>	7
Scuttlebutt... <i>what's coming your Commodore's way in '86.</i>	8
Errata... <i>corrections to Rhythmic Bits, Lightning Loader.</i>	45
Art Gallery... <i>move over, Michelangelo and da Vinci!</i>	76
Reviews... <i>the latest C-64 and C-128 software and hardware.</i>	78
Commodares... <i>programmed to puzzle and perplex you.</i>	100
Tips Ahoy! <i>...move over, Rupert and Card!</i>	106
Program Listings... <i>take your pick and punch them in!</i>	113

FEATURES

The Magical Link <i>by Dale Rupert*</i>	20
Speech Synthesizers, Part II <i>by Morton Kevelson</i>	32
Ahoy! Babblers/Talking Clock <i>by Isaac Michalowski**</i>	38
Entertainment Software: Calling Computer Coaches	47
Programs That Write Themselves <i>by Mark Andrews***</i>	92
Cadet's Column: Printer Basics <i>by Cheryl Peterson</i>	95

*Includes programs: RS-232 Receiver, ASCII Transmitter, Sequential Transmitter, Sequential Receiver (for the VIC and 64)

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PROGRAMS

Streamer Font <i>for the C-64 by Bob Spirko</i>	28
BASIC Relocator <i>for the C-64 by James E. Hosek</i>	30
Memory Check <i>for the C-64 by Buck Childress</i>	46
The Haunted Castle <i>for the C-64 by Derrick Brundage</i>	60
Knockout <i>for the C-64 by Tony Brantner</i>	70
The Martian Monsters <i>for the C-64 by James C. Hilty</i>	72
Microsim <i>for the C-64 by Tim Gerchmez</i>	89
Scratch Pad <i>for the C-64 by Don Schmidt</i>	91
Alarm Clock <i>for the C-64 by Tony St. Clair</i>	99
Infraraid <i>for the C-64 by Timothy VanDeventer</i>	110
Bug Repellents <i>for the VIC & 64 by Kleinert and Barron</i>	116
Flankspeed <i>for the C-64 by Gordon F. Wheat</i>	116

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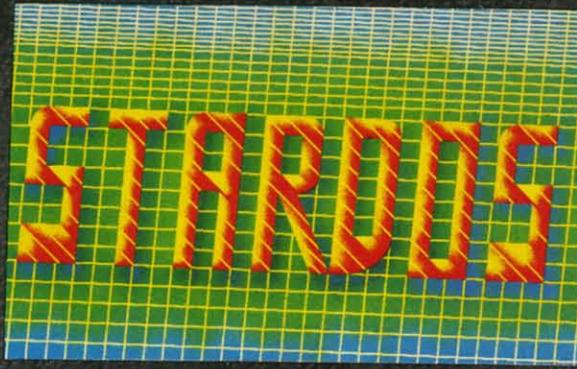


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VIEW FROM THE BRIDGE

What could we do, we wondered, to commemorate our second anniversary? We do our best to delight the serious Commodore user every month of the year anyway—and you can't do better than your best! But, we finally reasoned, we can do more of it! And so, though this issue includes significantly less advertising than our last few, we've maintained the same 148 page count (144 if you're picky and don't count covers). That means more editorial pages—including (depending, again, on how you count) 13 complete programs!

As for feature articles, we've our usual abundance of them as well—with the exception of *Creating Your Own Games on the Commodore 64*. Was Orson Scott Card simply unable to meet this month's deadline after three straight weeks of 16-hour days programming last month's *Gypsy Starship*—or did a band of roving gypsies take exception to his depiction of their race? You'll have to see if his column returns next month to find out.

- Morton Kevelson's survey of *Speech Synthesizers for the Commodore Computers* concludes this month with a look at (or is that a listen to?) *VIC-Talker*, *Hearsay 64*, and *LISNER 1000*. (Turn to page 32.) Coincidentally, while Morton prepared his two-part review, the perfect companion piece walked in our door—a speech synthesizer construction project. Morton worked with creator Isacc Michalowski to bring the *Ahoy! Babblers/Talking Clock* to fruition. (Turn to page 38.)

- This month's *Rupert Report* continues to explore *The Magical Link* through which computers can talk to each other—the RS232 serial port. By the time Dale Rupert is done, the C-64's in your room may keep you awake nights with their gabbing. (Turn to page 20.)

- As our cover announces, *Streamer Font* is a banner program. Literally! Bob Spirko's latest lets you generate *Print Shop*-like banners of unlimited length. (Turn to page 28.)

- In addition to surveying the field of team sports simulations for the 64 in this month's *Entertainment Software Section*, Arnie Katz and company provide full-length reviews of *Karate Champ*, *Alice in Videoland*, *Star Rank Boxing*, *Hacker*, and *The Island Caper*. (Turn to page 47.)

- *Microsim* lacks the cockpit window view of full-blown flight simulators, but includes a respectably complete instrument panel. (Turn to page 89.)

- Remember *Alice in Adventureland*, published last January? So do strategy game lovers around the country, who've clamored ever since for another game of like quality! Problem is, we didn't have one...until Derrick Brundage wrote *The Haunted Castle*, featured in this issue. (Turn to page 60.) And because the average arcade action game would look 'sick sharing an issue with Derrick's sparkler, we've included *The Martian Monsters*. (Turn to page 72.) Finally, to insure that the games in this issue knock you out, we've

included—*Knockout!*

- This month's programming utilities are too numerous to describe, but their names should be enough to get you typing: *BASIC Relocator*, *Scratch Pad*, *Alarm Clock*, *Memory Check*, and *Infraraid*. The documentation for the last-named program is in itself a complete article on identifying and trapping bugs in your programs.

Nor do we have room to describe what Mark Andrews and Cheryl Peterson have in store for you this month (in *Commodore Roots* and *Cadet's Column*, respectively). Or about the many products featured in this issue's *Reviews* section. But we're sure you can find your way.

If you haven't yet subscribed to *Ahoy!*, perhaps the offer in this issue will provide you with the needed incentive. For no more than the price of a year's subscription, you can now receive 12 issues of *Ahoy!* and a free PlayNET membership kit—A \$19.95 value! Some conditions apply. See page 81 for details.

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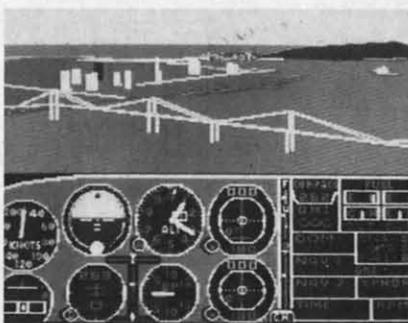
CSM Software, Inc., P.O. Box 563, Crown Point, IN 46307 (phone: 219-663-4335).

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The first person to solve the mystery of *The Dolphin's Rune*, newly translated to the C-64 by Mindscape, will receive a one-week, expense-paid trip for two to Hawaii or the Turks and Caicos Islands in the West Indies. The game requires the player-dolphin to survive sharks and fishing nets and learn to swim through the game's "color currents." As his skills improve, the ocean fills with dolphin sounds that can lead him to seabeds containing fragments of an epic poem composed in a runic alphabet. Nine successive trips yield nine stanzas, which must be deciphered to reveal clues to a secret location somewhere on earth. This location provides a tenth stanza and the name of the location. The winning entrant will submit the nine deciphered stanzas, plus the tenth stanza and the name of the secret lo-



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cation. More detailed rules are packaged with the program, which is priced at \$29.95.

Also new from Mindscape are the following American releases of three graphic adventures for the C-64, priced at \$29.95 each:

Quake Minus One gives you 10 hours to destroy four members of the Robot Liberation Front who have sabotaged an undersea power station. Fail, and the renegade robots will trigger an earthquake that will paralyze the Western world.

Shadowfire beams six superhero types aboard an alien spacecraft to rescue a kidnapped ambassador. A Game Changer disk available by mail

for \$9.95 allows players to change scenarios.

Lords of Midnight, an adventure without text entry, requires players to traverse the Land of Midnight in search of Doomark the Witchking. More than 32,000 different landscapes can appear during the course of play.

Mindscape Inc., 3444 Dundee Road, Northbrook, IL 60062 (phone: 312-480-7667).

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SubLOGIC Corporation, 713 Edgebrook Drive, Champaign, IL 61820 (phone: 217-359-8482; for orders 800-637-4983 except IL, AK, HI).

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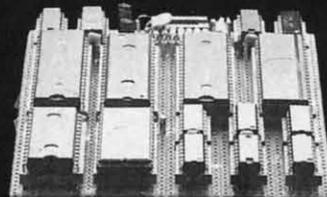
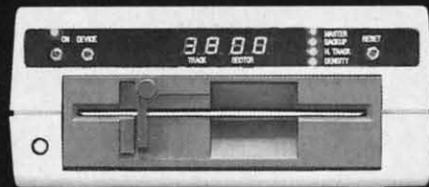
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Strategic Simulations Inc., 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043-1983 (phone: 415-964-1353).

Activision adventure games *Hacker* (see review this issue) and *Mindshadow* will be released in versions tailored for the Amiga. And due from Activision for the 64: a game adaptation of *The Rocky Horror Show*.

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

Spinnaker's UXB subsidiary will distribute British best seller *Kung Fu: The Way of the Exploding Fist* on this side of the Atlantic. The C-64 game for one or two players includes over 15 different karate moves, Oriental background music, and realistic sound effects. Price is \$29.95.

UXB, division of Spinnaker Software Corp., 1 Kendall Square, Cambridge, MA 02139 (phone: 617-494-1200).

The new Artworx Program Exchange, or PX, line of software consists of 11 programs for the C-64, ranging from arcade games to mystery thrillers to family adventures. Price is \$9.95 each.

Artworx Software Company, Inc., 150 North Main Street, Fairport, NY 14450 (phone: 800-828-6573 or 716-425-2833).

A simulation of a robotics manufacturing business over 72 operating months, *American Dream* (\$119.95) puts you in the pinstripes of the CEO, with the goal of increasing market share and profitability. Seven department heads report to you on sales, manufacturing, engineering, production, R&D, materials management, quality assurance, and finance. Gen-

eral industry trend data is also made available in graphic form. Your decisions will be affected by GNP, inflation, interest rates, competitors' prices, industry demand, labor rates, materials prices, and lead times.

Blue Chip Software, 6740 Eton Avenue, Canoga Park, CA 91303 (phone: 818-346-0730).

BOOK RELEASES

If you find 30 days too long to wait between installments of *Commodore Roots*, you can now learn assembly language from Mark Andrews at your own rate. *Commodore 64/128 Assembly Language* (\$14.95), just released by Howard W. Sams & Co., is targeted for the reader with high interest but little experience in using the 6502's native tongue. In addition to beginner-level concepts, the volume provides a collection of assembly routines, plus intermediate material covering sprites and other graphics. Followers of *Commodore Roots* will find much of the book's content familiar: designing a character set, writing joystick-controlled action games, drawing hi-res graphics, intermixing BASIC with machine code, and more.



Something of a computer industry guru himself after publishing 13 books, Mark has spent much of the past two years researching his next volume—about gurus. So if you see a mantra-generating routine in a future edition of *Roots*, you'll understand why.

Also new from Sams is *The Official Book for the Commodore 128 Personal Computer* (\$12.95), which explains how to access hundreds of

CP/M business programs, how to use the 128 as a 64 with existing software and peripherals, and the machine's enhanced abilities.

Howard W. Sams & Co., Inc., 4300 W. 62nd Street, Indianapolis, IN 46268 (phone: 317-298-5400).

An updated version of *Assembly Language for Kids* (see review in April '85 *Ahoy!*), with all the book's programs reconfigured for programming in C-128 mode using the machine's built-in assembler, has been released by Microcomscribe. Also included are a C-128 memory map, new BASIC 7.0 tokens, C-128 sprite assembler with new addresses for sprite storage, information on switching memory banks, and instructions on using the monitor and mini-assembler. Despite the 29 additional pages, the book's price remains \$14.95.

Microcomscribe, 8982 Stimon Ct., San Diego, CA 92129 (phone: 619-484-3884 or 578-4588).

Available in a new edition with over 200 additional pages and much of its previous content updated, *The Complete Handbook of Personal Computer Communications* (\$14.95) tells users what to look for in a modem and communications program,

Ahoy! columnist Mark Andrews authored one of Howard W. Sams' two new books on the C-128, covering assembly programming. READER SERVICE NO. 270

how to utilize electronic mail and teleconferencing, what to consider when evaluating electronic banking systems, how to sell stocks, commodities, and securities online, and more.

St. Martin's Press, 175 Fifth Avenue, New York, NY 10010 (phone: 212-674-5151).

WEST COAST SHOW

The Commodore Show II, a trade exhibition featuring the latest hard-

ware and software for Commodore machines from the C-64 to the Amiga, will be held on Saturday, February 8 and Sunday, February 9 from 10 a.m. to 6 p.m. at the Cathedral Hill Hotel in San Francisco. Experts will speak on graphics, telecommunications, business applications, and other subjects. Last year's show drew 5200 attendees, many of whom stopped in at the *Ahoy!* booth. If you attend this year, we hope you'll do likewise.

For information on booth space or advance ticket sales, contact the West Coast Commodore Association, P.O. Box 210638, San Francisco, CA 94121 (phone: 415-982-1040).

MICROLINE NLQ

It's taken them only a couple of years longer than the rest of us, but printer manufacturers have finally realized that near letter quality printing is a highly desirable feature in a dot matrix printer. In next issue's *Reviews* section you'll read about a hardware enhancement for making the near letter quality printing of the Star SG-10/15 even nearer. And now a \$24.95 PROM kit available from Okidata will endow the Microline 182 printer with near letter quality printing capability. Included is a PROM chip, installation instructions, and user's manual addendum.

Also new from Okidata is the \$229 Cut Sheet Feeder 900 for the Microline 192 and wide-carriage 193 printers, capable of accepting up to 170 sheets through the input hopper.

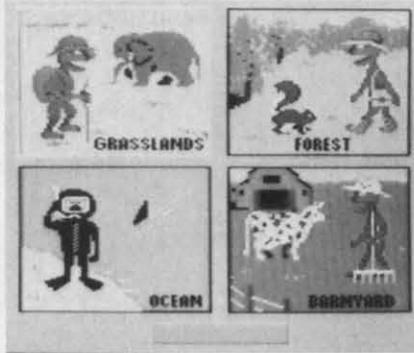
Okidata, 532 Fellowship Road, Mt. Laurel, NJ 08054 (phone: 609-235-2600).

EDUCATIONAL PROGRAMS

Two for the 64 from Sunburst Communications:

Trading Post (\$59.00) encourages elementary and junior high school students to think ahead as they barter general store items with the object of matching the selection randomly chosen by the computer. Advanced levels require students to match up to eight objects, with increasingly complex trading rules.

Hide 'N Sequence (\$69.00) challenges students to reconstruct scram-



Grover's Adventures: name animals.
READER SERVICE NO. 271

bled literary passages that demonstrate four types of writing (narration, exposition, description, and persuasion) and then use what they've learned about organization and sequence to create their own stories.

Sunburst Communications, 39 Washington Ave., Pleasantville, NY 10570 (phone: 800-431-1934 or 914-769-5030).

Two new C-64 releases from DLM: *Create with GARFIELD!* (\$29.95) lets cat lovers design and print their own cartoons by choosing characters,



Pals Around Town: create stories.
READER SERVICE NO. 272

setting scenes with backgrounds and props, and combining prewritten captions or creating their own. The software includes suggestions for creating name tags, place cards, invitations, notices, and signs.

The Writing Adventure (\$59.95) lets students write, edit, and print their own stories. Included are color graphics, suggested storylines, and prompting questions that aid in developing ideas.

DLM Inc., One DLM Park, Allen, TX 75002 (phone: 214-248-6300).

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This product is provided for the purpose of enabling you to make archival copies only.

Reader Service No. 201

Why squint into a telescope on some freezing rooftop? *CometWatch* provides three programs for calculating and plotting the orbit of Halley's comet on-screen. The C-64 astronomer can also calculate the comet's position in the sky for any date, time, latitude, and longitude during its 1985/86 return. Also included is information on the physics of comets and how to observe and photograph them.

Zephyr Services, 306 S. Homewood Ave., Pittsburgh, PA 15208.

Three C-64 releases from Free Spirit Software, Inc.:

Technique! (\$12.95) instructs the user in graphics, animation, sound, and music programming. A machine language music program, 12 songs, and an arcade game are included.

BASICally Simple (\$20.00) explains C-64 BASIC commands and operators in simple terms. Once the user has mastered BASIC, the disk serves as a reference guide.

Italy (\$15.00) teaches common Italian phrases through a text game.

Free Spirit Software, Inc., 5836 S.



**Direct Ernie's Rubber Duckie to him.
READER SERVICE NO. 273**

Mozart, Chicago, IL 60629 (phone: 312-476-3640).

CBS Software has trimmed its product line to 45 titles and cut prices on the following C-64 programs:

Reduced to \$14.95: *Astro-Grover*, *Sesame Street Letter-Go-Round*, *Big Bird's Funhouse*, *Mister Rogers' Many Ways to Say I Love You*, *Dr. Seuss Fix-up the Mix-up Puzzler*, *Webster: The Word Game*.

Reduced to \$19.95: *Richard Scarry's Best Electronic Word Book Ever!*.

Reduced to \$24.95: *Murder by the Dozen*, *Felony!*, *Adventure Master*.

Released at \$14.95 each are the following C-64 games developed by the Children's Television Workshop for tykes aged four to six:

Sesame Street Pals Around Town introduces children to the physical and social characteristics comprising a community as they explore a classroom, a schoolyard, a downtown street, Bert and Ernie's apartment, and Sesame Street. In each location, children create their own scenes and stories with music and graphics.

Grover's Animal Adventures teaches children to identify animals, presented by the program in four environments: the African grasslands, the Atlantic Ocean, a North American forest, and a barnyard. Children learn to associate animals and objects with their printed names and create their own nature scenes.

Ernie's Big Splash requires children to help a bathing Ernie procure his Rubber Duckie by building a pathway from soap dish to tub. An open fire hydrant, a water slide, and a friendly alligator are among the building pieces used in directing Duckie.

CBS Software, One Fawcett Place, Greenwich, CT 06836 (phone: 203-622-2500).

Smoky Mountain Software informs us that a number of bugs have been discovered in their *Grade Manager III* program. Owners desiring the correct version should return their disks, enclosing \$2.00 per disk to cover duplicating and shipping costs. (In other words, the user pays to ship the disk to the manufacturer, and then from the manufacturer back to him, plus the manufacturer's labor costs, to correct a mistake that is the manufacturer's fault. We'd like to see General Motors try to get away with that one.)

Smoky Mountain Software, P.O. Box 1710, Brevard, NC 28712.

ROLL OVER ESPERANTO

THE Word Processor, compatible with CP/M-80 operating systems, is now available in Latin-based languages, enabling C-128 users to mix English, French, German, Italian, Spanish, Swedish, Danish, Norwegian, Dutch, and Portuguese in the same text. You may never need to, but at

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Palantir Software, 12777 Jones Road, Suite 100, Houston, TX 77070 (phone: 800-368-3797 or 713-955-8880).

PRICE CORRECTION

The price of Powerline Software's *Energy Manager* was incorrectly listed in October's *Scuttlebutt*. The correct price is \$59.95.

Powerline Software, P.O. Box 635, New Hartford, NY 13413 (phone: 315-735-0836).

PORTFOLIO MANAGER

Designed to be comprehensive yet easy to use, *Personal Portfolio Manager* (\$39.95) allows C-64 owners to organize and manage their stocks and bonds. Capabilities include recording taxable or non-taxable dividends or interest income, reconciling each brokerage account cash balance with YTD transactions, producing reports for analysis to the user's specifications via a report generator, and entering quotes manually or automatically through DJNRS or Warner. The disk can run on one or two 1541's or 1571's; a printer is recommended.

Abacus Software, 2201 Kalamazoo S.E., P.O. Box 7211, Grand Rapids, MI 49510 (phone: 616-241-5510).

ROBOTIC PROGRAMMING

C-64 and C-128 owners can learn robotic programming while constructing machine prototypes ranging from a computer plotter to dual axis robot arms with the Parsec Research Robotic Programming Kit. The 240-piece hardware set comes complete with interface and all necessary attachments, including motors, gears, lamps, sensors, switches, and electromagnetic; components are designed to allow devices to repeat operations with $\pm 1\text{mm}$ tolerance.

The software is derived from Parsec's *Superforth* (see review in this issue), a language which meets industrial standards: everything users learn is transferrable to computer control systems such as laboratories and automated assembly lines.

Ten instruction models are included in the manual, but the possible

configurations are limitless.

Parsec Research, 41805 Albrae Street, Fremont, CA 94538 (phone: 800-633-6335; in CA 415-651-3160).

SPIKE BLOK

The Spike Blok plugs into an existing twin outlet receptacle and converts it into six outlets with full noise and spike suppression. Two indicator lights show that power is present and that protection circuitry is working.

Tripp Lite, Chicago, IL 60610 (phone: 312-329-1777).

TELECOM NEWS

CompuServe has announced the availability of 2400 baud dial-up access in numerous cities across the United States. Rate for 2400 baud access is \$19.00 per hour during standard hours and \$22.50 during prime service hours.

CompuServe, 5000 Arlington Centre Blvd., P.O. Box 20212, Columbus, OH 43220 (phone: 614-457-8600).

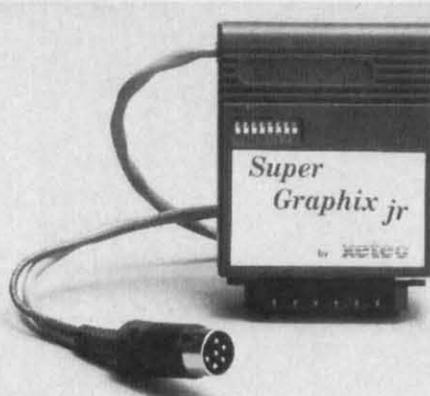
Huttonline, which enables E.F. Hutton clients to access the firm's compu-



Spike Blok suppresses noise, spikes.
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ters for personal account data and investment information, has expanded its services and restructured its fees. Now available are: Moody's Investor's Service (financial information on the 3600 largest public corporations in the US), Expanded Market Watch (monitor quotes on 20 issues, follow up to 800 issues automatically), Market Flash (snapshot of activity on the eight major

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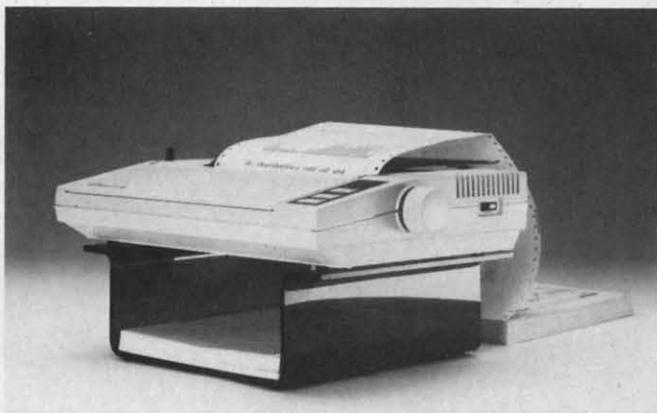
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Phone (412) 233-4659

Reader Service No. 123



Orange Micro's 80-Column Printer Stand stores paper supply under the printer. Rubber feet add stability.
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indexes), and Rates & Trends (currency exchange rates, metal prices, economic indicator announcements, yields for government securities, and more).

New rates are 25 cents per minute from 8 a.m. to 6 p.m. weekdays and 10 cents per minute at other times.

E.F. Hutton & Company Inc., One Battery Park Plaza, New York, NY 10004 (phone: 212-742-3317).

The QuantumLink Personal Computer Network and Fort Worth-based

Startext have joined the list of online information services offering the electronic edition of the Academic American Encyclopedia. For information on QuantumLink call 703-448-8700; on Startext call 817-390-7892; and on the encyclopedia contact Grolier Electronic Publishing, Inc., 95 Madison Ave., New York, NY 10016 (phone: 212-696-9750).

PRINTER STANDS

Why dwell on the fact that computers aren't selling anymore? At *Ahoy!* we prefer to accentuate the positive. With two models announced in last month's *Scuttlebutt* and two models described below, the printer stand market is apparently at an all-time high.

Orange Micro's 80 Column Printer Stand (\$29.95), built of smoked plexiglass, is designed to hold most narrow carriage printers plus paper. Rubber feet protect the table surface.

Orange Micro Inc., 1400 N. Lakeview Ave., Anaheim, CA 92807 (phone: 714-779-2772).

The MicroFold Printer Stand comes in sizes for 80 column (\$44.95) and 132 column (\$49.95) printers. The stand will feed and re-

fold printer paper via wire formed trays in an area no wider than the printer.

MicroComputer Accessories, Inc., P.O. Box 3725, Culver City, CA 90231 (phone: 213-641-1800).

PROGRAMS OF CHANCE

If *Lucky Lottery* (July '85 *Ahoy!*) hasn't made you a millionaire yet, Ridge Services offers *Lotto Picker* (\$29.95), a C-64 translation of the

program previously available in TI99/4A and IBM formats. The program will generate a series of random plays for all Lotto-type games, duplicating the process used by lottery commissions, thereby eliminating bias from the selections. North America's most popular lotto games are programmed in, including the new California Lottery and revised New York and Canada games.

Also newly available in C-64 format, *Pro Football Analyst* (\$35.00) promises to enable the user to select NFL and USFL winners against the point spread by spending only five minutes per week analyzing a complete slate of games. Statistical input required can be obtained from any local newspaper.

Ridge Services, 170 Broadway, Suite 201, New York, NY 10038 (phone: 718-833-6335).

HAM RADIO PACKAGE

Two new releases from AC3L Software:

While it will not save files, the *One-Shot* word processor is easy to use and suitable for letters and other simple, one-time-only applications.

Designed as an aid for ham radio enthusiasts, *Band/Ayde* includes the *One-Shot* word processor described above, a scratch pad for taking notes while listening or operating, clock functions (including audio and visual alarms), and pitch, volume, and color selection.

Both available on tape or disk for the C-64; \$14.95 each (PA residents add 6% sales tax). Tape versions will be discontinued January 1. This applies also to AC3L's *International Morse Code Trainer* and *ESP Tester* programs.

AC3L Software, P.O. Box 7, New Derry, PA 15671.

GAME DESIGN CONTEST

A cash award of \$5000 and a trip to Activision's headquarters in California will be awarded to the grand prize winner of Activision's *Game-Maker* Design Contest. A second prize of \$2500 and a third prize of \$1000 will also be awarded.

Contest rules are packaged with



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Reader Service No. 126

Garry Kitchen's GameMaker: The Computer Game Design Kit, which allows C-64 owners to design games without programming knowledge. Contestants must send their work on disk, along with an official entry form, to Activision, whose panel of experts will judge the games on the basis of creativity, originality, game-play, graphics, music, and effects.

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

NET WORTH ENHANCEMENT

Scarborough Systems has upgraded its home financial management program, *Your Personal Net Worth*, to provide clearer report formatting and the ability to change the name of the data disk from the maintenance menu. Users desiring the upgrade can obtain it for \$10.00.

Scarborough Systems, 55 South Broadway, Tarrytown, NY 10591 (phone: 914-332-4545).

\$4.99 SOFTWARE

BCI Software has released the first 12 titles in what is intended to be a comprehensive line of C-64 software available at \$4.99 per disk. These include *Inventory Control*, *Typing Tutor*, *Business Letters* (50 prewritten letters covering a variety of uses), *Word Processor*, *Data Base*, and assorted educational programs. Already available are several programs for \$9.99 each, including *Hydrax*, an adventure game offering a \$1000 prize. Coming is a \$29.95 spreadsheet.

BCI Software, P.O. Box 730, Ringwood, NJ 07456 (phone: 201-835-7300).

FOREIGN LANGUAGE PROGRAMS

Gessler Educational Software, publisher of more than 200 foreign language software titles, has re-released a number of C-64 programs from different manufacturers in French, Spanish, and German versions. Included are Spinnaker's *Kids on Keys*, *Kidwriter*, *Snooper Troops*, and *In Search of the Most Amazing Thing*, and Davidson's *Word Attack*.

Gessler Educational Software, 900

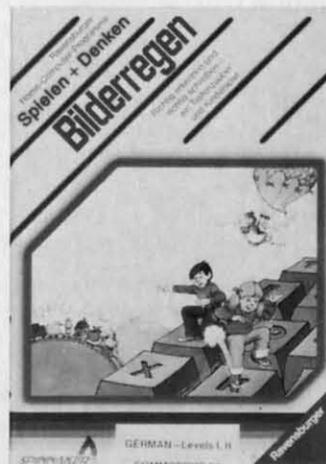
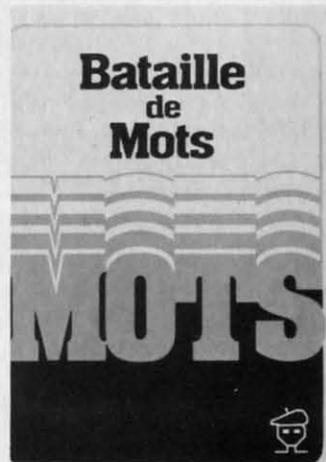
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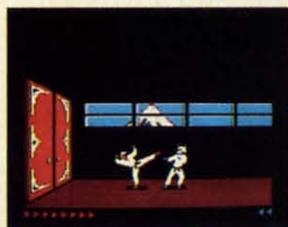
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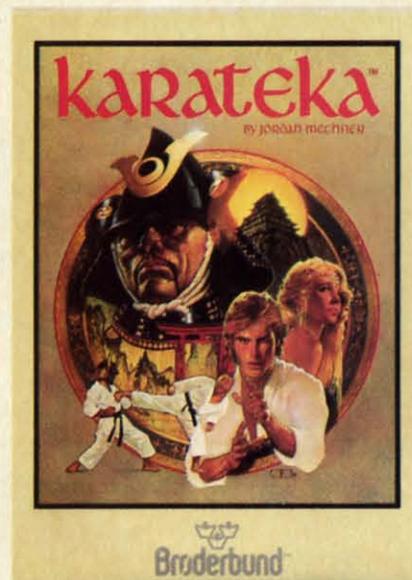


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RUPERT REPORT

THE MAGICAL LINK



JAVIER ROMERO

FILE COMMUNICATION ON THE RS-232 INTERFACE

BY DALE RUPERT

There is something magical about connecting two computers with some strands of wire and watching them share information. Last month we developed hardware and software to pass data in serial form back and forth between Commodore and IBM computers. This month we will create software so that two computers can exchange programs and sequential files over the RS-232 serial link.

All of the programs this month are written for the Commodore computers (VIC 20 and C-64). It should not be difficult to modify these programs for other computers. If you don't have two computers, get together with a friend. If you have no interest in exploring RS-232 communications, keep reading anyway. You may find this month's discussions of the keyboard buffer and sequential file handling useful for other applications as well.

We saw in last month's *Rupert Report* that it takes only three wires and two connectors to join the RS-232 ports of two Commodore computers. The Sout signal (pin M) of each Commodore (C-64 or VIC 20) goes to the Sin signal (pins B and C) of the other Commodore. Also the two grounds (pin N) are tied together.

It is very straightforward to establish an RS-232 communications channel. The channel is given a file number from 1 to 127 by means of an OPEN statement such as this:

```
OPEN 2,2,0,CHR$(8)+CHR$(0)
```

The first 2 is the file number. The next two numbers are always 2 and 0 for RS-232 communications.

The value in the first CHR\$ function specifies the baud rate, which is the speed of transmission. The first CHR\$

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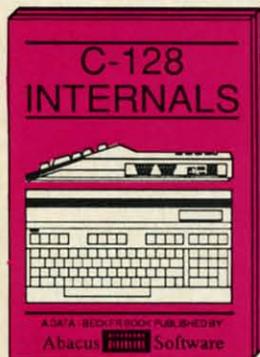
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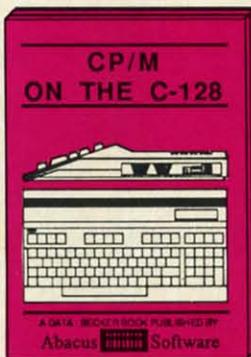
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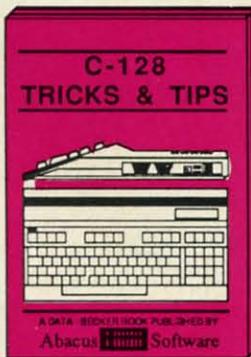
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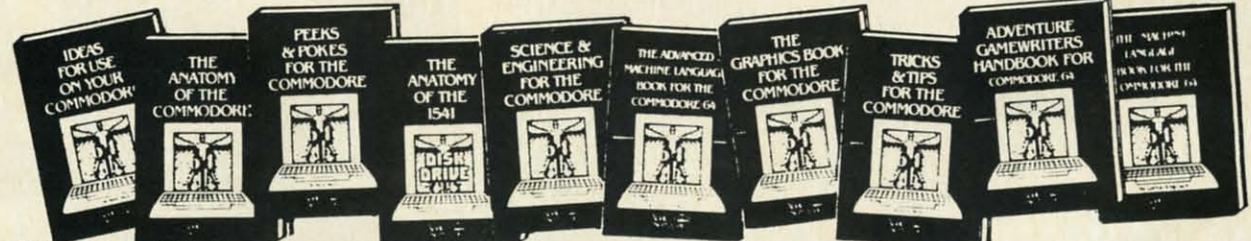


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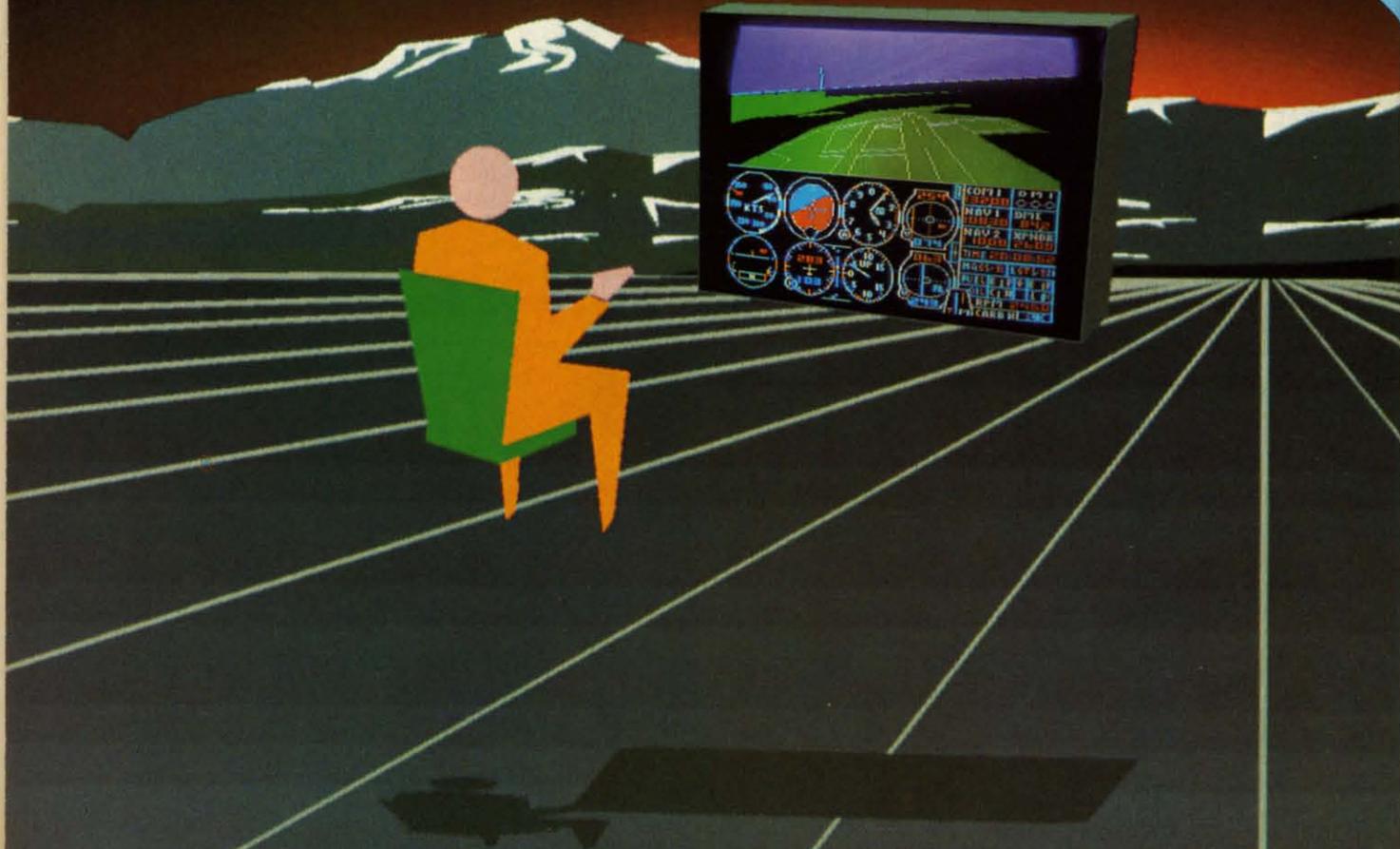
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argument is also used for indicating the number of stop bits and the number of data bits in each transmitted character. The CHR\$(8) means "1 stop bit, 8 data bits, and 1200 bits per second baud rate." Refer to last month's article or the RS-232 Interface Description near the back of the *Programmer's Reference Guide* for the details. If you have trouble using 1200 baud, you might replace the 8 with a 6 in order to communicate at 300 baud. If your programs still don't work at 300 baud, better check the wires and connectors.

The second CHR\$ function in the OPEN statement is optional. It is used for specifying the parity, the duplex mode, and the type of hardware handshaking lines being used. The value 0 gives the same results as simply omitting the CHR\$. The default values implied by CHR\$(0) are "no parity, full duplex, and 3-line handshaking." Parity is a means of performing error-checking on the received data, although it is not implemented in BASIC. Full duplex mode means that the Commodore will both transmit and receive data. The alternative to the 3-line (3-wire) connection that we are using is X-line handshaking, which is not implemented in BASIC.

Once the RS-232 channel has been opened, data is transmitted with the PRINT# or the CMD statements. Received data is read from the input buffer with the GET# statement.

WIRED PROGRAMS

BASIC programs are stored on tape or disk in a tokenized or compressed format. Each of the BASIC keywords is represented with a single byte value. It is possible to read such a program file and transmit it byte by byte to another computer. Unless that other computer is a Commodore, it would not be able to make much sense out of the tokenized program. To make our RS-232 programs more general, we will assume that all files to be transmitted or received are standard ASCII files. For example, a PRINT statement in a BASIC program will be transmitted as five ASCII characters rather than one tokenized code.

It is very easy for the Commodore computers to transmit programs in ASCII format. The CMD and LIST statements work nicely as the *ASCII Transmitter* program on page 119 shows.

If you want to send the BASIC program in memory to another computer over the RS-232 interface, just add the two lines of the *ASCII Transmitter* program and type RUN. You may use these lines in the direct mode also (that is, enter each one without line numbers).

Line 8 opens the RS-232 channel. The CMD statement redirects data which would normally go to the screen out to logical file number 2 instead. That logical file is the RS-232 channel. So now when the program is listed, the listing goes to the RS-232 output buffer for transmission. The listing is sent to the buffer in ASCII format.

The LIST command brings the computer back to command mode rather than to the next line of the program. Therefore to terminate the file and properly close the channel, type RUN 9 to execute line 9. Line 9 adds a

CHR\$(26) to the end of the transmitted program file. This is used by the receiver program which we will look at next. The PRINT#2 sends an "unlisten" to the RS-232 channel before it is closed.

The *ASCII Transmitter* program assumes that your program in memory does not use line numbers less than 12 (although you may omit the REMarks and use line numbers 0 and 1). If the program in memory to be transmitted uses line numbers 0 and 1, you may simply type the two program lines from *ASCII Transmitter* in direct mode without line numbers. You might use LIST 13— instead of simply LIST if you don't want to transmit this *ASCII Transmitter* program along with your other program.

QUICK, BRING THE BIT BUCKET!

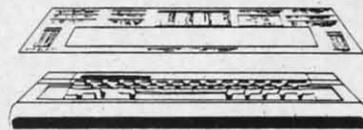
If you ran the *ASCII Transmitter* program without another computer attached to your RS-232 port, all of the transmitted data bits fell into the proverbial bit bucket behind your computer. To capture those bits and use them, you should have a second computer programmed and ready to receive that data as it is sent.

Using and storing a program which has been received in ASCII format is quite a bit more difficult than sending the program. In fact we are going to resort to downright trickery! We will use a strategy suggested by Dr. Gerald Neufeld in his latest book, *1541 User's Guide* (Datamost, 1984). His book contains a wealth of infor-

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mation on the 1541 disk drive and the various types of files available. (His clever and lucid disk drive alignment procedure alone was worth the price of the book for me.)

The *RS-232 Receiver* program on page 119 reads the incoming ASCII program data from the RS-232 input buffer character by character in lines 30120 through 30170. When a carriage return is found, the entire line is printed at the top of the screen by line 30070. "RUN 30000" is printed on the next line of the screen by line 30080. Line 30090 is where the funny business begins.

Characters typed from the keyboard go into a buffer starting at memory location 631. A count of how many characters are waiting in the buffer is stored in memory location 198. When the computer is ready to respond to keyboard input, it reads the character count and proceeds to remove the characters from the buffer to send them to the screen.

While the program is executing, the computer is not interested in reading any keyboard input (since the program does not contain any GET or INPUT statements). In the meantime, the program in line 30090 has surreptitiously put three characters into the keyboard buffer and stored and proper count in location 198.

After line 30100 is executed, the program has ended. The computer then checks the keyboard buffer to see if anything has been typed yet. Sure enough, it finds the three characters we POKEd and treats them as though

we had typed them. The first character (19) corresponds to the <HOME> key. You will find the ASCII and CHR\$ code numbers in an appendix at the back of your *User's Manual* or *Programmer's Reference Guide*.

Now the cursor is at the upper left corner of the screen. Remember that the first program line received from the RS-232 port is printed on the first line or two of the screen. The next character in the keyboard buffer is 13, meaning <RETURN>. Since the computer is operating in direct mode, the <RETURN> key stores the first received program line (line number and all) into memory, exactly as if we had typed the line ourselves and pressed <RETURN>.

Now the cursor is at the beginning of the next line on the screen, which says RUN 30000. The computer finds one more character in the keyboard buffer. Again it is a character 13, meaning <RETURN>. The command RUN 30000 is executed, starting the whole process again.

Thus each line of the received program is printed on the screen and entered just as if we had typed and entered each line from the keyboard. All of the received program lines are added to the *RS-232 Receiver* program. We are assuming that all of the received program line numbers are less than 30000 and that all program lines are 79 characters or less in length. Program lines longer than 79 characters are chopped off. You must edit them later if necessary.

The last program line received is followed by the CHR\$(26) (end of file character) which is sent by the *ASCII Transmitter* program. When that character is recognized, the RS-232 channel is closed by line 30140. Then, as a convenience, line numbers 30000 through 30200 are printed in a column on the screen. You may delete these lines of the *RS-232 Receiver* program simply by pressing the <RETURN> key 21 times. Now you are left with only the received program in memory which you may either run or save.

Now to briefly review the process,

1. Load the *RS-232 Receiver* program into computer A and run it.
2. Load the program to be transmitted into computer B and then add lines 8 and 9 from the *ASCII Transmitter* program to it.
3. Enter RUN 8 on computer B.
4. When all lines have been received by computer A, enter RUN 9 on computer B to close the channel.
5. Delete the lines of the *RS-232 Receiver* program in computer A by pressing <RETURN> 21 times.
6. If necessary, edit any lines of the received program in computer A originally longer than 79 characters.
7. Save and/or run the program in computer A.

No doubt some of you may be wondering why we would go to all this trouble when we could simply load the program from computer B's disk or tape into computer A. You are absolutely correct if both computers have compatible tape or disk formats (such as two Commodores).

The reason for using the RS-232 ASCII format is that it is a universal way to transport information. The Com-



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modore and IBM disk formats are totally incompatible, yet the two machines readily exchange programs in ASCII format. (Of course the two forms of BASIC are not totally compatible, but that is another story. Most general-purpose commands run equally well on both machines.)

THE FINAL LINK

Some computers do not have the convenience of the CMD command to send files in ASCII format to the RS-232 output buffer. It is useful for computers to be able to communicate sequential data files as well as programs. Therefore we will write a program to read and transmit sequential disk files from one computer. We will develop another program to receive these files and write them to the screen, a printer, or a disk.

The *Sequential Transmitter* program on page 119 is very straightforward. After opening the RS-232 channel, the program asks for the name of the file to be transmitted. Line 130 opens that disk file. Lines 140 through 190 read the file byte by byte, sending each character to the RS-232 output buffer. Line 170 filters any unprintable characters, and line 180 displays each printable character from the input file on the screen.

If the status variable ST is zero after reading from the disk file in line 140, the end of the file has not been reached. Line 190 tests that value and branches back to line 140 if the end has not been found. The value of ST is changed by line 160. That is why we must save its value at line 150 in a separate variable.

Once the end of the input file is found, line 200 is executed. A CHR\$(26) is transmitted, indicating the end of the file. The RS-232 channel and the disk file are then closed.

Completing the repertoire of RS-232 programs is the *Sequential Receiver* program on page 120. This program allows the user to receive a sequential file on the RS-232 link and either store it on disk, send it to the printer, or display it on the screen.

Line 90 establishes the RS-232 channel. Line 100 clears the receiver buffer. The quantity (ST AND 8) will equal 8 when the receiver buffer is empty. Line 110 allows the user to specify the destination of the incoming file. Lines 120 through 140 steer the program in the right direction.

If the printer is selected, an output channel to device number 4 is opened in line 150. If the file is to be saved on disk, line 160 requests the filename, and line 170 opens a sequential file with that filename. (You may replace the '8,8' in line 170 with '1,2' for tape storage. You should also delete the '+',S,W" ' in that line.) If the file is to be displayed on the screen, line 180 opens device number 3 which corresponds to screen output.

The receiver buffer is read by line 200. Each character is written to the selected device in line 210. If the "end of file" CHR\$(26) has been received, lines 230 and 240 properly close the RS-232 channel and the output device; otherwise the program goes back for more data.

You should be aware of a couple of potential problems. If screen output is selected, all characters, even non-displayable characters, will be written to the screen. These characters may make the display unreadable. A solution to this is to use the same type of filter as in *Sequential Transmitter*, line 170.

The other possible problem is that the receiver buffer may overflow if the *Sequential Receiver* program can't keep up with it. The solution to this problem is either to use a slower baud rate (replace the 8 in line 90 with a 6 for 300 baud) or to implement some software handshaking. The handshaking program last month should provide a model for you to implement. Since there will not necessarily be carriage returns throughout the sequential file, as there were for a program file, you may prefer to stop the transmitting program after a specified number of characters. Once the receiver program has received that number of characters, it will send a handshake character to the transmitter, which then sends the next set of characters.

With the capabilities of communicating over the RS-232 link, it is possible to open a whole new realm of applications for your computer. There are numerous laboratory instruments that provide an RS-232 interface. Let your computer become a data logger or a digital oscilloscope, periodically reading data from a digital voltmeter, for example. Once the measurements are stored in the computer, your software may filter, graph, or analyze the data. It may even provide control signal outputs based upon the measured voltages.

Remember that you need some additional hardware to provide true RS-232 signal levels. Use the circuit diagrams from last month for communicating with devices besides other Commodore computers. See what kinds of magic your computer can perform with its RS-232 serial link. **SEE PROGRAM LISTINGS ON PAGE 119**

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STREAMER

Banner Printing Utility for the C-64

If you had both a computer and a printer and wanted to put your ideas across in a BIG way, how would you do it? Naturally you would want to print a banner. First, though, you would need a program to help you. In its simplest form such a program would easily produce your message in large letters using a built-in character set. All that would be required is that you enter your message; the program would do the rest. Such a program could be enhanced in a number of ways. For instance, you might want to vary the size of your letters. Or you might want to be able to control the "pixels." For instance, you might want to have your letters composed of stars or hearts.

Streamer Font is such a program. It provides you with a number of enhancements so that you can easily create your banners. There are two listings. *Streamer Font* prints messages whereas the file, *Sequela*, supplies you with a complete character set. *Sequela* is a simple but elegant font that is appropriate for most messages. And if you want more fonts—make them! *Streamer Font* is also a full-featured character editor. You can design up to 40 characters for one font with each character having a resolution of 24 X 20. If you've worked with the 8 X 8 programmable screen characters you'll appreciate this degree of resolution. And you'll find it easy to design your characters with such commands as scrolling, mirror image, flipping, symmetry, and many others. Whether you're designing a font or drawing pictures, you'll find the program easy to use. Best of all, *Streamer Font* is written in machine language so the commands are fast.

Since it is in machine language, you'll need to type it in with *Flankspeed* (see page 116). Before you LOAD *Flankspeed*, however, you must set some pointers. These will place *Flankspeed* high in the memory and prevent it from being overwritten by *Streamer Font*. Enter the following, then LOAD *Flankspeed*:

```
POKE46,25:POKE64(0),0:NEW
```

Now LOAD and RUN *Flankspeed*. Enter in the hexadecimal addresses and type in *Streamer Font*. Once you've finished typing in the program SAVE it and reset your computer. Since *Streamer Font* acts like a BASIC program, you simply LOAD and RUN it.

After a brief title page, a pixel grid unfolds and you're ready to go. Two characters can be displayed at a time,

along with an indicator that will tell you which character you are currently working on. The screen is split in half, green on one side and black on the other. Each half is made up of small squares, the pixels of your character. Only the bottom line is free of these squares. Instead, this line displays letters A-Z, numbers 0-9, and a few punctuation marks. Most conspicuous, though, are the two flashing cursors: one to keep track of the pixel that you're working on, and the other, at the bottom of the screen, to indicate the current character.

Characters are drawn with your joystick. To plot a point, simply press the fire button when your pixel-cursor is on an empty square. Hold the button down and it will continue to draw. To erase, press the button while over a plotted square and that will set you in erase mode. If you wish to change the speed of the cursor, press SHIFT-V. The bottom line will be momentarily replaced with a message asking you to choose a number between 0 (slow) and 9 (fast).

As you move about the screen you'll notice a few things. If you move from one side of the screen to the other, the background colors switch and the character-cursor adjusts to a new character. You'll see that the green background follows your pixel-cursor while the character-cursor keeps track of the letter that you're working on. In other words, the green background corresponds to the character that the second cursor is pointing to.

Nothing happens when you try to move the pixel-cursor off the screen at either the top or bottom; it just reappears at the other end. But if you move offscreen to the right or left, a different character appears. If the letters A and B are on the screen and you move your cursor off to the right, the letters B and C will appear. Push your joystick right and hold it, and your cursor will move through the entire character set, eventually ending up back at the letter A.

To page quickly through the characters use the left and right cursor keys. Hold down one of these keys and if there's a font in the memory, you'll see huge letters flash across the screen. To find a particular character, just watch the character-cursor and stop when it gets to your letter. Faster yet, just press the letter that you want and you'll arrive there instantly.

DESIGNING CHARACTERS

There are a number of commands at your disposal to

STREAMER FONT

By Bob Spirko

aid you in drawing individual characters. Since many letters are symmetrical it makes sense to include a symmetry mode. Press the back arrow and whatever is drawn on one side of the character will be duplicated on the other side. Press the back arrow again and the symmetry mode will be turned off. Also, you can borrow from other letters. If you wanted to make a Q from an O, press f8 and save the O in the buffer. Then slide over and drop the O on Q's workbench with f7. Add the tail and you have your Q. If you want to make some changes to a character but are concerned about mangling it beyond use, tuck the letter away in the buffer for safekeeping.

The mirror image and flip keys are also handy. Press SHIFT-M and the letter will read backwards. Press SHIFT-F to flip a character upside down. Since these keys are frequently used there are also alternative keys to spare you from pressing the SHIFT key. Use the pound sign (it sort of looks like an f) to flip and the negative sign for mirror images. And to reverse the fields of any letter, press SHIFT-R.

Sometimes you'll complete a character only to realize that it's not centered. Not to worry. Use the function keys 1 to 4 to scroll with wraparound. If you press f1, for instance, your character will appear to SHIFT to the right. The pixels that move off the right side will emerge on the left. Similarly, f2 scrolls left, while f3 and f4 scroll down and up.

When you first RUN the program, *Streamer Font* automatically clears the entire font memory. After this, a switch is turned off. When you exit and reenter the program, the font memory will not be cleared, and your character set will remain intact. This means that if you SAVE *Streamer Font* after RUNNING it, it will be SAVED with the switch off. When you RUN this program it will not automatically clear the memory. A minor point, since you can clear it manually, but it's something you should be aware of. In any event, it's nice to enter *Streamer Font* and be greeted with a clean picture rather than a cluttered screen.

To clear the font memory press CLR. As a precaution, you will be asked: "ARE YOU SURE?". Hit Y, and all the characters will be erased. If you want to delete only the current character, press DEL. Pressing HOME, as you would expect, takes you to the upper left corner of the current character.

One more thing on character design. Most of the streamers that you create will probably run horizontal-

STREAMER FONT REFERENCE CHART

DEL: Delete current character
CLR: Clear font memory
HOME: Position cursor in upper left corner
Left and right CURSORS: Move to next character
A-Z: Move to specific letter
0-9: Move to specific number
SHIFT 1-5: Change character size

f1: Scroll right
f2: Scroll left
f3: Scroll down
f4: Scroll up
f5: Print streamer
f6: Change printer characters
f7: Recall character from buffer
f8: Store character to buffer

Back arrow: Symmetry mode
SHIFT-D: Display rotated character
SHIFT-F: Flip upside down
SHIFT-L: Load font from disk
SHIFT-M: Mirror image
SHIFT-R: Reverse field
SHIFT-S: Save font to disk
SHIFT-V: Change cursor velocity
SHIFT-X: Exit to BASIC

ly, but on occasion you may want to create a banner that hangs down. Creating vertical streamers means that your letters will appear sideways on the screen, making designing awkward. Don't turn your monitor on its side! Instead, toggle SHIFT-D. This will create a window in the lower left corner of the screen and display a rotated version of your character. When you draw a letter sideways it will appear upright in the window.

LOAD AND SAVE

Once you've designed your font you'll want to SAVE it on disk. Press SHIFT-S and you'll be asked for a file name. Enter the name and hit return. You'll notice that you can use DEL but no other screen-editing keys. If all goes well your creation will be SAVED to disk. If not, you'll get a "DISK ERROR" message; hit any key to con-

Continued on page 146

BASIC Relocator

For the C-64

By James E. Hosek

BASIC Relocator is a short utility that sits at the beginning of your BASIC program. When you RUN it, Relocator will move your program to make room for character sets, sprites, extra text screens, etc. Then, it will delete itself and RUN the rest of the program in its new location. You will never again have to worry about setting up pointers before loading up a program.

ENTERING THE PROGRAM

To use BASIC Relocator type in the listing on page 144. Be sure that the proper number of A's are included in lines 1 and 2. This makes space for the short machine language routine that does the relocation.

Line 1100 contains the value of the memory page to move the BASIC program to. Normally, programs begin at page 8. Each page is made up of 256 bytes. Therefore, if you needed 2K of space to make room for a character set, you would set this value to 16.

After you have entered the program, be sure to save a copy to disk or tape. This is a generator program and the value in line 1100 needs to be changed if you need a relocater for a different location. To run the generator program, type 'RUN 1000' (Not 'RUN'). When the program is finished, the READY prompt will appear. If there was an error in the DATA statements, load back the copy from tape or disk. The one in memory has already destroyed itself.

After you RUN the generator, LIST it. There should be only one line which looks like the following:

```
1 SYS2063:END:REM"-RELOCATOR-"
```

The characters which appear between the quotes are the actual program itself. There should be 115 graphics characters altogether. Even though the Commodore 64 editor allows only 80 characters per program line, BASIC allows more.

NOTE TO INSTANT BUG REPELLENT USERS...

If you proofread BASIC Relocator by using the Instant Bug Repellent printed in our November '85 issue, rather than the Bug Repellent program we publish every month (see page 116 of this issue), you will find that some of the Bug Repellent line codes listed alongside the program lines on page 144 will not match up. These are the correct codes for use with the Instant Bug Repellent:

1:	JE	920:	LI	1010:	MO	1050:	MO	1090:	JB
2:	KE	930:	FF	1020:	FA	1060:	AA	1100:	ON
900:	JD	940:	JD	1030:	OA	1070:	PB	1110:	AC
910:	DN	1000:	DN	1040:	HB	1080:	KE		

You are now ready to add on your own program. If you have a merging utility, now is the time to use it. Otherwise, just add on the rest of the lines.

At first, you will not want to use the relocater when testing out the program. If you need to make changes, the relocater part will already have deleted itself. To get around this add the following line to your program:

```
0 GOTO 10: REM THE START OF YOUR PROGRAM
```

This will skip over the relocater program. As a result, you will need to reset the pointers to the start of BASIC manually while debugging the program. Once you are finished, simply delete line 0 and save the program. To RUN the program with active relocater, turn off the computer and turn it back on. Load up the program and RUN it. Line 1 will be deleted once the program is safely in high memory, and it is now safe to load up your character set or sprites.

HOW BASIC RELOCATOR WORKS

The program in line 1 is a short machine language routine. When you type 'RUN', the SYS2063 sends control to it.

It starts by calculating an offset by means of the value provided in line 1100 of the Generator program. The BASIC program is then transported to the new location, byte by byte. Once this is done, the relocater must calculate the new pointers within the BASIC program itself.

It does this by adding the offset to the high byte of the pointer at the beginning of each BASIC line and using this to find the next pointer. It then saves the new pointers to the beginning and end of the program to their zero page locations. When this is done, it puts the following string into the keyboard queue:

```
1 CHR$(13) R SHIFT-U CHR$(13)
```

Then control returns you your BASIC program which is still running in its original location. Of course the next command encountered is the END statement in line 1. BASIC will then check the keyboard queue and execute the commands in it.

1 CHR\$(13) will cause line 1 to be deleted. However, BASIC is now seeing the program in its new location and will delete the line from there. Next, the R shift-U CHR\$(13) is shorthand for RUN, and your program will be executed in its new spot. □

SEE PROGRAM LISTING ON PAGE 144

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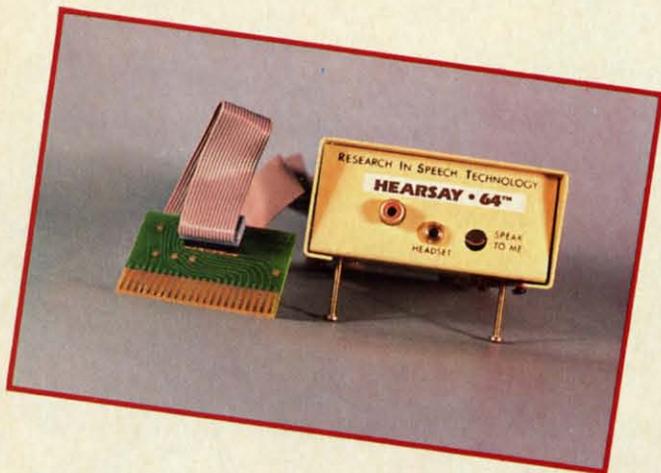
SPEECH SYNTHESIZERS

For the Commodore Computers

PART II

By Morton Kvelson

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VIC-TALKER

Talktronics, Inc.
27341 Eastridge Drive
El Toro, CA 92630
Phone: 714-768-4220
Price: \$89.00

Talktronics is definitely the new kid on the block. In our opinion they are destined to make an imprint on the Commodore speech synthesis market if the VIC 20 prototype of the VIC-Talker, which we looked at, is any indication. "What?" you may ask, "a new VIC 20 product at this stage of the game?" We were as surprised as you. However, it appears that the similarity between the VIC 20 and C-64 operating systems allowed for the development of both versions at minimal extra cost. As a result, all the VIC 20

users in our audience will benefit.

Talktronics is the outfit which has been running the full-page color ads you have probably noticed. You will have also noticed amazing claims about their speech synthesizer. This is one case where the product delivers what is claimed. A surprising collection of features and technology has been crammed into the VIC 20 cartridge case. It leaves us very curious as to how it will all be squeezed into a half-sized C-64 cartridge.

THE HARDWARE

The VIC-Talker is based on the SSI 263P speech synthesis chip. This phoneme-based synthesizer differs from the SPO256-AL2 in that it allows for the control of rate, pitch, and

inflection. The sixteen-kilobyte operating system in ROM does a good job of applying these features to the synthesis of speech. The glass-epoxy, double-sided, printed circuit board also carries two kilobytes of electrically erasable programmable read only memory (EEPROM) and one kilobyte of RAM.

Some sophisticated onboard bank switching allows this 19-kilobyte collection of memories to occupy only the eight-kilobyte cartridge block in the VIC 20 memory map. This block, located at addresses 41920 to 49151 (\$A000-\$BFFF) is normally used for plug-in game cartridges. As you would expect, most cartridge games will not work with the VIC-Talker. There is one notable exception. The



Yankee Doodle went to town,
A-riding on a pony,

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- My Old Kentucky Home ● Turkey in the Straw
- My Bonnie Lies Over the Ocean ● Goober Peas
- Red River Valley ● Oh! Susanna ● Dixie
- The Yellow Rose of Texas ● Yankee Doodle
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Reader Service No. 122

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five Scott Adams text adventures released on 16K cartridges for the VIC 20 will work. Of course you will need a cartridge expansion board to allow the use of at least two cartridges at once. The Scott Adams cartridges do not conflict with the VIC-Talker, since they reside at addresses 16384 to 32767 (\$4000-\$7FFF).

Incidentally, we have found the old Scott Adams VIC 20 adventure game cartridges to have a notable, hitherto unnoticed, feature. They are excellent examples of proper use of the Commodore Kernal. The Kernal is the jumbo machine language jump table which Commodore recommends to all third party programmers. If you follow this rule in machine language programming, your program should be transportable across machines. It turns out that Scott Adams did follow the rule. As a result, the contents of these VIC 20 cartridges can be saved to disk, LOADED into a C-64 (at the same address), and they will work, without any modification! How's that for a 16 kilobyte M/L program?

Getting back to our review, the VIC-Talker can be set to intercept the output to any hardware devices. The data is then sent along to the original device after it is vocalized. This is what allows the VIC-Talker to vocalize the text output of the Scott Adams adventures.

Installation of the VIC-Talker is simple. Just plug it into the cartridge port. Since it is completely self-contained, additional expansion RAM is not required. A five-pin DIN jack at the back of the cartridge accepts the video cable to either the VIC 20 RF modulator or a video monitor. The short cable which hangs from the cartridge is terminated in a five-pin DIN plug which goes into the VIC 20 video port. An onboard audio mixer combines the sound from the VIC 20 with the synthesized speech.

THE OPERATING SYSTEM

The VIC-Talker looks like two additional hardware devices to the VIC 20. Device number 20 is the actual speech device. Information is sent to it by OPENING a data channel very similar to a printer or disk drive. De-

TABLE OF VIC-TALKER COMMANDS

An (n=0..F)	Sets volume
F+	Increments filter frequency
F-	Decrements filter frequency
Fmn (mn=00..FF)	Sets filter frequency
I+	Increments inflection frequency
I-	Decrements inflection frequency
Ilnn (lmn=000..1FF)	Sets inflection frequency
R+	Increments rate of speech
R-	Decrements rate of speech
Rn (n=0..F)	Sets rate of speech (8 to 1 range)
IM	Sets immediate inflection mode
T	Sets transitional inflection mode
P	Exception programming mode
AON, AOFF	Automatic inflection mode on & off
FON, FOFF	Fraction mode on & off
PON, POFF	Punctuation mode on & off
1, 2	Selects voice one or two
RESET	Clears EEPROM
TALKmn	Set talking channel to mn

vice number 21 is the VIC-Talker's control channel, which functions in a manner very similar to the command channel on the disk drive.

On power up the VIC-Talker does a reasonably good job of translating text to speech. It was the only synthesizer which vocalized our own test word (GHOTI) anywhere near the correct way. (GHOTI is pronounced "fish"—GH as in lauGH, O as in wOmen, TI as in naTIon.) The translation routines are part of the operating system. They handle all text-to-speech conversion for the VIC-Talker. They are sufficiently complete that the creators of the VIC-Talker left no way for the user to access direct phoneme speech synthesis directly. At least the preliminary manual neglects to mention the availability of this feature.

As with all the hardware speech synthesizers we have encountered, the VIC-Talker has its own peculiar accent. To get around this, the VIC-Talker lets you create exceptions to its rules. This is where the two-kilobyte EEPROM comes into play. All exceptions are stored in the EEPROM. Thus they are not lost when the computer is turned off. Programming the EEPROM is simple enough that you should consider sav-

ing custom dictionaries on disk or tape for rapid entry as needed.

The VIC-Talker accepts over a dozen commands for customizing the operating system to a specific application. These are summarized in the accompanying table. Among these is the ability to vocalize a BASIC program listing. This supports program proofreading by simply LISTing it to the screen, since all of BASIC's keywords are recognized (and vocalized) by the VIC-Talker. Just be sure to turn on punctuation mode before starting.

The VIC-Talker has two built-in voices. The modes for each voice can be independently set. This allows, for example, the reading of text in one voice while punctuation is vocalized by the other voice. The availability of the two voices combined with the variety and complexity of the commands make controlling the VIC-Talker a fairly complex task. The manual recognizes this by separating the commands into two groups, beginner and advanced. The former group are the ones most likely to be used. The latter group forms the complete set.

The VIC-Talker performed well. We are looking forward to seeing what the C-64 version can do. □

HEARSAY 64 (formerly The Recognizer)

Research In Speech Technology, Inc.
1825 74th Street
Brooklyn, NY 11204
Phone: 718-232-7266
Price: \$59.95

LIS'NER 1000 THE MICROMINT, INC.

25 Terrace Drive
Vernon, CT 06066
Phone: 800-635-3355 (orders)
203-871-6170 (technical)
Price: \$149.00 (assembled)
\$119.00 (kit)

This product represents the current state of the art in speech recognition technology for the Commodore 64. You may wonder why we're presenting a combined report on the offerings from two different suppliers. The fact is that for all practical purposes these products are functionally identical. They differ primarily in the three "p's" (price, packaging, and presentation). A little historical information is required to see how this came about.

A HISTORY LESSON

In the late 70's, Milton Bradley, a major toy manufacturer, embarked on a research project to develop low cost speech synthesis and recognition for their product lines. The results of these labors were widely disseminated among the technical community with no strings attached. This data forms the basis of many of the speech products presently available.

At about the same time the General Instruments Company (GI), a major semiconductor manufacturer, was getting involved in the manufacture of large scale integrated circuits for speech synthesis. The SPO256 and the CPO256-AL2 are both GI products. You will note that these are the chips used in the *Ahoy!* Babler construction project in this issue. The SPO256-AL2 is also the heart of the Welwyn Currah Voice Messenger reported on last month.

The most recent GI product is the SP-1000, a super speech processor with both voice synthesis and voice recognition capability, which incorporates the latest results of the Mil-

ton Bradley research efforts. This chip is also the heart of Hearsay 64 and the LIS'NER 1000.

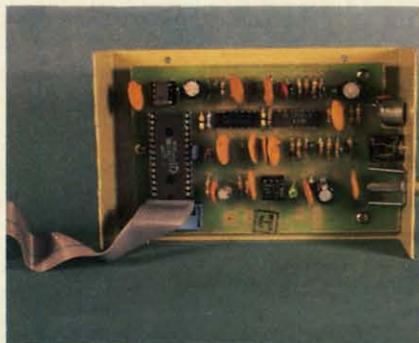
As time went on several GI employees (as employees often will) went their own ways. One, Dennis Intravia, formed his own consulting company (Mind's Eye Technology, 21 Anita Place, Amity Harbor, NY 11701; 516-848-3544). He developed a speech recognition and synthesis device based on the SP-1000. This was subsequently presented as a construction project by Steve Ciarcia in the November 1984 issue of *Byte* magazine. At this point the project became another offering from THE MICROMINT, the company which distributes all of Ciarcia's *Byte* construction projects.

Steven Veltri, another ex-GI employee, is now the V.P. of Sales and Marketing for R.I.S.T. As you might expect, the design for the LIS'NER 1000 was also turned over R.I.S.T. It was perceived, and rightfully so, that the market for the two companies was sufficiently diverse so as to present no conflict of interest. MICROMINT directs its products to the advanced hobbyist and experimenter. R.I.S.T. on the other hand concentrates its efforts on the general user in the mass market. Along with the hardware design came a detailed concept for the user interface and software. In order to better manage the software development, MICROMINT undertook the writing of the Apple version while R.I.S.T., namely Ed Garrity, did the Commodore 64 version.

This is where we stand today. If you should happen to obtain the MICROMINT offering you will still be greeted by Ed Garrity's message and the R.I.S.T. copyright notice when you boot the software.

WHAT THEY DO

Last month we presented *Easy Speech*, a software package from R.I.S.T., which when used in conjunction with the Welwyn Currah Voice Messenger gave the C-64 the power of speech. The implementation was completely transparent to the operating system and the user. Many commercial software packages would



Top to bottom: VIC-Talker uses SSI 263P chip; Hearsay 64 is similar to LIS'NER 1000 (Reader Service #260)

work with it without modification.

The Hearsay 64 and the LIS'NER 1000 perform the complementary function. They bequeath upon the C-64 the ability to recognize and act upon your spoken word. Verbal commands are entered into the input buffer (and usually the screen as well) just as if they were typed in and entered from the keyboard. These are speaker-dependent, isolated word systems. This means that lengthy exchanges, as demonstrated by Captain Kirk, which begin with "Computer..." and end with the mechanical response of "WORKING" just won't work with the C-64. You will have to utter your commands one word or

phrase at a time. Each utterance may be up to two seconds in length. Nevertheless, given the overall system costs, the results are impressive.

THE PRODUCTS

The LIS'NER 1000 and Hearsay are functionally identical, that is, either software package will work with either hardware module. However, as we mentioned, the three "p's" are quite different.

The LIS'NER 1000 is an open, unadorned circuit board whose gold plated edge connector plugs directly into the expansion port of the C-64. In other words, the entire works are exposed to all observers as well as the ambient environment. It is supplied with a separate headset microphone which plugs into a miniature jack on the board. An RCA jack is supplied for audio output if and when the speech synthesis software for the SP-1000 is ready. The software provided with the package is unprotected. The making of backup copies is encouraged. The accompanying manual, in looseleaf format, describes the operation, the hardware, and the software in some detail.

The Hearsay hardware is completely enclosed in a sturdy metal case. The expansion port edge card connector, which is not gold plated, hangs off the end of a length of flat ribbon cable. This allows the module to be conveniently positioned. The object is to bring the module to the vicinity of your mouth so as to be in reasonably close proximity of the built-in microphone. A headset microphone is available for \$5.95 to those who send in their warranty cards. We recommend you buy the headset. The accompanying manual, in a reduced half-size format, includes detailed descriptions on how to use the system. The manuals were in many ways nearly identical in both form and content. The Hearsay manual did include additional explanatory paragraphs for what were perceived to be the more difficult topics. However, some of the detailed technical explanations of the hardware and software were omitted.

Both manuals would benefit from

the attentions of a good editor. Fortunately the software, which is supported by extensive menus and screen prompts, is nearly self-sustaining. This was surprising in that Steven J. Veltri, who undoubtedly had a hand in the preparation of the documentation, has authored a very readable and informative book on speech synthesis. *How to Make Your Computer Talk* (\$9.95), published by McGraw-Hill, is primarily a series of speech synthesizer construction projects, based on the SPO256-AL2, for most popular personal computers. The Commodore versions are very similar to the Babbler project in this issue. This is not surprising, as all are based on a sample circuit in the General Instrument data sheet for the SPO256-AL2. The book also includes several chapters on the theory of speech synthesis as well as an excellent allophone table for the SPO256-AL2.

THE SOFTWARE

Copy protection aside, the main routines of the Hearsay software were identical to the corresponding routines in the *LIS'NER 1000*. The Hearsay manual also included a paragraph threatening the usual dire consequences for any attempts to copy the disk. A backup copy is available for \$5.00.

The bulk of the operating system is a sophisticated editor which allows you to conveniently train the templates used by the recognition package. Training a set of templates is a multistep process. First you enter a set of prompts. These are only used to prompt the speaker as to what to say when actually training the commands. Next, the actual commands are recorded. These will be the characters which the operating system will enter into the keyboard buffer. The command strings may be BASIC commands, including non-printing characters such as carriage returns (CHR\$(13)). They may also be application-specific, such as the various *Zork* commands included in the demonstration file. A command string may be up to 16 characters long.

Templates are set up with up to 64 words. These are organized in groups of eight. Scanning the templates is a

time-consuming process. It can take three seconds to scan all 64 words. This process can be speeded up by defining a syntax for each group of eight words. In this step, a set of group pointers are recorded with each group. These pointers confine the searches to groups of related words.

The last setting is the rejection threshold. This sets the rejection ratio of the stored 108-byte template against the incoming word. A rejection ratio of one (the default) will correctly recognize a phrase about 95% of the time. Moving up to four will guarantee recognition better than 99% of the time. The tradeoff is sensitivity. A high rejection ratio also results in a large number of incidents of no phrase at all being selected.

The templates are saved on disk for subsequent loading. This last function is performed by the Loader/Linker software. To avoid possible conflicts with other software, the templates and recognition routines can be loaded into various locations on the C-64. These are the top of BASIC RAM, the RAM under the BASIC ROM, and the RAM under the Kernal ROM. The LINKER portion of the LOADER is for two or more users. It allows up to eight templates to be linked. Of course the size of each template is reduced correspondingly.

Once loaded, operation of the recognition software is completely transparent to the system. The process can be toggled on and off by a CNTRL-V keystroke. Of course either the Hearsay 64 or the LIS'NER 1000 hardware must be installed as well. Nothing happens until a sound is detected above the recorded background noise threshold. The templates are then scanned and if a match is found the appropriate command string is entered into the keyboard buffer.

CONCLUSION

Either package is an effective voice recognition system for the Commodore 64. However, do keep in mind that the state of the art, at this price level, is still somewhat limited. This is in no way meant to discourage the capabilities of these packages in performing their intended tasks. □

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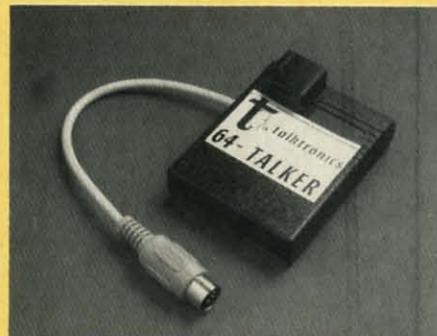
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VIC-Talker and **64-Talker** are priced at \$89 each and are available from

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9 AM - 5 PM, PST



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Reader Service No. 255

Build the *Ahoy!* Babbler/Talking Clock

A Speech Synthesizer for the C-64, C-128, or VIC 20

By Isaac Michalowski and Morton Kvelson

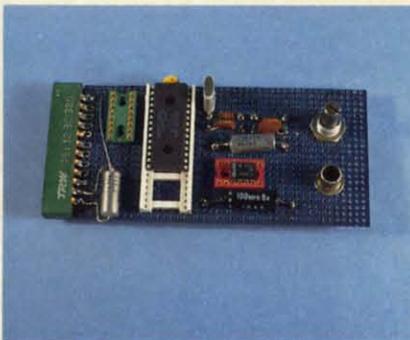
If you are reasonably adept at the assembly of electronic projects, you can easily construct your own speech synthesizer for a total cost of about \$20. The *Ahoy!* Babbler circuit board, as presented here, is actually the basis of two distinct yet closely related projects. The talking clock is a dedicated application of speech synthesis while the Babbler is a generalized speech synthesizer. Your selection of the speech processor chips will determine the actual results.

This project was originally based on the General Instrument SPO256 Speech Processor and its associated SPR16 custom ROM. This chip set was sold by Radio Shack as catalog number 276-1783 for \$12.95 and may still be available in many stores. The SPO256 has a small built-in vocabulary consisting of the digits 0-9. The SPR16 expands this vocabulary to 32 phrases which are suitable for a talking clock.

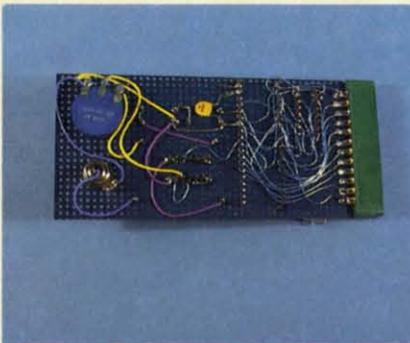
The SPO256 and the SPR16 were subsequently replaced by the SPO256-AL2 as stock number 276-184, which is being sold at the same price. The new chip has a built-in ROM which contains 64 phonemes, the fundamental components of speech. Thus the SPO256-AL2 has an unlimited vocabulary and it no longer requires the use of the external ROM. This Speech Processor chip is actually the same one used in the Welwyn Currah Voice Messenger. The difference between the Voice Messenger and the Babbler is that the former also includes its own eight-kilobyte operating system and text-to-speech translator on ROM.

You will have to program the Babbler yourself by combining allophones into the appropriate strings. This speech code will be stored in your computer as part of your application program.

Since the circuit of the *Ahoy!* Babbler is the same for either chip and many Radio Shack stores still have both chips in stock, we are presenting the specialized Talking Clock as well as the more generalized *Ahoy!* Babbler speech synthesizer. The circuit was designed to work with the VIC 20, the C-64, and the C-128 with only some minor software changes.



The basic circuits for the Babbler and the Talking Clock are identical.



A bottom view of the Babbler prototype shows its wire wrap construction.

The same program will work with both the C-64 and the C-128, since the I/O chips reside at the same memory locations for both computers. The VIC 20 I/O locations are different, which requires a modification of the code. It should be possible to easily modify the project for the Plus/4 as well.

The basic circuits for the *Ahoy!* Babbler and the Talking Clock are identical. The only difference is that the clock has an extra socket for the SPR16 custom ROM. Since the Babbler does not require the external ROM chip, you may leave out its socket labeled U2 on the drawings.

Two programs are presented on pages 118-119. The *Talking Clock* program is for use only with the SPO256/SPR16 ROM chip set. When you are typing in this program, be sure to pay attention to the REM statements for your computer. The listing shown is for the VIC 20. The lines for the C-64/C-128 are REMed out. (The Bug Repellent line codes to the right of each program line are, however, for the C-64.)

The short program for the *Ahoy!* Babbler (see VIC 20 and C-64/C-128 versions on page 119) demonstrates the basic combination of phonemes into words. An interesting first project would be setting up the vocabulary to implement the Talking Clock using the Babbler circuits. If you study the code and the accompanying sample programs for the *Ahoy!* Babbler, you should be able to convert the clock program to work with the SPO256-AL2. This should not be difficult, since the data sheets that accompany the SPO256-AL2 include a dictionary

W
C
DISK D
C-64
1541
1571
1572
MSD S
MSD D
Indus G
Cardco
INTER
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Cardco
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Lazor 2
DISK
SKC
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SS/DD
DS/DD
MAWE
MD-1
MD-2
ELEPH
SS/SD
SS/DD
DS/DD
INNOV
CONC
Flip-N-
10 ...
15 ...
25 ...
w/lock
50 ...
50 ...
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which contains the required words. The only thing you may not be able to reproduce are the various clock chimes which are generated by the Talking Clock. Table 2 is a complete list of the allophones for the SPO256-AL2 Speech Processor.

HOW IT WORKS

To voice a specific word or allophone, its address is placed on address lines A1-A8. This will be a value of 0-35 for the Talking Clock or 0-64 for the Babblor. A negative pulse from the computer on the ALD (pin 20) loads the eight address bits into the synthesizer input port. At this point a sequence of allophone data, from the external or internal ROM, is serially clocked into the synthesizer. The selected word is then sounded. Handshaking capability is provided through the Load Request line (LRQ) (pin 9). When the LRQ goes to a logic 0, address data is strobed into the synthesizer's input port. A logic 1 on the LRQ indicates that the input buffer is full and a word is being sounded. Even in the world of Micro Technology, it is rude to interrupt someone when he is talking.

A pulse width modulated digital signal is transmitted out of the synthesizer chip on pin 24. Conversion to an analog audio signal is accomplished by a 5Khz external filter.

THE TALKING CLOCK PROGRAM

The TI\$ string variable, in Commodore BASIC, performs the function of an internal, real time 24 hour clock, which is updated at the rate of one count every second. This clock counts up to 235959 and then resets to 000000. TI\$ can be set in either direct mode or under program control.

When RUN, the program prompts you for the current time in HHMMSS format. Enter the time of day based on a 24-hour clock. For example, 2 p.m. will be 140000. As you are typing in the time, the hours, minutes, and seconds will align under their respective letters. If you enter the time incorrectly, i.e., too many characters or an invalid number, the program will reset the screen and al-

TABLE 1 — VOCABULARY LIST FOR SPO256 (TALKING CLOCK)

Address	Word	Address	Word
0	Oh	18	Eighteen
1	One	19	Nineteen
2	Two	20	Twenty
3	Three	21	Thirty
4	Four	22	Forty
5	Five	23	Fifty
6	Six	24	It Is
7	Seven	25	A.M.
8	Eight	26	P.M.
9	Nine	27	Hour
10	Ten	28	Minute
11	Eleven	29	Hundred Hour
12	Twelve	30	Good Morning
13	Thirteen	31	Attention Please
14	Fourteen	32	Please Hurry
15	Fifteen	33	Melody A
16	Sixteen	34	Melody B
17	Seventeen	35	Melody C

low you to reenter the time. Once you have successfully entered the time, the computer will announce the time and continue to announce the time at the top of every minute.

The TI\$ variable is analyzed to acquire the Hour "A" and the Minutes "B". The hours are evaluated for anything greater than 20 by lines 270-290. The minutes are also evaluated in the same manner as the hours, but in this case values of 20 through 50 are checked. The reasoning for the elaborate checking, for both the hours and minutes, will become evident when you realize that addresses greater than 20 on the SPO256 will not give you the corresponding voiced output. If you look at Table 1, you

will notice that inputting a 25 into the synthesizer will not give you the number "twenty-five" sounded out. Instead, the phrase "A.M." will be voiced. In order for the number "twenty-five" to be voiced, it must first be broken into two corresponding addresses. The first address is 20, which corresponds to the voiced "twenty." The following address would be 5, which corresponds to the number "five" being voiced.

As an example, line 390 checks for the minutes being greater than 40. The value 40 is subtracted from the actual minutes value. B1 now contains the units of minute value and the value B is replaced with the proper address (22) in order to voice the word "forty."

PARTS LIST

U1	SPO256	Speech Processor	Radio Shack 276-1783
U2	SPR016	Serial Speech ROM	P/O RS 276-1783
U1	SPO256	Speech Processor (alternate)	Radio Shack 276-1784
U3	LM386	Audio Op Amp	Radio Shack 276-1731
XTAL	3.579MHz	TV Colorburst Crystal	Radio Shack 272-1310
R1,2	33K, 1/4W	Resistor	Radio Shack 271-1341
R3	10K	Variable Resistor	Radio Shack 271-1721
R4	10 OHM, 1/4W	Resistor	Radio Shack 271-001
C1,2	.002 mf	Capacitor, Disc	Radio Shack 272-1066
C3,10	10 mf	Capacitor, Electrolytic 35VDC	Radio Shack 272-1014
C4	10 mf	Capacitor, Electrolytic 35VDC	Radio Shack 272-1013
C5,6	.1 mf	Capacitor, Disc 50VDC	Radio Shack 272-135
C7	100 mf	Capacitor, Electrolytic 35VDC	Radio Shack 272-1016
C8,9	47 pf	Capacitor, Disc 50VDC	Radio Shack 272-121
J1		44 Pin Card Edge Socket	Radio Shack 276-1551
J2		Shielded Phono Jack	Radio Shack 274-346
		Multi-purpose Plug-in Board	Radio Shack 276-152
		or	
		Grid Board	Radio Shack 276-158
		8 Pin Dip Socket	Radio Shack 276-1995
		16 Pin Dip Socket	Radio Shack 276-1998
		28 Pin Dip Socket	Radio Shack 276-1997

The format, or sequence, on how the line is voiced is stored in the array labeled SP(x). SP(1)=31 addresses the phrase "Attention Please," while SP(2)=24 addresses the phrase "IT IS." The subsequent values in the SP array contain the hours and minutes value as decoded in lines 270-420.

Three Sound Format routines are incorporated to handle the

- 1) Top of the Hour
- 2) Units of Minutes
- 3) Tens of Minutes

Line 2000 is aptly labeled SPEAK! In this section the array SP is accessed and sent out as successive addresses to the synthesizer. Handshaking is checked by line 2020:

```
IF PEEK(DRT)>127 GOTO 2020
```

(for the VIC 20). The computer checks to see if the synthesizer is ready for another address. The time is enunciated at the top of every minute. Lines 2050-2090 check for the top of the minute.

The I/O setup (lines 130-160) initializes the user port so that all bits, except the most significant bit, are outputs. This is accomplished by POKE DDR, 127. The output strobe is done via CB2 by the instructions A=PEEK(37148) AND 15:POKE 37148,160 OR A (for the VIC 20).

As mentioned previously, the time is enunciated every minute. To have

TABLE 2 — SPO256-AL2 ALLOPHONE ADDRESSES

Decimal Address	Allo-phone	Sample Word	Duration	Decimal Address	Allo-phone	Sample Word	Duration
0	PA1	PAUSE	10MS	32	/AW/	Out	370MS
1	PA2	PAUSE	30MS	33	/DD2/	Do	160MS
2	PA3	PAUSE	50MS	34	/GG3/	Wig	140MS
3	PA4	PAUSE	100MS	35	/VV/	Vest	190MS
4	PA5	PAUSE	200MS	36	/GG1/	Got	80MS
5	/OY/	Boy	420MS	37	/SH/	Ship	160MS
6	/AY/	Sky	260MS	38	/ZH/	Azure	190MS
7	/EH/	End	70MS	39	/RR2/	Brain	120MS
8	/KK3/	Comb	120MS	40	/FF/	Food	150MS
9	/PP/	Pow	210MS	41	/KK2/	Sky	190MS
10	/JH/	Dodge	140MS	42	/KK1/	Can't	160MS
11	/NN1/	Thin	140MS	43	/ZZ/	Zoo	210MS
12	/IH/	Sit	70MS	44	/NG/	Anchor	220MS
13	/TT2/	To	140MS	45	/LL/	Lake	110MS
14	/RR1/	Rural	170MS	46	/WW/	Wool	180MS
15	/AX/	Succeed	70MS	47	/XR/	Repair	360MS
16	/MM/	Milk	180MS	48	/WH/	Whig	200MS
17	/TT1/	Part	100MS	49	/YY1/	Yes	130MS
18	/DH/	They	290MS	50	/CH/	Church	190MS
19	/IY/	See	250MS	51	/ER1/	Fir	300MS
20	/EY/	Beige	280MS	52	/ER2/	Fir	300MS
21	/DD1/	Could	70MS	53	/OW/	Beau	240MS
22	/UW1/	To	100MS	54	/DH2/	They	240MS
23	/AO/	Aught	100MS	55	/SS/	Vest	90MS
24	/AA/	Hot	100MS	56	/NN2/	No	190MS
25	/YY2/	Yes	180MS	57	/HH2/	Hoe	180MS
26	/AE/	Hat	120MS	58	/OR/	Store	330MS
27	/HH1/	He	130MS	59	/AR/	Alarm	290MS
28	/BB1/	Business	80MS	60	/YR/	Clear	350MS
29	/TH/	Thin	180MS	61	/GG2/	Guest	40MS
30	/UH/	Book	100MS	62	/EL/	Saddle	190MS
31	/UW2/	Food	260MS	63	/BB2/	Business	50MS

the time enunciated whenever you hit any one of the keys, remove lines 2060-2080 and insert the following:

```
2060 GET A$:IFA$="" THEN 2060
2070 GOTO 200
```

To change the melody at the top of the hour to another phrase, or melody, select the appropriate address

from Table 1 and insert it into SP(5) in line 1010 and SP(6) in line 1020.

CIRCUIT DESCRIPTION

The circuit (Figure 2) is based on the Radio Shack data sheet. The synthesizer chip U1, after being loaded with the 8-bit address (0-35 for the SPO256, 0-64 for the SPO256-AL2) produces a pulse modulated digital output (pin 24). C1, C2, R1, and R2

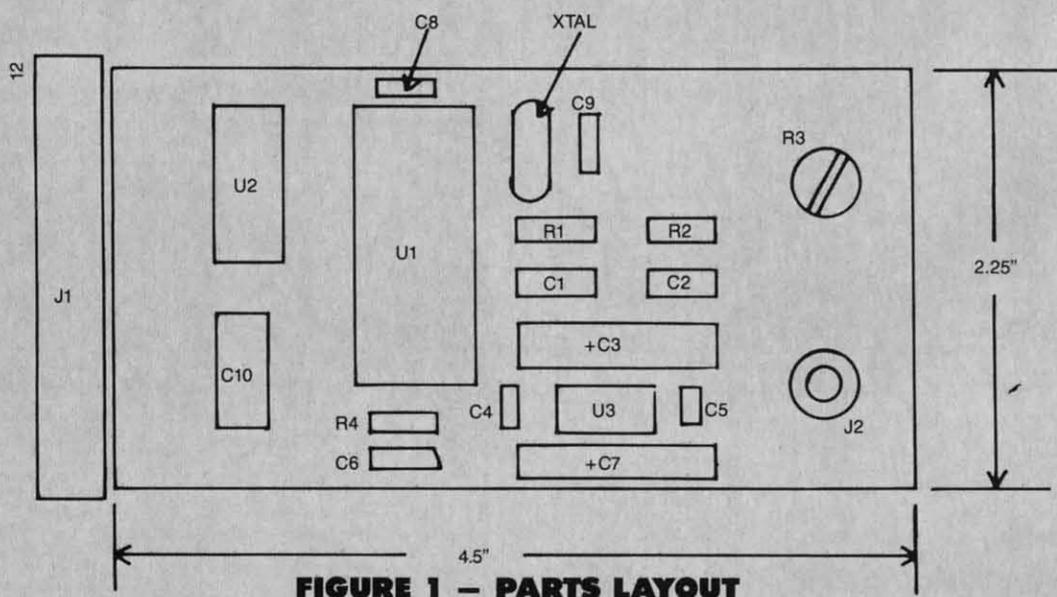


FIGURE 1 — PARTS LAYOUT

A standard piece of perforated 100th inch center board was used for circuit board. Layout and wiring techniques are not critical. Wire wrap sockets were used (the fastest way to get the circuit running).

form a 5KHz low pass filter. U3 is an audio amplifier with a gain of 200, whose output volume is controlled by R3 (10K potentiometer). For lower output gain, the 10mf capacitor (C4), can be removed. A standard 8-ohm speaker is used for the output. Note that the SPRO16 ROM chip (U2) may be omitted if you are using the SPO256-AL2.

CONSTRUCTION

The circuit board layout is shown in Figure 1. A standard piece of perforated 100th inch center board was used. Layout and wiring techniques are not critical. Wirewrap sockets were used since it was the fastest way to get the circuit up and running. Although the applications in the data sheet called for a 3.12MHz crystal, a standard 3.579MHz T.V. color burst crystal, available at Radio Shack, can be used with excellent results.

In construction, a 12-pin edge connector was used, butted up against the perforated board edge. To secure the edge connector to the board, a small piece of wire (use the remains of one of the component leads) should be run through pins 1 and 12 of the edge connector. Solder pins A to 1, and 12 to M.

Caution: Do not do this to any other pins. A, 1 and 12, M are the only pin sets that are common on either side of the I/O connector.

An alternate method of assembling the connector is to acquire a 44-pin plated finger perforated board, cut it down to size (24 pins), and solder the edge connector directly to the fingers of the board. If you cannot find a 24-pin edge connector, use a 44-pin connector, sold at Radio Shack, and cut it down to 24 pins. Wire the edge connector on your perforated board so that it corresponds with the layout

in Figure 2.

IN CLOSING

Advanced users will recognize the possibility of creating a real time talking clock using machine language. This will require the use of the microprocessor's interrupt capabilities. Properly implemented, this clock would run in the background without interfering with your BASIC programs. This is a possible topic for a future article. □

SEE PROGRAM LISTINGS ON PAGE 118

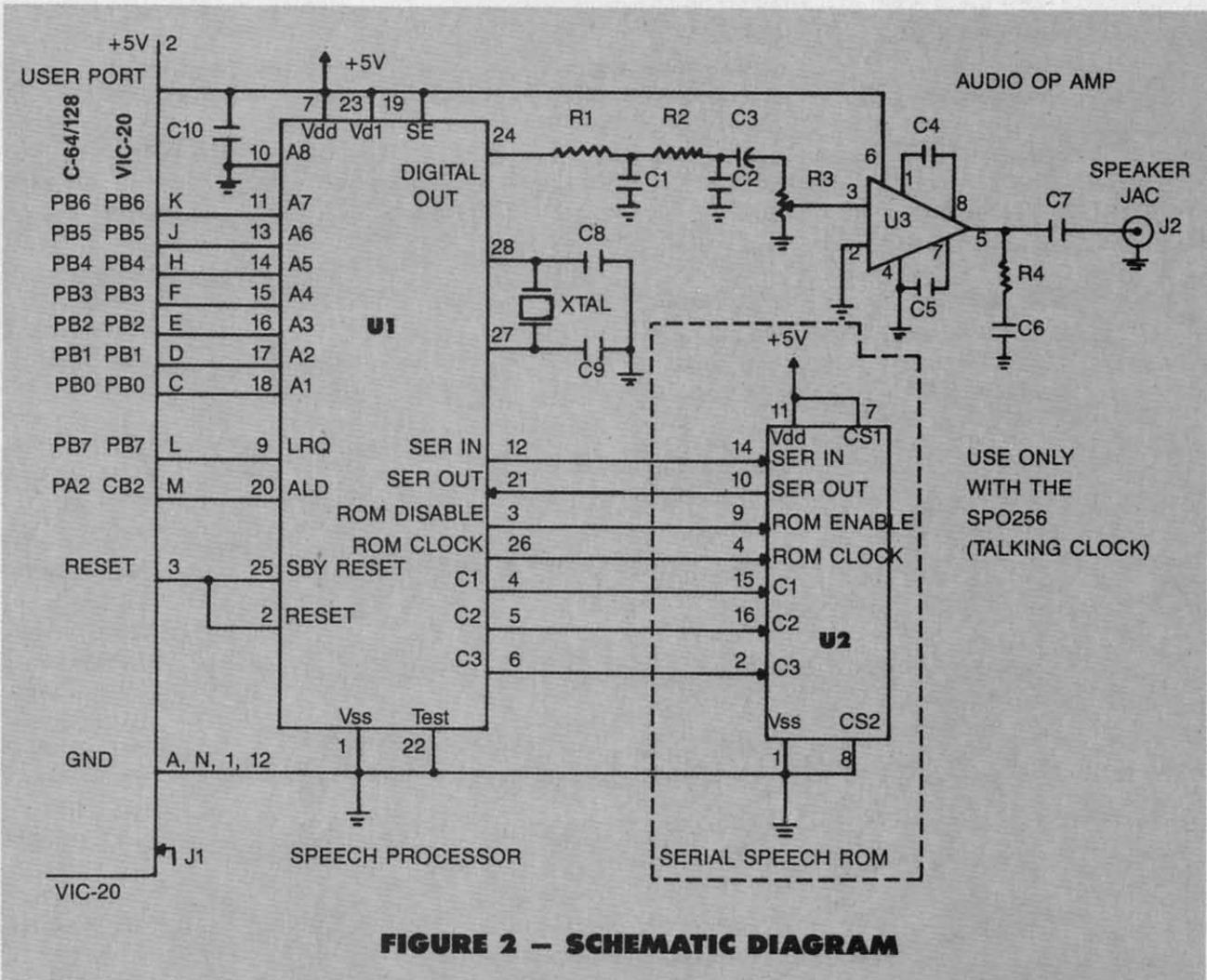
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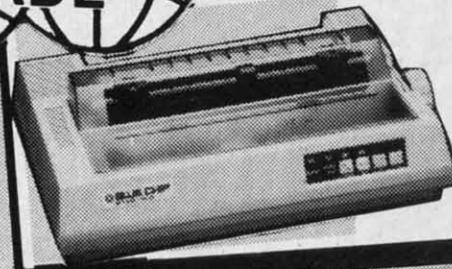
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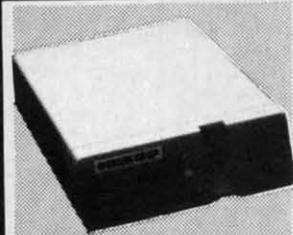
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FERRATA

RHYTHMIC BITS (Nov. '85)

The machine language portion of *Rhythmic Bits* did not appear in the magazine. Using *Flankspeed*, type in the ML portion as listed here and save it to disk. To use *Rhythmic Bits*, LOAD "ML PORTION",8,1 and then load in the BASIC portion from the November issue and run it.

RHYTHMIC BITS ML

Starting address in hex: C000

Ending address in hex: C0B7

```

C000: 01 02 04 08 10 20 40 80 FF
C008: 00 07 0E 00 FF FF 00 00 1D
C010: 00 04 08 0C 10 14 18 1C 80
C018: A6 FD BD 08 C0 85 FE A6 6E
C020: FC BD 10 C0 85 19 EA BD F2
C028: 00 C1 A6 FE 9D 00 D4 A6 A8
C030: 19 BD 01 C1 A6 FE 9D 01 0E
C038: D4 A6 19 BD 02 C1 A6 FE F3
C040: 9D 06 D4 A6 19 BD 03 C1 FA
C048: A6 FE 85 19 E6 19 A5 19 4B
C050: 9D 04 D4 C6 19 A5 19 9D 03
C058: 04 D4 60 EA EA EA EA 28
C060: EA A6 FC BD 00 C0 25 FB 8E
C068: 60 EA EA EA A9 00 85 FC B5
C070: 85 FD 85 FE 20 61 C0 F0 AB
C078: 0B 20 18 C0 E6 FD A5 FD 05
C080: C9 03 F0 08 E6 FC A5 FC CC
C088: C9 08 D0 E8 60 EA EA EA 35
C090: A5 19 A2 00 E8 D0 FD EA 94
C098: EA C6 19 D0 F5 60 00 00 8A
C0A0: A0 00 B9 00 C2 85 FB AD EC
C0A8: 0C C0 85 19 20 90 C0 20 A5
C0B0: 6C C0 C8 C0 20 D0 EB 60 A4
  
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LIGHTNING LOADER (Nov. '85)

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MEMORY CHECK

For the C-64

By Buck Childress

Don't you sometimes wonder if Old Reliable has a touch of amnesia? Will it remember all those goodies you just packed into its RAM? Lots of things can happen to arouse your suspicions. Maybe a command won't execute the way you expect it to, or the C-64 keeps crashing like a DC-10. Heck, who wants to admit they goofed? But, when all is said and done, it's almost always a user error (oh, the pain of it). Still, with that much free RAM, isn't it possible that some memory might have vanished?

After another rousing argument with my computer over which one of us caused the latest disintegration of a masterpiece, I decided to write a program which would prove once and for all that I was right and my C-64 was wrong. After all, my dignity was at stake. So, in a gallant quest for truth, *Memory Check* was born.

Memory Check will test every one of the 38911 BASIC memory locations in your C-64. It works by attempting to store all values from 0 to 255 in each location, beginning at 2048 (start of BASIC RAM). If all's well here, *Memory Check* moves to 2049 and the process is repeated. This continues through 40959 (end of BASIC RAM).

While *Memory Check* is running, you'll see what appears to be a shimmering object. This is a video display of the values being stored in each memory location. The object appears to be shimmering because of the tremendous speed of machine language. The current location being tested is also displayed. Should a bad area be encountered, the screen border will turn red and the display will let you know where the problem is. If everything checks out the screen border will turn green and the display will verify that the last test was at 40959.

Since the computer must store and display values almost ten million times (38911 locations * 256 values), while making comparisons in between, it was necessary to program *Memory Check* in ML. It only takes a few minutes to complete its task, as opposed to many hours if it were programmed in BASIC.

After you've entered *Memory Check*, save it before doing anything else. You can then run it and follow the prompt.

By the way, my 64's RAM checked out fine. It must be something else. After all, it couldn't be me, could it?!

I hope *Memory Check* becomes a useful addition to your software library. □

SEE PROGRAM LISTING ON PAGE 137

CALLING COMPUTER COACHES

Team Sports Simulations for the Commodore 64

By Bill Kunkel and Arnie Katz

After breakfast, I spent a cool million on a professional football squad. Then, I blasted a few pucks past a top goalie, drafted players for my major league baseball team, and shot some hoops with Larry Bird.

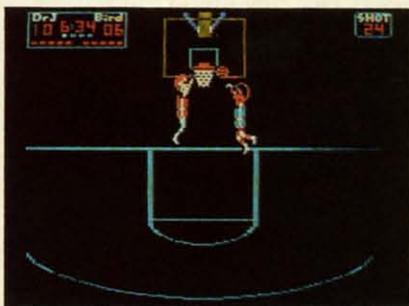
All in all, it was a most enjoyable morning. How fortunate to own a Commodore computer during the Golden Age of C-64 sports games! Excellent programs are available which simulate every major team sport, and there's frequently a choice among action, strategy, and statistical replay contests.

The Whole Hundred Yards

Football is the major popular computer sport in Commodore country with six titles. Designers have tried a wide range of approaches to transferring the strategic and kinetic thrills of the gridiron to the gaming screen, so there's a pigskin program for just about every taste.

All football games incorporate at least some strategy. Football without set plays and precise formations would be a melee between two uniformed mobs of fitness freaks. A game which completely ignored the sport's more cerebral aspects wouldn't be much of a simulation.

An action-oriented football game, like *On-Field Football* (Gamestar), subordinates planning to execution. The strategic elements serve to set up the action.

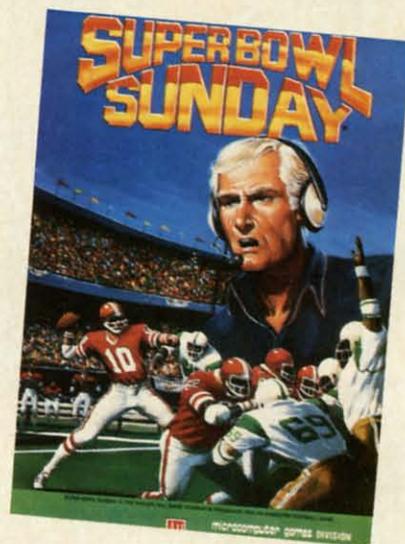


Jump with Bird and Erving; bump with *The World's Greatest Football Game*.
READER SERVICE NO. 242

Artificial intelligence makes the onscreen athletes more than simple human-shaped cursors. Coaches customize their offensive squads by selecting a quarterback, tight end, and wide receiver from a pool of available talent. Each of the candidates has a different balance of skills. A particular quarterback may heave the ball 60 yards but lack mobility, while the alternative is a scrambler with a weak but accurate arm. These strengths and weaknesses subtly fashion the team's personality.

The coach of the team with the ball picks a formation and play-routes with the joystick, which also controls the action after the ball is snapped. The defense, also employing a joystick, chooses one of the four line setups and selects pass coverage for the secondary.

Two additional options sharpen the strategic focus. The offensive team can cross up the defenders by substituting an "audible" at the line of scrimmage



Direct one of twenty classic teams.
READER SERVICE NO. 241



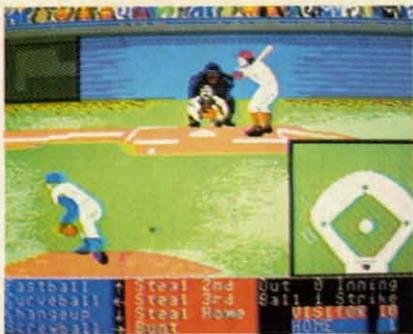
Jump with Bird and Erving; bump with *The World's Greatest Football Game*.
READER SERVICE NO. 243

for the original play, and teams can insert substitutes late in the game.

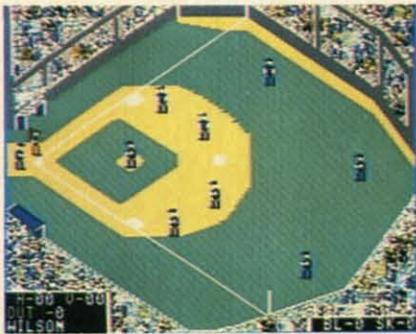
The visual presentation of *On-Field Football* is highly unusual. The gridiron scrolls vertically as possession moves between the goal lines, while most other programs favor the traditional horizontal playfield. The players are well-drawn and correctly sized for the playing area. *On-Field Football* gives teams room to maneuver so that the game doesn't become an endless series of desperation passes.

No one will ever confuse the free-wheeling hijinks of a typical game of *On-Field Football* with the National Football League. This is sandlot football with four men on a side and razzle-dazzle plays which often mystify the team with the ball as much as they do the defense. Would-be Tom Landrys may find *On-Field Football* a little too frivolous, but it's truly an action-gamer's delight.

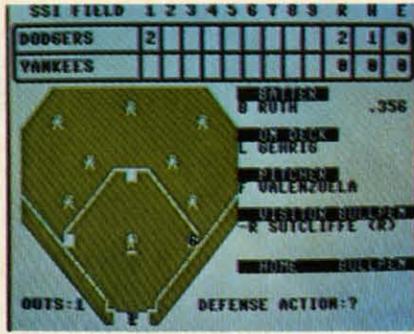
Strategy football games sacrifice



Hardball has TV camera perspectives.
READER SERVICE NO. 244



World's Greatest Baseball Game: slow.
READER SERVICE 245



Computer Baseball: replay seasons.
READER SERVICE NO. 246

direct control of the onscreen action for greater latitude in offensive and defensive play-making. Thus they are less a test of motor skills than a battle of wits between rival planners.

Computer Football Strategy (The Avalon Hill Game Company) was the first program of its type for the Commodore and still rates as a thought-provoking sports simulation. *Computer Football Strategy* is a one- or two-player contest based on AH's long-popular non-electronic boardgame of the same name.

Basically, it's a poker game between offense and defense. Each coach picks a play from an extensive list of possibilities. The computer cross-indexes these selections and shows the result of the play in colorful animation.

Computer Quarterback (Strategic Simulations) limits the graphics to the x's and o's of the coach's chalkboard, but adds a new dimension to the strategizing: variation in the abilities of the players.

Before the opening kickoff, each coach uses a bankroll of \$3 million to build a dream team. The amount spent on players in each of the 12 categories (split end, tight end, wide receiver, fullback, halfback, quarterback, offensive line, defensive line, linebackers, deep backs, special teams, and kicker) determines the quality of the gridgers the team acquires.

The coach/general manager can create any type of squad by spending more on some positions and less on others. Allocating heavy bread for a quarterback and the receivers produces a passing attack to rival the Miami Dolphins, while spending the

same amount on a halfback, fullback, and offensive line can generate a crunching running game. SSI has disks with statistically computed models of actual professional football players for those who like the idea of directing teams bristling with familiar names.

The World's Greatest Football Game (Epyx) is a detailed simulation of football coaching which frees grid-iron gurus from the shackles of pre-set plays. The computerist creates the offense and defense from scratch using a simple electronic chalkboard system. In effect, each gamer can design a complete playbook and save it to disk for use in actual games.

The outcome of all this planning can be displayed on the screen at a variety of user-selectable speeds. Plays may be rerun and examined in microscopic detail; there's even an option allowing frame-by-frame advance.

Statistical replay games are strategy-oriented programs which up the emotional ante by putting analogs of actual players on the field. Such contests are built on extremely detailed mathematical models designed to reflect real-world performance. In essence, a player in a stat-replay program will have about the same degree of success as his flesh-and-blood counterpart.

Stat replay is probably the most precise way to reproduce the dynamics of actual sports on the computer screen. In pure strategy games, the coaches call offensive and defensive plays in an ideal environment, but stat-replay coaches must also consider the abilities of the athletes who carry out their orders. An outside

sweep, therefore, has a much greater chance of success if the ball is in the custody of the elusive Marcus Allen than if the lumbering Pete Johnson is toting the pigskin. Of course, the talents of the offensive line and the individual defenders also have a bearing on the result.

Stat replay games never wear out. Just feed them a new set of statistics, and it's a brand new game. Publishers of such software traditionally issue a "team disk" which reflects player performance during the previous season.

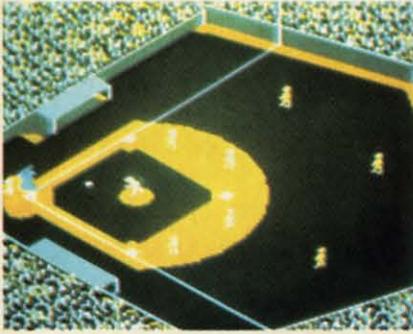
For most gamers, the best stat replay program is probably *Super Bowl Sunday* (The Avalon Hill Game Co.). Computerists can direct one of 20 classic Super Bowl squads against another human coach or the computer.

The offensive coach picks the formation (pro set, three-back, or four-receiver), selects a play, and assigns players to carry it out. The defense then enters its play-orders, including blitzes and double-coverage of key receivers. Well-designed menu screens make this process remarkably easy.

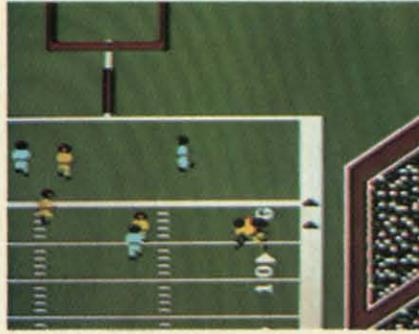
Once both teams are ready, full-screen animated graphics show the result of the play. Although the figures are not overly detailed, the lifelike animation captures the spirit of blocking and tackling.

Avalon Hill has already produced a team disk based on the 1984-1985 season. Additional disks featuring classic teams from the pre-Super Bowl era are a definite possibility.

Three-in-One Football (Lance Haffner Games) is a no-frills product from a small company which should greatly please dedicated stat replay fans. This all-text program features both pro and



Star League Baseball: full-field view.
READER SERVICE NO. 247



On-Field Football is action-oriented.
READER SERVICE NO. 248

college teams, and Haffner Games offers literally hundreds of different squads, including the USFL.

Ironically, *Three-in-One Football* requires less knowledge of individual players than other stat games. The computerist calls the play, and the program automatically picks the appropriate ball carrier or pass catcher. The simulation is extraordinarily detailed, and *Three-in-One Football* may well be the most precise recreation of big-time gridiron action.

Diamond Disks

The National Pastime is also well-represented in the C-64 universe. In addition to a pair of classic action contests, there are no fewer than four statistical simulations.

The newest kid on the block is *Hardball* (Accolade), a high-resolution action-strategy game with TV camera perspectives. This contest concentrates on the battle between pitcher and batter as viewed by sports television's celebrated "centerfield camera" angle. If the batter hits the ball, the appropriate fielder takes center-screen. A small overhead view of the whole diamond gives managers a sense of the big picture.

Star League Baseball (Gamestar) takes a more well-rounded approach to Abner Doubleday's creation. By keeping the entire field always in view, *Star League* draws computerists' attention to the team aspects of the sport.

The use of artificial intelligence, characteristic of Gamestar software, allows each manager to customize some aspects of his or her team. The hitters can aim for the fences or

pound out liners, and the pitcher can throw smoke or finesse the opposition with curveballs. There's even an opportunity to bring in a reliever in the late innings.

But *Star League* is fundamentally a contest of timing and reflexes. The defense selects pitches and maneuvers fielders, and the offense controls everything from the batter's swing to the baserunning.

Even after several years on the market, *Star League Baseball* is still Hall of Fame arcade-style fun. It plays well, and it looks great.

Micro League Baseball (Micro League Sports Association), on the other hand, is meat and drink for stat replay lovers. Though its graphics equal those of any action program, it also accurately replicates the performance of major league players.

Micro League Baseball comes with 19 classic teams, all-time great Philie and Tiger squads, two teams of old-time superstars, and the 1984 All Star teams. Additional team disks, including one which allows managers to trade players and draft leagues, are available for separate purchase.

Although the program features a fairly effective computerized opponent, *Micro League* is even more fun as a head-to-head competition. The skipper of the team at bat decides whether the hitter should swing away, hit and run, or bunt, and also controls the aggressiveness of baserunners. The opposing pilot selects the type of pitch and positions the infielders in crucial situations.

Every nuance is displayed in color animation. The onscreen athletes seem almost alive as they whip the

ball around the diamond after a strikeout or trot to the dugout between innings.

Computer Baseball (Strategic Simulations) isn't quite as pretty as *Micro League Baseball*, but it may be better for those who replay entire seasons, a popular pursuit among stat-oriented gamers. Its graphics are minimal, little more than a schematic to track runners on base, but its mathematical model considers more statistical categories than other programs.

Because *Computer Baseball* has been on the market for several years, the publisher has had time to produce a large library of supplemental disks. These include both selections of great teams of the past and full seasons.

Statis-Pro Baseball (The Avalon Hill Game Co.) also favors numbers over pictures. Because it's based on a non-electronic baseball game, the computer version benefits from about a decade of fine-tuning. *Statis-Pro* is visually primitive, but its play-mechanic is exceptionally smooth and simple to learn.

Avalon Hill has recently released a supplementary disk for *Statis-Pro Baseball* which reproduces the 1984 major league season. Several past years are also available from the publisher.

Those who want the versatility of a program which features both strategy and action should check out *The World's Greatest Baseball Game* (Epyx). The program, designed by Quest, offers both statistical-replay and arcade-action modes.

Graphics include a full-field display and an outfield scoreboard with inning-by-inning breakdowns and the lineup of the team at bat. The animation is a little slow in the action version, but is quite suitable for the stat-replay mode.

Sports Far Afield

Baseball and football aren't the only team sports which have been turned into computer simulations for the Commodore 64. *International Soccer* (Commodore/cartridge) is a pure action game, but, oh, what action!

The player uses a joystick to control the ball carrier, who can pass,

dribble, and shoot. On defense, the highlighted athlete is under the computerist's control. When action nears one of the goals, control automatically shifts to the netminder.

International Soccer is played on a beautiful, horizontally scrolling field canted at a three-quarters angle. The onscreen players are large and well-articulated, and they respond well to the joystick. The program also includes a nice extra: the winning team is presented with a loving cup at center field.

Ice hockey aficionados, meanwhile, may wish to take a skate with *International Hockey* (Advantage Artworx). This is a first-class revamp of Artworx's *Slap Shot*. As in the earlier program, action scrolls horizontally, and the coach controls the puck carrier (or the nearest defender) with the joystick. The skaters can pass, rush, shoot, or even body check. But if they get too boisterous, watch out for penalties.

International Hockey provides the solitaire play option missing from *Slap Shot*. The new design also boasts limited speech synthesis and "penalty shots," a secondary mode in which a puck is shot directly at the goal, seen from a head-on perspective.

The graphics and play, while not the ultimate in sophistication, should be quite acceptable to hockey-starved computerists. Artworx has taken a solid program and made it truly excellent.

There are no team basketball simulations, but there is *Larry Bird and Julius Erving Go One-on-One* (Electronic Arts). Fluid animation and artificial intelligence which mimics the players' signature court moves make this one a must-have.

One of two gamers direct computerized replicas of Bird or the Doctor with the joystick. Whether or not the ball goes into the hoop depends on where on the court the player shoots and how well the defender is guarding.

Basketball purists will certainly miss key aspects of the sport such as passing and set plays, but *One-on-One* gives a fair approximation of what might take place if these two all stars met on a playground for a little head-to-head rivalry.

On the Farm

The already extensive selection of team sports simulations will expand even further in coming months. Lance Haffner Games will soon produce its stat replay basketball program for the Commodore 64, Gamestar reports it is preparing a basketball title, and Micro League Sports Association intends to publish a football simulation to go with its popular baseball program. And there will be, as usual, several unpreviewed sports simulations, too.

Play ball! □

ALICE IN VIDEOLAND

Artworx

Commodore 64

Disk; \$19.95

Alice has fallen down a rabbit hole, into a spectacular world of mad queens, white rabbits, Cheshire cats, and other characters created by Lewis Carroll. Alice's adventures have inspired John Fitzpatrick to design four linked action games which transport joystick-jockeys to the heart of this wonderland. This all-family entertainment is simple enough for even a fumble-fingered parent, yet charming enough to hold a child's attention.

Alice begins her trek in a lovely park. Clouds drift over a tree-lined landscape, and birds fly through the sky as a white rabbit hops across the lawn. When the bunny jumps into its hole, Alice follows.

The first test chronicles her plunge through the rabbit warren. Using a joystick, the gamer moves Alice back and forth and attempts to catch useful objects as she tumbles past them. There are bottles of make-me-small liquor, slices of make-me-grow cake, and keys which fit doors in the next room. Alice needs as many as she can capture for the second round of play, but she can only hold one object at a time unless she snags one of the wicker baskets. If the heroine bumps into any of the wall sconces as she falls through the room, she drops everything and must start collecting goodies again.

When Alice finally hits the floor, she has to search for doors. These color-coded portals only open with

the captured keys, and Alice can enter only if she's the right size. The cakes and bottles let her adjust her height. Each of these rooms contains more drifting objects and more doors to open if she can.

Not everything that flies past is helpful. If Alice is hit by the rabbit's fan, it makes her too big for any door. If a clock hits Alice, time runs out.

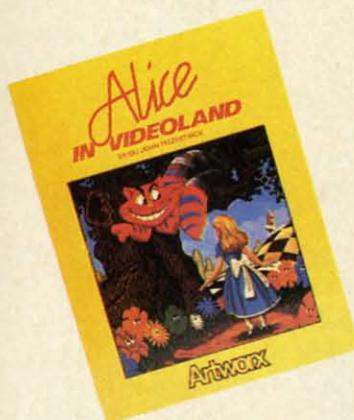
Next, Alice explores a lovely garden in a jumping game. While the caterpillar smokes his hookah atop a giant mushroom and the Cheshire Cat smiles down from his treetop perch, Alice tries to capture butterflies as they flit past. Each one is worth 10 points. A winged rocking horse worth 100 points flies past periodically. When Alice captures this tiny Pegasus and hops back down to the ground, the horse turns into a ball and rolls away, to reappear in a later contest.

If Alice is struck by a seed from a germinating flower, she shrinks to such a small size that further jumping becomes impossible. Eating one of the small fungi that rings the caterpillar's giant mushroom restores her size so she can continue the contest. When the girl has devoured all of the little mushrooms, the scene changes again.

The third game echoes the chess theme of Carroll's masterpiece. Alice has to make her way across a chessboard, avoiding the Jabberwocky and Tweedledum and Tweedledee. She has two white knights to run interference, but Jabberwocky and the fat twins are formidable opponents. It's worth 1,000 points to get Alice all the way across the board, but it takes careful strategy to gain that goal.

The final game parodies the croquet contest between Alice and the Queen of Hearts. When the round begins, Alice has one ball plus any orbs won in the garden scene. If Alice can maneuver the croquet ball into one of the two hoops formed by the playing-card soldiers, she earns 500 points plus another ball. But if the Queen captures the ball, she stomps it flat.

This is a game of angles. Alice must bounce the croquet ball against the bushes and fence to make it scoot through the hoop.

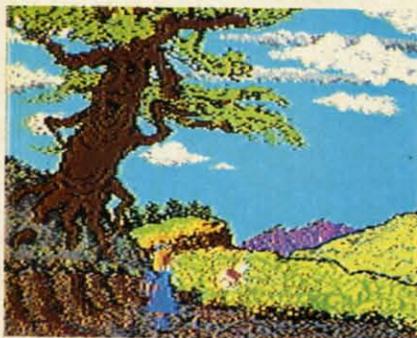


Alice consists of four linked games.
READER SERVICE NO. 249

Alice in Videoland is not difficult at its beginning level, but it can challenge even skilled gamers at its upper settings.

Still, the uncomplicated play-mechanic could hardly be called innovative or original. The first contest is reminiscent of early videogames; all the computerist has to do is maneuver Alice around the screen to catch desirable objects while avoiding obstacles. The second screen, despite its stunning graphics, is a straightforward jump-and-grab game. The chess match against Jabberwocky and his twin helpers, a challenge for strategists, is the most unusual of the quartet, although it is less visually striking. The croquet contest just takes some practice.

Alice in Videoland partially overcomes its relative simplicity with superior presentation. The animated title page, with hopping rabbit and flying birds, is strikingly beautiful. The garden scene also boasts outstanding visuals. Although the other screens



Graphics screens in Alice in Videoland range from attractive to striking.



Alice's uncomplicated play-mechanic is hardly innovative. The first contest is reminiscent of early videogames; the second, though stunning, is straightforward. The third game is the most unusual.

aren't as dramatic, they are quite attractive, and their good looks go a long way toward making the game fun to play. *Alice in Videoland* has little to test the skill of action aces, but casual players will probably enjoy the total experience fairly well.

Artworx, 150 North Main St., Fairport, NY 14450 (phone: 716-425-2833).

—Joyce Worley

STAR RANK BOXING

Gamestar
Commodore 64
Disk; \$29.95

The most exciting fights since *Rocky III* are taking place on the Commodore computer, thanks to the efforts of designer Troy Lyndon. Once again, Gamestar proves it has the courage to tackle a supposedly overused subject and the talent to produce a strikingly original program. Activision published the first piece of fistic software in 1980, and there have been at least a half-dozen more games since, but *Star Rank Boxing* looks like the new champion.

Star Rank Boxing breaks new ground by relating individual matches to the fighter's overall career. Other boxing games have attempted to provide a larger context for the left hooks and right crosses, but they are all statistically based. They generally let the gamer pick the fighter and even set the strategy, but leave the computerist holding the water bucket in the corner once the timekeeper rings the bell.

The first step before leather hits flesh is to design a boxer using a se-

ries of joystick-activated menu screens. After typing in the future Ali's name (up to 16 characters), the player determines the man's physical appearance, chooses an image, and picks one of five basic styles: dancer, boxer, mixed, slugger, or bulldog. This is a crucial decision, because it determines the boxer's computer-directed footwork during bouts.

Once the player makes these choices, the program generates the fighter's profile screen. This contains ratings for factors such as strength,



Star Rank Boxing breaks new ground.
READER SERVICE NO. 250



Island Caper: the cold war continues.
READER SERVICE NO. 251

stamina, endurance, and agility as well as intangibles like general attitude. It's a shame that the user can't directly determine the last-named factor, because no one really wants to guide the career of a boxer characterized as "negative."

The game disk holds up to 40 customized boxers. More can be saved on separate initialized disks.

The Circuit Status screen shows the current rankings. All new fighters start at the bottom, #19, and can only advance by vanquishing either of the two fighters rated directly ahead of them.

It's a long climb to the championship held by Boris Nicolenko. Along the way, a boxer must battle men with styles ranging from the toe-to-toe slugging of Bashin' Bill Snow to the deadly speed of Flash Fenwick.

Once the match is made, the boxer heads for training camp to get ready for the confrontation. There are five activities, each designed to build up one or more attributes. Roadwork

improves endurance, which helps the man rebound from a knockdown, while sparring has a beneficial effect on stamina, the factor which governs between-rounds recovery.

After camp breaks, it's on to the ring to mix it up with a human- or computer-controlled foe. The well-drawn arena shows a side view of each combatant within a ring tilted slightly toward the gamer to aid visibility. The crowd sends up a cheer as the rivals close for action.

The boxers are fairly large on the screen, which makes it easy to see who is landing the punches. Although the figures look good standing still, the animation is a little stiff. More movement of the shoulders and upper body would have produced a more realistic appearance.

Since the computer handles the footwork, the computerist can concentrate on throwing punches and blocking blows. A joystick-based control scheme lets the boxer throw an assortment of inside and outside punches or protect the head or body from attack. A "thud" accompanies a punch which finds its mark, while a whooshing sound signals a clean miss.

Each round consumes three minutes of game time, equivalent to about one minute in the real world. After each round, an update screen displays the current condition of both men, the crowd reaction to the bout, and the officials' scoring using the "10-point must" system.

A fight ends when a man knocks out his opponent, scores a TKO by knocking him down three times in the same round, or gets the decision after the last round. A screen summarizes the outcome and displays the purse for both winner and loser. All results are saved to disk at the conclusion of a bout, so a fighter carries his record forward from one contest to the next.

The automatic footwork is both a blessing and a curse. It greatly streamlines the mechanics of fighting, though managers may yearn for the ability to move a battered battler out of range when a knockout threatens. Experience quickly teaches the wisdom of covering up in such situations.

No boxing simulation offers a more attractive mixture of strategy and lightning action. It's the kind of game that hooks the player immediately. In short, *Star Rank Boxing* is a knockout.

Gamestar, Inc., 1302 State St., Santa Barbara, CA 93101 (phone: 805-963-3487).
—Arnie Katz

SPY VS. SPY: THE ISLAND CAPER

First Star Software

Commodore 64

Disk; \$29.95

Mike Riedel once again proves that you can successfully combine action and strategy, suspense and humor, in the same piece of software. Like its award-winning predecessor, *Spy vs. Spy: The Island Capers* is a one- or two-player action-strategy contest featuring the comic strip characters created by Antonio Prohias for *MAD* magazine in 1960.

The two agents of chaos who battled over hidden secret plans in an embassy in *Spy vs. Spy* are matched against each other in another treasure hunt. This time, the black- and white-garbed rivals have parachuted onto a volcanic island where parts of an advanced missile are buried.

The foes must compete against each other and the ticking time bomb of the volcano. The one who unearths the three segments of the top-secret XJ4½ missile can escape with the assembled device in a waiting submarine.

The outstanding feature of this game is that everything happens in real time. The horizontally split display provides a window for each spy, so that players can move, search, and set traps as fast as their fingers can work the joystick or keyboard. By breaking through the rigid structure of turn-by-turn play, author Riedel creates a game which requires plenty of thinking, but which rushes ahead at the same breakneck pace as any fast-action arcade contest.

The trapulator, somewhat redesigned from *Spy vs. Spy*, is the focus of the struggle between the two mad-cap agents. It allows players to store and use various items en route to successfully completing the mission.

A lit L.E.D. next to an indicator button means that the spy has at least

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one of that item in his possession. To pick up an item on the island, the player moves the spy next to it and presses the controller's action button. A second push adds it to the trapulator inventory.

Pushing the action button twice activates the Trapulator, which contains a batch of surprises for an unwary opponent. A spy can use the shovel to dig pits and punji stake traps, set up a snare with a rope, prepare coconut gasoline bombs, or even bury a canister of deadly napalm.

Each agent starts the game with 100 units of strength. This is depleted as a result of ordinary activities such as walking and swimming or as a result of setting off a trap. A sword cut during hand-to-hand combat costs the on-screen character three points, while a blast of napalm reduces strength by a whopping 40 units. A little rest permits a spy to regain some strength. An agent dies when the strength level hits zero, which gives the opponent a clear shot at scooping up the missile parts and catching the sub for home.

The graphics are beyond reproach. Each window scrolls independently in response to a spy's movement, which produces the satisfying illusion of spaciousness. The three-dimensional perspective allows an agent to walk toward the foreground or background, as well as left and right.

Spy vs. Spy: The Island Caper provides seven levels of difficulty. Among the variables are the amount of time before the volcano blows, the quantity of gasoline available for coconut bombs, and the number and size of the islands. The intelligence of the computerized player in solitaire games is also adjustable, so that novices and veterans alike will always feel challenged.

Some gamers feel that the excitement has gone out of entertainment software with the waning of the action game boom. *Spy vs. Spy: The Island Caper* demands quick thinking, but it's guaranteed to keep players on the edge of their chairs until the final seconds.

First Star Software, 18 East 41st Street, New York, NY 10017 (phone: 212-532-4666). —Arnie Katz

KARATE CHAMP

Data East
Commodore 64
Disk; \$29.95

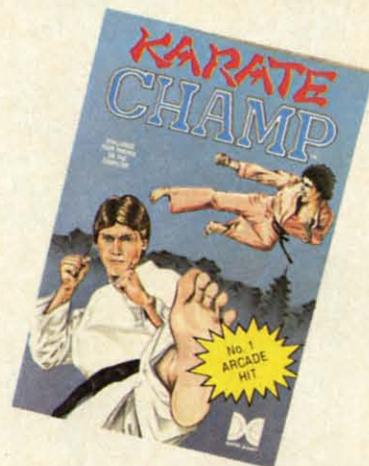
If, like most home computerists, you haven't visited a family amusement center since *Pac-Man* was only *Pac-Boy*, you've probably missed the hottest trend in play-for-pay machines. In an effort to lure back those who became jaded with endless shooting and blasting, coin-op manufacturers have developed a batch of quarter-snatchers which incorporate a lot of strategy while maintaining the fast pace of the classic shoot-em-ups and maze-chases.

You can put away the old coin-holder, because a good example of this new breed is now available in translation for the Commodore. The home edition isn't quite as electrifying as the arcade version, but it's an entertaining action-strategy test for one or two would-be martial artists.

The computerist directs a white-clad fighter using a fairly complex system of joystick commands. The coin-op employs a dual-stick system which could not be duplicated for the C-64 disk. The single-controller method works well, but most players will take several matches to memorize the various stick positions. That's unfortunate, because *Karate Champ* really comes into its own only after executing the various blows becomes second nature. The documentation wisely counsels neophytes to play test matches against a stationary opponent to get the hang of the command structure.

To order a move, the gamer points the joystick in one of the eight possible directions. Pressing the action button while doing this enables the gamer to access another group of moves.

In four cases, the same stick position actually invokes two different maneuvers. The computer determines which one is executed according to the distance between the fighters and what the opponent is doing at that instant. For example, pushing the joystick to three o'clock while holding the button yields a middle lung punch if the foes are widely separated or a front kick if they are close together.



Kick, punch, block, grow huge feet.
READER SERVICE NO. 252



Each encounter lasts thirty seconds, or until one fighter decks the other.

The display shows a side view of the martial artists along with an on-screen referee who announces the winner of each encounter in a square speech balloon. A contest lasts one to nine rounds, and there's a different background setting for each one.

A major innovation in *Karate Champ* is that the combatants don't always face the same direction or stay on the same side of the display throughout the bout. A somersault combined with an about-face shifts the fighter who started on the left side of the display to the right. This also flip-flops the control system, which doesn't make order-entry any easier. The extra complication is worth the trouble in this instance, however, because it makes the game more fluid and unpredictable than any previous martial arts program.

Timing is far more important than speed in *Karate Champ*. The on-screen surrogate performs each move at a predetermined speed, and it is not possible to program several blows

at the same time. Ordering a new blow before the fighter finishes the previous one aborts the move and leaves the man open to vicious counterattack. The idea is to enter a new order just as the fighter finishes the last one to mount a sustained attack.

Each encounter lasts 30 seconds or until one fighter decks the other. The judge awards a full or half point for a fall, depending on the nature of the blow and the quality of the execution. Two points wins the round. A separate score, which does not directly affect the outcome of the match except in the case of ties, provides an index of how effectively each man performs the various karate maneuvers.

The winner of a match earns the chance to accumulate bonus points by meeting special challenges. If the fighter can knock a flower pot out of the air, break boards, or stop a charging bull, it adds 200-2,000 points to his score. Successfully completing a bonus round gives the karate kid a chance to try again, up to a maximum of five bonus opportunities.

The learning curve is steep, but *Karate Champ* is assuredly worth the initial effort. When the joysticks are in the hands of two practiced gamers, it is one of the most exciting games to hit the computer screen in a long time.

Data East USA, Inc., 470 Gianni Street, Santa Clara, CA 95054 (phone: 408-727-4490). —*Arnie Katz*

HACKER

Activision

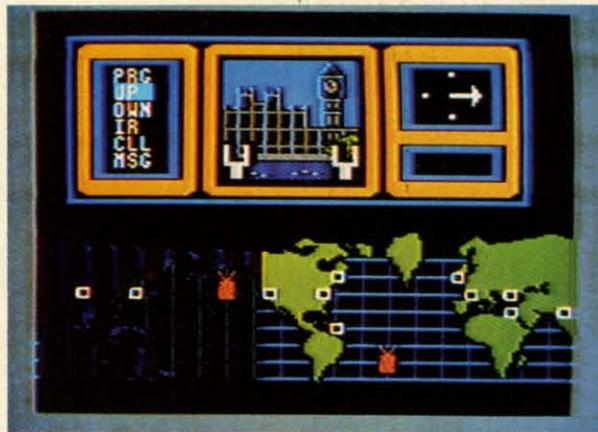
Commodore 64

Disk; \$29.95

Be prepared for a shock when you open the *Hacker* package: there is no documentation. Activision hasn't even included a little folder crowing about the "thrill of discovery."

It's no simple oversight. To the contrary, the absence of copious instructions, design notes, and the like is intended to slightly disorient the gamer and remove the security blanket which a rulebook represents to the purchaser of a new piece of software.

The anything-can-happen ambience is the perfect setup for *Hacker*. It promotes the willing suspension of disbelief which allows you to enter



Careful Hackers will keep a note pad handy, as periodic security checks require you to give responses based on previously acquired data.

READER
SERVICE
NO. 130

the topsy-turvy world of the game.

Booting the disk thrusts the player into the middle of a planet-threatening conspiracy. As an involuntary eavesdropper on a private computer network, the player discovers that a multinational conglomerate, Magma Ltd., plans a secret experiment which could blow up the world.

The gamer pieces together little bits of information which flash across the display to learn the full story. When a bulletin reports the theft of a document which could blow the whole rotten operation sky-high, the adventurer's course is clear: get that incriminating report and give it to the proper authorities.

This mission, the central theme of *Hacker*, should keep the computerist busy for many, many sessions of play. Someone has ripped the document into little pieces and given each shred to a different spy. To stop Magma's insanity, you've got to get that paper.

How do you contact secret agents located all over the globe without leaving the computer console? The same accident which let the gamer into the Magma network also gives control of a highly mobile scout robot. This mechanical probe can travel from city to city through subterranean tunnels.

Once the crusading computerist gets the probe to a world capital, sending a signal causes the local spy to appear. The trick is to figure out what price each agent will take for his piece of the document. Some want cold cash, and others specific items.

Most of the agents also have a list of items, including everything from

a chalet to an autographed Beatles album, which they would like to sell to the player. The player must selectively buy these offerings, because some will be needed to get pieces from other agents.

Winning at *Hacker* is largely a matter of trial and error. The player tests various buying and trading strategies until the one which collects all the pieces of the Magma report is found. This is likely to require at least a half-dozen runs through the program, and probably more.

Hacker will appeal most strongly to those who enjoy memory tests. During the course of play, satellite security checks require you to give responses based on previously acquired data. The checks become more and more challenging.

Steve Cartwright has brought some of his videogame design experience to *Hacker* in the form of an eye-catching action sequence. When the gamer programs the robot for a new destination, the breakneck trip down the tunnel, shown in first-person perspective, lends excitement to what is otherwise a fairly cerebral contest.

The fact that *Hacker* is essentially a puzzle, albeit a complex one, is certain to enthrall some and repel others. It is fundamentally different from most other strategy games, because repeated play is an integral part of reaching the solution. Those who enjoy a protracted battle of wits will find *Hacker* a lively test of their abilities.

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

—*Steve Davidson*

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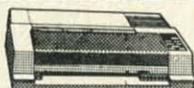
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DRIVES

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Program	Star-Dos	Reg. Load	Mach 5	Fast Load	MAGNUM LOAD
Pitstop II	?	144 sec.	43 sec.	41 sec.	31 sec.
Music Shop	?	105 sec.	105 sec.*	105*	21 sec.
Hitchhiker's Guide to the Galaxy	?	70 sec.	70 sec.*	N.G.**	68 sec.
On-field Football	?	149 sec.	66 sec.	63 sec.	56 sec.
EASY FINANCE I	?	58 sec.	13 sec.	13 sec.	11 sec.

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for Combo Version

*Will not fast load - defaulted back to regular load

**Failed to load at all

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- Imbedded Track Number Creator
- Disk Manipulation System
- 3 Minute Copy (backup program)
- Diskette Matcher (compare sectors)
- Unscratch A File (recover file)
- View BAM (block allocation map)
- 1541 Read/Write Test
- 1/2 Track Reader
- Header Reader (display disk header)
- Sync Maker
- Device Number Change (disk drive)
- Electronic Arts Backup
- Drive Mon (disk drive m/1 monitor)
- Diskette File Log (start-end address)
- Write-Protect Sensor Test
- Repair A Track (recover data)
- Fast Format (10 seconds)
- 1/2 Track Formatter

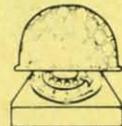
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TOP SECRET STUFF II

- RAM Test (test Computer RAM)
- Copy \$A000-\$FFFF (under ROMS)
- Display G.C.R. (All sector data)
- Un-Write Protect (diskette)
- Unnew Program
- Wedge - \$8000
- Smooth Scroll (messages up screen)
- Koala Dump (koala pad screen dump)
- Disk Manipulation System
- Disk Eraser (20 second clean wipe)
- Split Screen (TWO screen colors)
- Disk Protection System (stops copies)
- Write Protect (diskette)
- Boot Maker (autobook BASIC programs)
- Wedge - \$C000
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THE HAUNTED CASTLE

For the C-64

By Derrick Brundage

Your task in *The Haunted Castle* is fairly simple: avoid the ghosts while searching the castle for three treasures. It sounds easy, but it isn't. First of all, the castle has over 1000 rooms (1100 to be exact) spread over 11 levels (100 per level). Second, the ghosts open and close the doors leading from each room at will, and you have no key with which to unlock them when they are closed. If a ghost catches you, it will steal a treasure and place it somewhere else in the castle. Should a ghost catch you without a treasure, the game will end.

Despite all this, you have a few things going for you. For one, you don't have to search all the rooms of each level for stairs and treasures. The number of the room you are currently in is displayed, as well as the room numbers of all staircases and treasures on that level. If the treasure location reads "NONE," there is no treasure on that level. Staircase room numbers work in the same fashion. Once you have found all three treasures, return

to the room you started in (room 00 on level 0).

Movement is as would be expected: move the joystick in one of the four general directions and your character will move. You simply guide it away from ghosts and through open doors. To go up or down a level, just enter a room with a staircase going to the level you desire. Touch the staircase and WHOOSH!!! you're there. To get a treasure, enter a room with one and touch it.

After reading the above, it may seem that I've made the game too easy with all the room numbers. But the game is difficult enough with just the randomly opening and closing doors. In the original program, I left the player with nothing more than the current room number and the number of treasures, but the game proved far too difficult for my liking, so I added all the "extras." When you play the game you will find that it is still quite challenging, and it doesn't require nearly as long to play as the original, though it will still take about half an hour to play to completion.

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THE HAUNTED CASTLE

Variables, Strings, Arrays, and Line Numbers

STS - Draw Stairs	A - General Purpose	B - General Purpose
SBS - General Purpose	X - Player's X Position in Castle	Z - Current Level in Castle
TRS - Treasure Room Number	SD - Start of Sprite Definitions	TC - Number of Treasures Collected
USS - Up Staircase Room Number	S - Start of Sprite Registers	C - General Purpose
DSS - Down Staircase Room Number	SO - Start of SID Chip	D - General Purpose
DS(x,x) - Draw Doors/Open Doors	SL - ML Sprite Left Routine	SS - Stair Status; Up or Down
WS(x) - Draw Walls in Doorways	SR - ML Sprite Right Routine	T - General Purpose
SS(x) - Staircase Location on Screen	XR - 6510 X Register	CL - Number of closed Exits in Room
M - ML Main Loop	P - ML Animate Player Routine	TR - Room Status; Treasure or Ghost
U - ML Main Loop Status Register	Y - Player's Y Position in Castle	

Lines:

0-15 Initialization	39-65 Set up New Room	96-98 Read Data
-16 Main Loop	66-75 Initialization	99-122 Sprite Data
17-24 Movement Between Rooms	76-78 Found all Treasures	123-152 ML Data
25-31 Movement Between Levels	79-85 Display Information on Screen	153 Clear SID Chip
32-35 Grab Treasure	86-89 Title Page	154-156 Sound Effects
36-38 Gost Catches Player	90-95 Game Over - Player Killed	157 Draw Side Walls

For all the dedicated hackers out there, I have compiled all the variables, strings, arrays, and line numbers used by the program and supplied a short description.

The program uses several ML routines, but they are all called at once by an ML Main Loop starting at 49750 decimal (variable M). One of the routines called by the main loop is needed by BASIC for animation when moving between rooms. This routine starts at 49496 (variable P). Of interest to BASIC programmers who need a little extra speed in their sprite programs are the routines at location 49176 and 49196 that move any sprite left or right one pixel; they even set the MSB when needed. Just POKE 781 with the sprite number multiplied by two and SYS the routine. These routines do not support wraparound so don't let your sprites past the bor-

ders. Also, these routines require the first 16 bytes starting at 49152. There is a sprite up routine at 49168, and a sprite down routine at 49172, but they would not be of much use simply because they wouldn't be much faster than an equivalent BASIC statement. However, if you do wish to use them, they work the same as the left/right routines and *do* support wrap-around. I am not one for writing neat, orderly ML code, so I extend a warning to all ML programmers: don't disassemble the code! It can get quite complex, in fact, it's a miracle some of it even works.

I enjoyed writing this game, and I hope you enjoy playing it. I welcome any comments or criticism regarding the program. □

SEE PROGRAM LISTING ON PAGE 137



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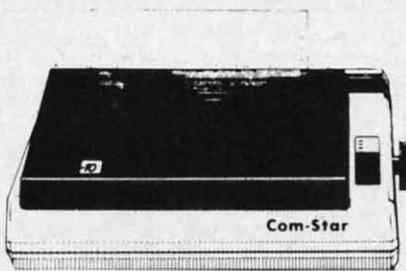
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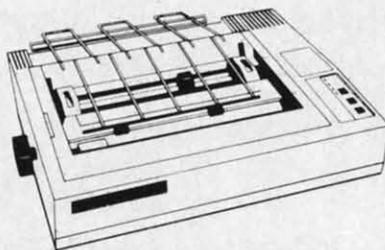
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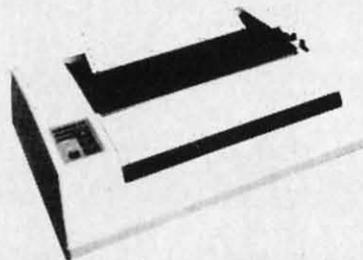
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For the C-64

By Tony Brantner

Knockout is a boxing simulation which lets you step into the ring and slug it out with a human or computer opponent without even getting your hair mussed.

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You will now be shown an overhead display of the ring, with the fighter in white controlled by a joystick plugged into port 2 and the fighter in black controlled by either a joystick plugged into port 1 or the computer. As soon as you hear the opening bell, come out fighting. Moving the joystick moves your fighter in the corresponding di-

rection, while pressing the fire button makes him throw a punch. You have two minutes to try to outscore your opponent by landing more punches, with the time elapsed within the round displayed just above the ring. You will receive one point for each shot you land. If you get 100 points, the match will be stopped and you will be awarded a technical knockout. Once the match has ended, press the f7 key to either defend your crown or try to avenge your loss.

Just like in real boxing, your best strategy is to "bob and weave," backing away from your opponent's punches and countering with your own. Trying to "brawl" your way through a match by forcing your punches can result in a humiliating loss. Don't dance around the ring too much though, or you'll find yourself on the ropes fighting for your life! □

SEE PROGRAM LISTING ON PAGE 140

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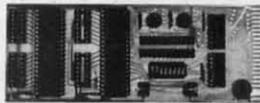
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Reader Service No. 265

THE MARTIAN MONSTERS

For the C-64
By James C. Hilty



Spaceships are our favorite food—and we are getting hungry.” These are the words that greet you on the title screen of *The Martian Monsters*, a game for the Commodore 64. After the title screen, a random starfield is drawn with the surface of the planet Mars on the bottom of the screen. A multicolored spacecraft attempts a landing when suddenly a swarm of monsters begins an attack. You have five ships at your disposal, but you’ll need them all, because these pesky little creatures eat spaceships.

Hitting the monsters with your laser gains you points, while a monster catching you gets you gobbled up for lunch. If you miss the monsters when you fire your laser, all five of them will stop and laugh. Five misses with your laser will end the game. Losing all of your ships will also end the game.

Your spaceship is constantly moving horizontally across the screen. You control vertical movement by pushing the joystick up or down. Pressing the fire button fires your laser.

STRATEGY

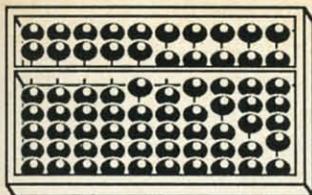
Hitting a monster with the laser will blow him up. But he rejuvenates himself almost instantly. Thus, if you fire at a monster when he is very close to you, he may come back to gobble you up if you’re not fast enough with the joystick. Sometimes it is better to fly around and wait

for a safe shot, but this increases the risk of a monster sneaking up on you and having a light snack.

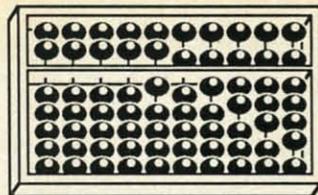
AN ILLUSION OF SPEED

Things seem to move pretty fast in outer space. A short machine language routine (lines 5000-5230) causes the screen to scroll. The main loop (lines 850-970) keeps your spaceship flying horizontally and contains the joystick routine which allows you to control vertical movement. A machine language interrupt routine moves all of the sprites except your spaceship. This routine, like all interrupts on the 64, is read every 1/60th of a second. The machine language routines allow the main loop to be tightened up, creating a faster game and allowing error-free collision detecting. If your program does not have to read as many POKEs and PEEKs, then it can read your collision routines faster. When combining BASIC with machine language, the SYS command is often used. In this program SYS 49152 calls for the scrolling routine and SYS 51104 sets the sprite movement routine in motion.

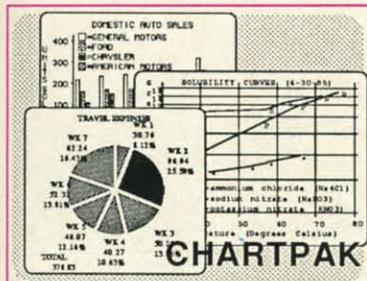
Thus, the machine language routines scroll the screen and move the sprites, and the BASIC main loop moves your spaceship. You have monsters moving all over, your spaceship constantly in motion, a laser being fired, and the screen moving. You have an *illusion* of great speed. This illusion is very important in many arcade-type computer games, especially those written in BASIC.



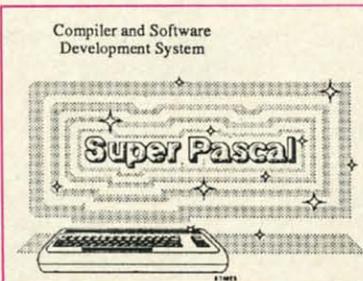
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AUDITIONING THE ACTORS

The five monsters are sprites. Initially they are all the same shape. Each monster sprite is a different color. The spaceship is a multicolored sprite (red, white, and blue). The laser beam is also a sprite.

The characters in a game need personality. The monsters, by their shape and color, appear "cute," which is what I wanted. By "quoting" the monsters through the use of several messages, a mischievous mood is created. The whining sound on the title screen also adds to the monsters' personality, as this is their voice. While data is being read by the computer a message declares that the monsters "are building up an appetite." When the game is over, the monsters appear onscreen gloating with a friendly message.

The monsters go through changes as the game is played. If you miss a shot, all the monsters expand, turn sideways, and "laugh" (lines 2500-2550). Lines 3000-3270 allow the monsters to gobble you up if they collide with you. Your ship explodes and the monsters eats up the remains.

EATING A SPACESHIP

As mentioned, part of the monsters' personality is shown through different shapes and animation. The main loop (lines 850-970) checks each of the five monsters for a collision with the spaceship. If there is a collision the program branches to the "eating" subroutine (lines 3000-3270). The appropriate monster (found by giving variable Q the appropriate memory location for the sprite) is expanded horizontally and vertically by POKEing (V+23) and (V+29) with the appropriate values. The monster's shape is altered by continually POKEing different pointers in the sprite's memory location.

For example, sprite #2 is one of the monsters. The original pointers are set by POKEing 2042,192. All the monsters start out with their memory locations being POKEd with 192. Sprite #2 is expanded vertically by POKEing V+23,4 and expanded horizontally by POKEing V+29,4. The shape of the sprite is changed by POKEing location 2042 with values 195 and 196. This creates a "flip page" animation effect. Using a variable speeds things up—in this case variable Q for the sprite memory location and variable P for the sprite pointer. The following chart illustrates how this animation effect is used in *The Martian Monsters*:

Q=2042	(Sprite memory location for sprite #2)
P=195	(Pointer where sprite data pattern shows the Martian with his mouth closed) (Pointer 196 shows the same pose, but with the mouth open)
For T=1 TO 8	(How many times the Martian opens and closes his mouth)
POKE Q,P	(Changes the Martian's shape to mouth closed) (Changes the Martian's shape to mouth open when P=196)
P=P + 1; If P=197 then P=195	(Changes P from 195 to 196, then back to 195)
Next T	(Completes the loop for 8 "chewing cycles")

Since the collision routine in the main loop gives the memory location for the particular monster involved, the sprite retains its own color and position. A similar routine occurs when a missed shot happens, only rather than just one, all five monsters laugh using the same sprite pointers used for "eating." When hit by a laser, sprite pointer 197, a picture of an explosion, is POKEd into the monster's memory location. After a split second, his original shape is restored by POKEing 192 back into his memory location. Sprite pointer 197 is also used when the spaceship collides with a Martian monster.

SOUNDS

Sound adds a great deal of feeling to a game. In *The Martian Monsters*, sound also helps add to the monsters' personality. The different sounds of a monster eating and being hit lets you know what is happening in a game. The whining noise at the beginning and end of the game is actually the monsters' voice.

The sounds in *The Martian Monsters* change when you do not have control of the joystick—that is, outside of the main loop. This eliminates a slowdown in the game. This also allows for more elaborate sound. A monster can take his time eating your spaceship, since there is nothing you can do about it.

AVOIDING THE SEAM

Let's get back to the illusion of speed. The 64 has a seam in the screen approximately $\frac{3}{4}$ of the way across. The joystick routine which allows you to control vertical movement and the routine in the main loop which moves your ship horizontally are written in BASIC. To move the spaceship across the seam would require an additional line in the main loop (POKE V=16,1; POKE V+0,X). This line would permit horizontal movement across the seam. The addition of any extra lines slows down the game. To avoid having to contend with the seam, the portion of the screen to the right of the seam is used for displaying the title, score, ships, and missed shots. Thus, the game is not slowed down any more than it has to be. The machine language scrolling routine does not scroll this part of the screen.

SUMMARY

Mechanics are important in any type of programming. The program must do what you want it to. But in a game program other factors are equally if not more important.

You must be a magician or storyteller. You must quickly create characters and situations that are interesting and visually appealing. You are creating pictures and a mood. You are affecting the feelings of the person playing your game.

You must create a grand illusion with POKE and PEEK. At the conclusion of the game, when the "play again" option is displayed, you want the player to press "Y". Then you know that your illusion was a success. □

SEE PROGRAM LISTING ON PAGE 120

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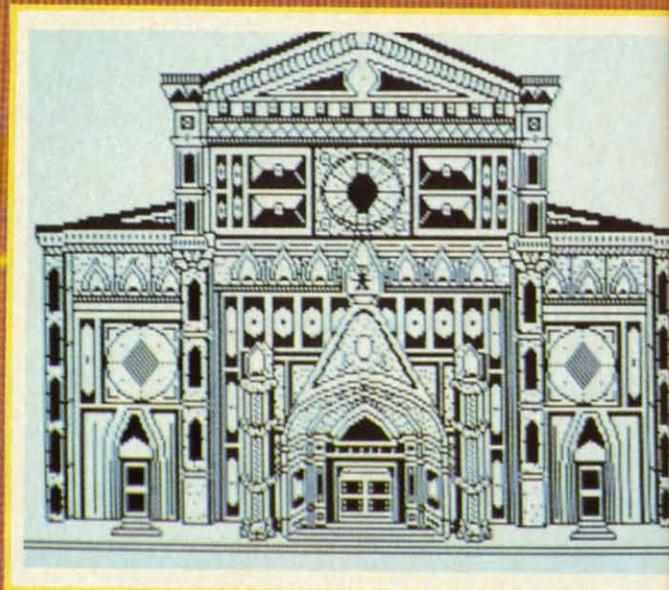
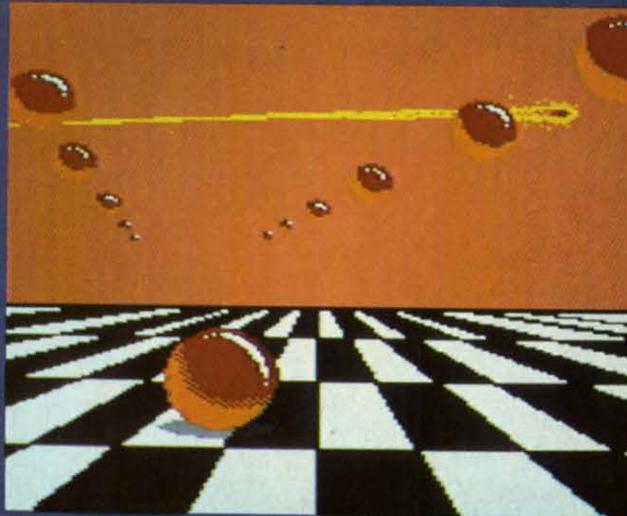
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As you read these words, it's early December. But as we write them, it's early October—hence our Columbus Day-inspired *Art Gallery* salute to Italians and Italian-Americans. Steven Distasio's detailed *DOODLE!* images, *Venice Church* and *Italian Church*, demonstrate the maximum resolution of the C-64's 320 x 200 pixel hi-res graphics mode.

Space2 and *Bridge* were created with *Koala Painter* on the Koala Pad by Alberto Valsecchi of Milano, Italy—definitely a New Renaissance artist of the highest order. Saluting the great astronomer Galileo and forming the background for this month's images is *Comet* by Sean Huxter (Springdale, NF), who made his *Art Gallery* debut last month. The image is shown unobscured at lower left.



REVIEWS

DATA MANAGER 128 SWIFTCALC 128 WORD WRITER 128

Timeworks, Inc.
Commodore 128
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Timeworks' word processor, spreadsheet, and database programs, their first for the 128, are the equal of any I've seen. The three have many features in common, so I'll enumerate these, then get down to each one's strengths and (almost non-existent) weaknesses.

The good news starts as soon as you open the packages. A toll-free hotline number is printed on the inside front cover of the documentation for each program. The support person I spoke with knew the systems and said that she uses them exclusively.

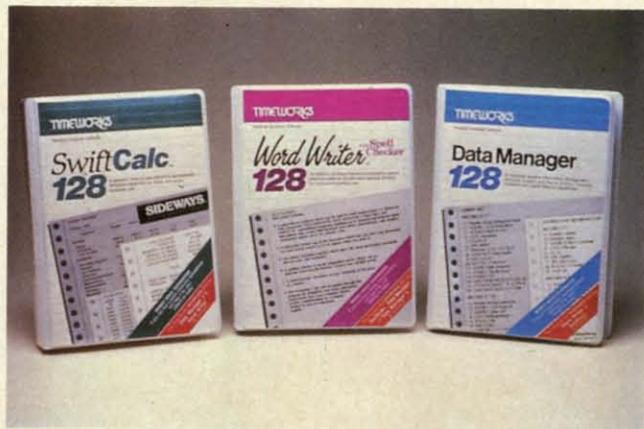
At this writing, the programs work only in the 128 80-column mode. For those used to a 40-column character set, the 80 columns can produce splitting headaches within a short time. This is especially true if a monitor has any flicker to it at all. By the time this article sees print, Timeworks will be offering 40- and 80-column versions of *Word Writer* on the same disk. While going back and forth between the two will require reloading the appropriate version of the software, it will give the user a choice.

Because of the difficulty of getting all the necessary information on a 40-column screen, *Data Manager* and *SwiftCalc* will be available only in 80-column mode. Timeworks is planning to redesign these packages to run in 80 columns with the 1702 using the video out port, so a special cable connecting the RGBI port won't be necessary.

The documentation for each program is outstanding. An alphabetic glossary of terms at the beginning of each manual tells you what they're talking about in advance. A tutorial in the early pages teaches you how the main features of the program work. In each, you cre-

Timeworks' 128 versions of their spreadsheet, word processing, and database programs can share data with minimal inconvenience.

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ate a sample that with a little modification could actually be used for a purpose. Sample files are included on the disk and the manual is sprinkled with examples. A "facts at your fingertips" section in the back has a condensed version of the information found elsewhere, for those who like to just dive in and deal with problems when they arise. A section on troubleshooting and error messages can really help when things don't seem to be working right.

All three programs use a Macintosh-like menu bar and "pull-down" menus. Hitting the 128's escape key (ESC) puts the menu bar across the top of the screen. The arrow keys are used to highlight the option you want to use. Hitting the return key pulls down the menu so you can see what options are available. Again, the arrow keys are used to highlight the option you want. The RETURN key picks the option.

For instance, printing information with your printer requires choosing the print option in the menu bar. This calls up a sub-menu with the option to print on the screen or your printer. When you've made that choice a group of questions helps determine how your printout will look. After the questions are answered your document is printed. This is a very effective way for new users to work with a program because the computer prompts for all the information it needs to complete the action you ini-

tiate. However, as users gain experience with a program, menus can become cumbersome. I understand that the programs will soon include keystroke commands to use as alternatives to the menus.

The three programs include a "repeat the last command used" feature, so that you don't have to keep pulling down the menus to reuse a command.

All three programs include print drivers that will work with most of the commonly marketed printers and interfaces. They all have provisions for modifying the print control codes that are sent to the printer, so special fonts and sizes of type can be adjusted. All contain an option to designate the third number used in the printer "OPEN" command, as well as toggling the ASCII correction on or off.

As with previous Timeworks packages, the three programs can share files. Programs are included to create files that can be read by the other modules, making it possible to transfer data from the spreadsheet to a word processing document or from the data manager to the spreadsheet, etc. The word processor has a pull down calculator that easily puts the results of your calculations right into the document you're editing. The database program allows number fields and calculation fields that can include logic operators and "IF-THEN-ELSE" statements. The database will also create graphs of those

calculations or number fields (much like *Lotus 1-2-3* does for IBM users). *SwiftCalc* also graphs data for you and includes "IF-THEN-ELSE" operators.

The *Word Writer* program has most of the features that make a good word processor, including some of the most versatile cursor movement keys I've seen. The only movement command missing is backward or forward one word. Formatting of information in a document is relatively simple. Many format commands are in the print menu and do not have to be inserted into the document. A reformat command is included to handle changing margins mid-document or for an alternate printout.

A page break display is provided to show where each new page starts. Word wrap and insert are included; however, the insert is not an on/off toggle. Instead you must insert a character or line at a time. The delete functions are well planned and include delete character, word, or line. You can also delete a block of text or the remainder of a file.

Another nice feature is the memory remaining command. Since Time-works chose to limit the size of documents to 64K, it's always reassuring to be able to check the space left. A more realistic document size limitation that you should keep in mind is the spelling checker's limit of 10 pages of text. Linking documents requires a bit of manual labor. Instead of inserting commands to load new modules automatically, the writer must print the first, load the second, print the second, load the next, and so forth. Unless a reset command is used to prevent it, each new document loaded in is treated as an extension of the last. The reset function puts the page number back to one.

The spelling checker takes about the same amount of time as others and will make corrections in the document. It is easy to use and fairly forgiving. Its dictionary is not too extensive, but you can add a supplementary dictionary of words you use that aren't in the main one.

SwiftCalc has most of the features of *Lotus 1-2-3*, and Timeworks plans to

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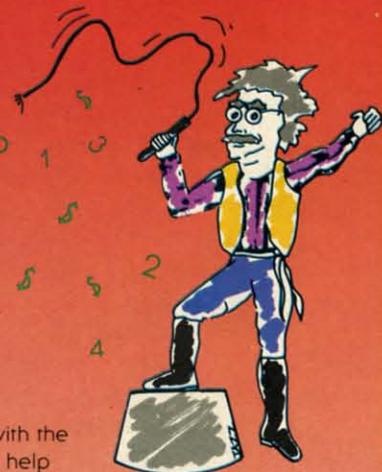
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add more. While it will currently create simple graphs of data, soon more complicated illustrations will be possible.

Cells are initially fixed at a given size, but can be adjusted to new widths as data is being entered. Cells can contain numerical data, labels, text, or formulas that reveal results of calculations. These formulas can contain up to 240 characters and use the cell names as variables. For instance, adding the first three cells in column one would be done by specifying a cell as a formula cell and entering its contents as $A1+A2+A3$. The numbers' appearance, whether or not to include dollar signs, and number of decimal places are easily adjusted. Scientific notation can be used if you prefer.

SwiftCalc has an automatic calculation feature that causes all formulas to be reevaluated each time a cell's contents are changed. While this is ideal for smaller spreadsheets, the recalculations can take much longer for more complex or lengthy forms. Since the C-64 can't handle data input while it is calculating, the wait can be annoying while you are manipulating the numbers. *SwiftCalc* has a feature to turn the recalculation off. A separate command is included to "force" the calculation manually. This is a real time saver.

SwiftCalc has features that you would find in a word processor, as well. You can add, delete, move, or copy cells, rows, or columns, or blocks of cells. You can also search or search and replace. Believe it or not, you can even set tab stops. A GOTO command lets you access any cell instantly.

Commands are also provided to check the amount of memory left and to freeze a row or column. The freeze command lets you keep your label fields on the screen, while helps prevent losing your place.

In addition to processing user-defined formulas, *SwiftCalc* has some built-in functions that are very useful. These include the minimum, maximum, and average value of a range, sum or value count of a range, absolute or integer value of a cell, and the present and future value of a dol-