

Ahoy!

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...SPECIAL HARDWARE REVIEW ISSUE!...



SPEECH SYNTHESIS

ON
THE VIC
AND
64

THE YEAR'S 25 BEST GAMES

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ANOTHER!

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ON THE
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INFORMATION NETWORK**

**PROGRAMMING JOYSTICKS
IN MACHINE LANGUAGE**



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Scale the mighty cliffs that lead to Akuma's fortress. There, you

will encounter the first of many palace guards. Kick! Thrust!

Parry! At every turn you will face yet another warrior, each stronger

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Finally, Karateka, you will come face-to-face with Akuma himself. Here your fate will be decided. Either eternal happiness or instant death. THE MAKING OF KARATEKA.



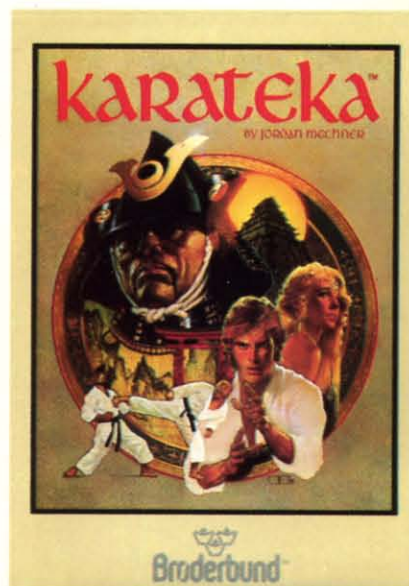
"Karateka" designer Jordan Mechner is a karate enthusiast and a stickler

for realism. He used film clips of karate masters as a guide for the moves used in the game.

The carefully detailed, animated figures perform all the moves of real martial arts combat with stunning realism.

Beautiful scrolling hi-res backgrounds, an intricate story line and

fast-paced karate action make "Karateka" a great way to get your kicks.




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Ahoy!

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*Includes program: *Gypsy Starship* (for the C-64)

**Includes programs: COMMTX, COMMRX, COMMHS, and COMMHILO (for the VIC and 64)

***Includes programs: BLACKBOARD.S and SKETCHER for the C-64)

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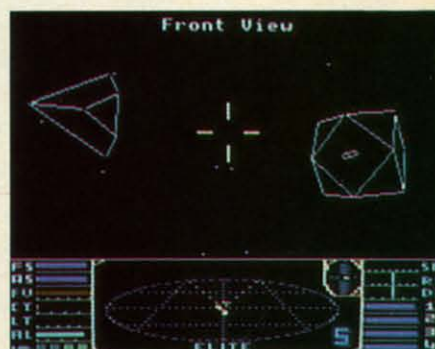
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VIEW FROM THE BRIDGE

It's hard to stay mad at us for long. Readers outraged by the absence of Morton Kvelson's popular hardware articles from our October and November issues will be more than appeased by the inclusion of two detailed hardware survey pieces in this issue—covering two of the most talked about categories in Commodore home computing!

In covering *Speech Synthesizers for the Commodore Computers*, Morton examines the theory behind generating voice-like sounds on a computer and looks in detail at five products useful in the process: Magic Voice, Voice Messenger-Speech 64, Voice Command Module, Voice Master, and Easy Speech 64. (Turn to page 33.) Next month he continues with Lis'Ner 1000, Hearsay, and ProVoice—plus detailed instructions on building your own speech synthesizer!

Morton has taken over our *Reviews* section for this month as well, with a look at three of the interfaces available for linking your C-64 to some of the high-powered IEEE-488 business peripherals now being sold at bargain basement prices. Also featured is the best-known of these peripherals, the \$199, one megabyte SFD-1001 Disk Drive. (Turn to page 79.)

In 1941, the year Joe DiMaggio hit in 56 consecutive games, Ted Williams' .406 batting average went relatively unnoticed. We hope the same won't happen with *Gypsy Starship*, sharing this issue with Morton the K's masterworks. It is nothing more than the finest feat of programming ever generated for *Ahoy!*'s readers by Orson Scott Card—and those who've followed *Creating Your Own Games* from the beginning know that that's saying quite a bit. The best part is, along with providing the complete game, Orson Scott teaches you how to do just as well on your own! (Turn to page 18.)

Who is better qualified to pick *The Year's Best Commodore Entertainment Software* than Arnie Katz? For years he presided over the awarding of *Electronic Games* magazine's Arkies, the videogame industry's highest honors. And this summer, he and I were the two individuals elected by the Electronic Industries Association to judge Commodore software for the June '85 CES Software Showcase. Read the picks of Arnie and the *Ahoy!* staff beginning on page 47...followed by reviews of *The Alpine Encounter*, *Countdown to Shutdown*, *Slap-Shot*, *Crusade in Europe*, and *Super Huey*.

Dale Rupert continues to lead us where no Commodore magazine has gone before—to the IBM PC! If you don't have one, don't worry—*The IBM Connection* actually deals with linking any two computers via their RS-232 ports. (Turn to page 61.)

Cheryl Peterson has managed to do it again with this month's *Cader's Column*—provide a feature geared to beginners that's just as relevant to the more advanced user. Join her on *A Tour of CompuServe's Commodore Information Network*. (Turn to page 95.)

Mark Andrews concludes his two-part *Commodore Roots* series on *High-Resolution Graphics*, providing the most detailed assembly language programs seen in his column to date. (Turn to page 91.)

We'll spare the hyperbole in our description of this issue's remaining programs. We don't have room for it—and besides, you know what to expect from *Ahoy!* in that department!

Cloak is a file encryption program for the C-64 or VIC 20.

(Turn to page 108.)

Gameload takes the work out of loading BASIC and ML games, and leaves only the fun. (Turn to page 107.)

Fun is just what you'll have playing *Jewel Quest* on your 64...unless Killough Bytes' robot sentries catch you in the process of making his priceless gem collection your own! (Turn to page 17.)

Santa's Busy Day is just what you need to keep the small children in your house quiet until Christmas morning. (Turn to page 118.)

Directory Manipulator generates eight helpful dictionary options controlled by the function keys. (Turn to page 113.)

Lineout provides an easy and disasterproof means of eliminating unwanted program lines. (Turn to page 90.)

This issue marks our completion of two years before the mast—24 straight months of bringing you the best package of Commodore goods we know how to put together. The fortunes of the home computer industry being what they are, we don't know if we—or Commodore—will be here in another 24. But we're going to plan on it, as we continue streamlining *Ahoy!* in the months ahead to most effectively serve our segment of the ever-changing Commodore market: the serious Commodore users on all levels.

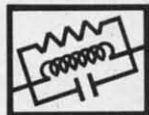
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We have tested it on well over five hundred programs and it loads spectacularly fast.

It's Easy

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

THE KEEPER

A cartridge that will retain 8192 bytes of memory even after you power down your C-64 or C-128, *The Keeper* will let you create autostart cartridges of your own programs as well as store programs for use upon power up. Unlike PROM programming systems, it utilizes virtual RAM that can be changed at will. Built-in software simplifies program storage. An in/out switch shuttles your program in and out of the computer's view. Price is \$49.95 plus \$3.00 shipping.

Marvco Electronics, 15702 S. Neibur Rd., Oregon City, OR 97045.

VIDEO DIGITIZER KIT

The package provides machine language software, plans, documentation, and a blank printed circuit board. You supply parts available at Radio Shack for about \$20.00, and roughly an evening's time. The result: a black and white video digitizer for use with an NTSC video input source such as a VCR or video camera.

The completed unit, powered by the C-64's I/O port, will digitize an eight gray level, 160 X 200 pixel im-

age in under three seconds. The included software allows keyboard control of gray scale selection (4, 6, or 8 levels). The digitizer permits control of brightness and contrast. An alternate dot pattern technique (dithering) is used to produce the 6 and 8 gray level display.

Price (for the software, plans, board) is \$39.95 plus \$2.00 shipping (specify disk or tape version).

Kinney Software, Dept. A, 121 N. Hampton Rd., Donnelsville, OH 45319 (phone: 513-882-6527).



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Blue Chip Electronics, Inc., Two West Alameda Drive, Tempe, AZ 85282 (phone: 602-829-7217).

WINDOWS

We thought windowing for Commodore programs was a neat idea when we presented Thomas Bunker's *Win-*

dows on the VIC and 64 program in the August '85 *Ahoy!* St. Mars Systems apparently agrees, having just released the *Windows* Screen Processor Utility (\$24.95). The program provides C-64 users with the capability of creating unlimited numbers of windows in their BASIC or assembly language programs. Supported are window color controls, move commands, independent scrolling, and cursor positioning routines. Included is a 12-page programming guide.

St. Mars Systems Inc., 1400 Clay Street, Winter Park, FL 32789 (phone: 305-657-2018).

NEW BANK OPENINGS

Broderbund has announced three additions to the *Bank Street* series for the C-64.

Compatible with the *Bank Street Writer*, the *Bank Street Speller* uses a 30,000+ word dictionary to find and highlight typing errors. Users can substitute "wildcard" characters for unknown or missing letters, and create personalized dictionaries by adding words of their own.

The *Bank Street Filer* will store, sort, retrieve, and print out customized reports. The database manager is supposedly easy enough for a child to use, but powerful enough to meet the requirements of adults, organizations, and small businesses.

The *Bank Street Mailer* comprises a letter-writing program (a special version of the *Bank Street Writer*) and a mailing list database with full mail/merge capabilities.

All three programs are scheduled for fall release, at \$49.95 each. One backup disk is included with each.

Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101

(phone: 415-479-1170).

CADPAK ENHANCEMENTS

Abacus has enhanced its Cadpak graphic package with the addition of a dimensioning feature that allows exact scaled output to most printers, the ability to input from the keyboard as well as an optional light pen, and a more flexible object editor (used to create detailed figures or text). Additionally, the list price has been reduced to \$39.95.

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

NEW GAME RELEASES

In *A Mind Forever Voyaging* (\$44.95), Infocom's latest release for advanced players, you are a computer that has been raised as a human being. Government and industry leaders have drafted a plan to address a global crisis: you must enact a simulation of that plan, exploring its effects on the future. This is the first in Infocom's series of Interactive Fiction Plus titles, employing a new development system with expanded memory (making possible a working vocabulary of over 1700 words). As such, the game is only for computers with 128K, including the Commodore 128 and the Amiga.

Concluding the trilogy begun by *Enchanter*, *Spellbreaker* (for expert-level Infocomers) places you in the pointed hat of the leader of the Circle of Enchanters. The magic of your world—a world founded on sorcery—is failing, and you must discern and destroy the cause. This you accomplish by undertaking a journey to the foundation of the magic itself. For the C-64 and the Amiga; \$44.95.

Infocom, Inc., 125 CambridgePark Drive, Cambridge, MA 02140 (phone: 617-492-6000).

Based on Tolkien's classic, *The Hobbit* is an adventure that can be played with or without graphics (80 screen shots are included). Over 50 different action commands and over 900 words are understood by the program. Included are a copy of the novel, hint booklet, and a guide to Middle Earth. The Commodore 64 version (\$29.95) in-



Only *A Mind Forever Voyaging* can prevent a journey into global chaos.
READER SERVICE NO. 230

cludes an original soundtrack.

Addison-Wesley Publishing Company, Reading, MA 01867 (phone: 617-944-3700).

As the great knight *Corum*, you are summoned to the land of Peloria to save the fair princess Diana from the evil sorcerer Targoth, whose defenses include moorugs, groggs, skeletons, lava monsters, ghosts, bats, witches, slime monsters, and spiders. (Just how fair was that princess?) For the C-64; \$14.95.

Tri Micro, 1010 N. Batavia, Suite G, Orange, CA 92667 (phone: 714-771-4038).

Idle Time II, the second C-64 disk culled from the IBM PC series, comprises eight one-player mental exercises (two with two-player versions as well), including numerical reverse, scrambled words, knowledge of US cities, colored square cube puzzle, and finding the correct mathematical equation to avoid a lunar crash. Price is \$19.95 plus \$2.00 shipping (PA residents add 6%).

ABLE Software, P.O. Box 422, Kulpville, PA 19443 (phone: 215-368-2518).

Two for the C-64/128 from Artworx, priced at \$19.95 each:

Falcon Patrol II pits the player's Falcon Fighter, equipped with air-to-ground and air-to-surface missiles, against enemy helicopter squadrons. Sixteen levels of play are included.

Sorcery, an adventure game in an arcadelike setting, challenges you (the last of the great sorcerers) to use a

battery of powerful spells to reconquer your homelands and restore the rich life of a past era.

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

Purchasers of 13 different Epyx game programs can participate in a sweepstakes program offering five trips to San Francisco and the Lucasfilm Games design headquarters, a ski week at Lake Tahoe, ski equipment, an Amiga computer, and free software. Details are available in those famous specially marked packages.

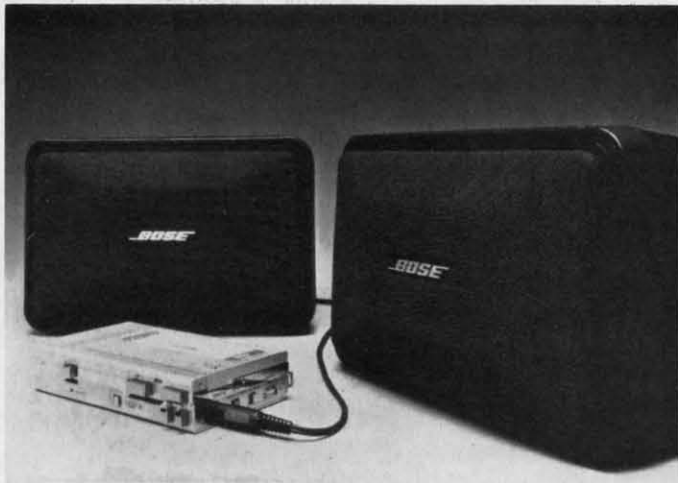
Epyx Computer Software, 1043 Kiel Court, Sunnyvale, CA 94089 (phone: 408-745-0700).

The game based on the Cubological Formulation mentioned in October's *Scuttlebutt* is available for \$4.95. The collector's version, with a signed copy of the works that underlie the theory, sells for \$99.95. And you thought Rubik's cube was a kid's game.

The Wizards (after Jan. 1, the Epsilon Research Group), P.O. Box 7118, The Woodlands, TX 77387.

THE LOUD COUPLE

Ideal for taking advantage of the Amiga's stereo output capability, the Bose RoomMate powered speaker system (\$229.00) plugs directly into the computer, enabling users to generate room-filling sound comparable to complete component systems costing several times as much. Each speaker measures only 6 X 9 X 6".



Built-in electronics of the amplified RoomMates balance sound between the speakers, providing true stereo or enhanced hi-fidelity.
READER SERVICE NO. 231

The onboard electronic amplifier and equalizer were engineered for low distortion and reduced hiss. Also available are the Video RoomMates, offering volume control and shielded drivers to prevent TV interference. Either model can also be used with Walkman-type portable tape players and portable CD players such as those available from Sony and Technics.

Bose Corporation, The Mountain, Framingham, MA 01701.

MICRO CLEANING KIT

The Read/Right Microcomputer Cleaning Kit (\$34.95) is designed to remove damage-causing contaminants from the head, screen, and housing of your computer. Included are a floppy disk head cleaner good for up to 15 cleanings of the read/write heads, *Static Stopper* spray, 24 terminal cleaning pads and 10 office equipment cleaning pads.

The Texwipe Company, 650 E. Crescent Ave., P.O. Box 575, Upper Saddle River, NJ 07458 (phone: 201-327-9100).

EDUCATIONAL RELEASES

Welcome Aboard (\$24.95) utilizes Muppet characters and a nautical setting to teach new C-64 users about five computer concepts: computer-aided design (by helping Gonzo beautify Miss Piggy in the Salon de Beauté), word processing and electronic mail (by transmitting information from the message center to help Captain Kermit stay on course), database management (by helping Fozzie sort through his joke library), program-

ming, and games. Included is *The Muppet Guide to Computerese*, an illustrated glossary of terms.

Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101 (phone: 415-479-1170).



New releases from Learning Activities.
READER SERVICE NO. 232

Joining the 40+ programs in Resource Software's line of CP/M-based programs for the C-128 with 1571 disk drive, the Honors Series drills students in advanced mathematical disciplines.

Honors Calculus covers applications of the derivative including curve sketching, related rates and maximum/minimum problems, and applications of definite integral topics.

Honors Trigonometry deals with circular functions, polar coordinates, identities, sine and cosine, and solution of triangles.

Honors Geometry addresses similar polygons with attention to ratio and proportion, applications of similar triangles, coordinate geometry, and the circle.

Honors Algebra focuses on poly-

nomials, factoring common monomials, trinomials, and the difference between squares.

Each is available for \$34.95, with more titles on the way.

Resource Software International, Inc., 330 New Brunswick Ave., Fords, NJ (phone: 201-738-8500).

A French language version of Scarborough's *MasterType* typing tutorial, one of the best-selling C-64 educational programs of all time, has been released.

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

Snowdrifts and Sunny Skies teaches fledgling forecasters eight years old and up to predict the weather utilizing a map showing fronts and pressure areas (following lessons on weather folklore, terminology, and the historical weather

pattern for the city and month you've chosen). After investigation, you predict tomorrow's weather and obtain a score based on the accuracy of your prediction versus the actual weather. For the C-64; \$14.95.

Tri Micro, 1010 N. Batavia, Suite G, Orange, CA 92667 (phone: 714-771-4038).

Learning Technologies Inc. has announced 20 new C-64 programs for preschoolers through eighth graders, available for \$19.95 each.

In the Early Learning Series: *The Flying Carpet* (shapes), *Let's Go Fishing* (numbers), *How to Weigh an Elephant* (ordering and sequencing), *Learning to Add and Subtract*, *Math in a Nutshell* (counting), *Clowning Around*, *Shutterbug's Patterns*, *Bike*

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In the Thinking Strategies Series, designed to develop problem-solving skills: *Scrambled Eggs, Sliding Block, Monkey Business, Speedy Delivery, Alpine Tram Ride, Gremlin Hunt, Pipeline, and Number Please.*

If you return the response card included in any Learning Technologies program, you will receive a teacher's Learning Kit that includes a color poster, lesson plan, worksheets, student management chart, and award certificates, plus the opportunity to win a Commodore 128 or Apple IIc computer in the company's Screen Stars Sweepstakes.

Learning Technologies, Inc., 4255 LBJ, Suite 131, Dallas, TX 75244 (phone: 214-991-4958).

SLIPPED DISK

Users within a drive, bus trip, or mooseback ride of Madison Heights, MI can take advantage of Slipped Disk, Inc.'s software and hardware preview center, C-64 social club, educational center, rental computers, and library of computer periodicals for \$50.00 a year. The center is open 12 hours a day, 7 days a week.

Slipped Disk Inc., 31044 John R, Madison Heights, MI 48071 (phone: 313-583-9803).

OKIMATE 10 REBATE

If you purchase an Okimate 10 Personal Color Printer before January 31 and return the form available at your dealer with sales receipt and UPC label or stock number, you will receive a \$15.00 rebate from the manufacturer. Offer is good only in the U.S.A. The price of ribbons for the Okimate 10, by the way, has been reduced to \$4.95 each for black and \$5.49 each for color.

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

WORLD OF COMMODORE

The World of Commodore III, the third annual exposition for Commodore users, will be held this year from December 5 to 8 at the Toronto Interna-

tional Centre. Commodore will exhibit the C-128, Amiga, and PC 10/PC 20 computers, and software, peripherals, and other items will be displayed and sold by a host of exhibitors (including your favorite Commodore magazine). Last year's show drew more than 40,000 visitors, so it's recommended that you make travel and hotel arrangements as early as possible.

Admission price will be (in Canadian dollars) 4.00 for adults, \$3.00 for students and senior citizens, and \$10.00 for a four-day pass. Advance tickets for groups of 25 or more are \$2.00 each per day, but must be purchased before November 15.

Contact Hunter Nichols Inc., 721 Progress Ave., Scarborough, Ontario M1H 2W7 (phone: 416-439-4140).

PRINTER STANDS

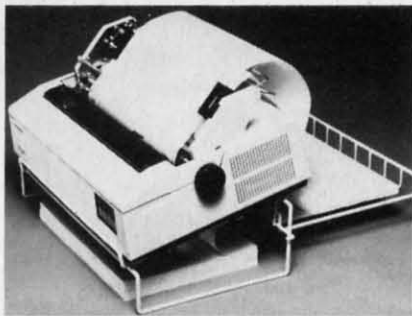
The Pedestal printer stand stores paper underneath the printer and catches and refolds the printout in a receiving tray. Built of vinyl-covered heavy duty steel wire, the putty-colored stand is available in widths to accommodate 80- or 132-column printers (\$28 and \$34 respectively).

Computer Coverup, Inc., 1740 N. Marshfield, Chicago, IL 60622 (phone: 312-276-9007 or 1-800-282-2541).



Universal Printer Stand: 7° slant.
READER SERVICE NO. 227

The Universal Printer Stand (\$19.95), constructed of molded plastic, features a seven degree forward slant to allow easy printout viewing. Paper guides prevent cables from interfering with paper feed; rubber feet reduce noise and protect desk tops. The stand is wide enough to accommodate most bottom- and rear-feed



Pedestal stores, catches, and refolds.
READER SERVICE NO. 228

printers of up to 132 columns.

PerfectData Corporation, c/o Rogers & Associates, 2049 Century Park East, Suite 4060, Los Angeles, CA 90067 (phone: 213-552-6922).

TELECOM NEWS

Not content with cutting into the U.S. Post Office's business via electronic mail, CompuServe has now made available the FBI's 10 Most Wanted List. Biographies and descriptions of the fugitives can be read and high resolution graphic pictures of the individuals downloaded and viewed. Watch out, software pirates.

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

Viewtron now offers trading prices for nearly 100 commodities, updated every 10 minutes with prices gathered from 14 exchanges. When a subscriber requests a price quote, all the contracts in a given commodity are listed with their opening, high, low, and last available prices, along with the change from the previous settlement price.

Viewdata Corporation of America, Inc., 1111 Lincoln Road, 7th Floor, Miami Beach, FL 33139 (phone: 305-674-1444).

For \$9.95 per month and 6¢ per minute (with the first hour free), Quantum Link offers Commodore users programs to download, software

previews, online games and contests, electronic mail, shopping and swapping, world news, discussion forums, an encyclopedia, and more. (To be added soon are banking, investment, and financial services.) The system operates 24 hours a day weekends and 6 p.m. to 8 a.m. weekdays. A free preview is offered to all C-64 and C-128 owners; call 800-833-9400 (using your modem) to register. Communications software and one month of service is given away with purchase of the Commodore 1660 or 1670 modem.

Quantum Computer Services Inc., 8620 Westwood Center Drive, Vienna, VA 22180 (phone: 703-448-8700).

Intended to suppress damaging phone line spikes, the Kleen Line security system (\$69.95) employs two-stage semiconductor and gas discharge tube suppression techniques. Available for standard 4-pin telephone modular connectors (RJ-11) and the wider 8-pin connectors (RJ-45).

Electronic Specialists, Inc., 171 South Main St., P.O. Box 389, Natick, MA 01760 (phone: 1-800-225-4876; in MA 617-655-1532).

BOOKS

The Commodore Ham's Companion details the basics of upgrading your system for amateur radio use, programming for data including RTTY, Morse, AMTOR, and Packet and the ins and outs of information management. Also included is information on "telehamming" (connecting to amateur radio information by telephone line), message storage operations, and finding specialized software for slow scan TV, satellite tracking, and other applications. Price is \$15.95 plus \$2.50 shipping.

QSKY Publishing, P.O. Box 3042, Springfield, IL 62708.

Computer Entrepreneur (\$29.95) describes over 100 businesses that the computer owner can run from his home, ranging from keeping statistics for little league teams to legal research. Included is a self-test to find the business that the reader is best suited for.

Computer Information Limited, 11 The Point, P.O. Box 181948, Corona-

Uni-Kool DISK DRIVE FAN FOR COMMODORE



Designed to work with Commodore Disk Drive Models 1540, 1541, SFD 1001, the quiet C-100 fan enclosure moves cool, filtered air through the top vents of the disk drive cooling the drive and thereby reducing the misalignment problems caused by heat build-up. A custom filter keeps room dust from entering the disk loading opening. This greatly increases the life span of the disk drives, and decreases the maintenance required to keep the drive functioning properly. Only \$39.95 plus \$2.50 for shipping and insurance. 115 vac

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Reader Service No. 189

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Reader Service No. 190



Kleen Line guards against spikes.
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do, CA 92118 (phone: 619-266-9141).

Starting Your Computer Services Business (\$9.95) also discusses various aspects of using a home computer to earn extra money. Various business formats, such as sole proprietorships, partnerships, and corporations, are examined in detail.

J.V. Technologies, Inc., P.O. Box 563, Ludington, MI 49431 (phone: 616-843-9512).

Investment Management with Your Personal Computer (\$14.95) discusses investment software, electronic databases, and online trading, listing and reviewing over 120 products and services including spreadsheets, portfolio managers, investment simulations, and bond and mutual fund aids.

COMPUTE! Publications, Inc., 324 W. Wendover Ave., Suite 200, Greensboro, NC 27408 (phone: 919-275-9809).

The World Almanac Book of Inventions (10.95) traces the history of inventions from ancient times up to the present, including a detailed section on the evolution of the computer.

World Almanac Publications, 200 Park Avenue, New York, NY 10166.

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Reader Service No. 224

this month and next's feature on *Speech Synthesizers for the Commodore Computers*, the Votalker C-64 (\$99.95) includes a screen echo that allows any words, numbers, punctuation marks, and other symbols printed to the screen to be spoken.

Three types of vocalization are supported: conversation mode (reads text in a natural way, pausing at punctuation marks), verbatim mode (reads text and pronounces symbols), and character mode (spells each word and pronounces numbers and symbols).

The 4 x 5" unit plugs into the 64's expansion port and contains its own amplifier, speaker, and external speaker jack, with no need to buy any additional cables, hookups, or hardware. All necessary programs and enhancements are stored in onboard ROM and accessed by a single key.

If you purchase Votalker C-64 before the end of 1985, you'll receive Trivia Talker II for free. The \$39.95 program contains 200 questions in each of five categories.

Votrax, Inc., 1394 Rankin, Troy, MI 48083-4074 (phone: 313-588-2050).

80-COLUMN ADAPTER

In the August '85 *Ahoy!*, Morton Kelson showed you how to do it. Now Microventions has done it for you by manufacturing an interface cable that permits the C-128 owner to utilize the Commodore 1701 or 1702 (or any color or monochrome) monitor in 80-column mode, eliminating the need to buy the 1901 RGB monitor for this purpose. The user can shuttle between 40 and 80 column modes with a simple ESCAPE-X command. List price is \$14.95.

Microventions, 5333 Mission Center Road - Suite 345, San Diego, CA 92108 (phone: 619-291-2722).

TELECOM PRINTER

The Microline 182 TTY differs from Okidata's standard 182 by offering selectable intelligence levels and an optional communications roll paper stand to meet the needs of telecommunications applications.

In TTY mode, the printer responds only to carriage return, line feed, and

form feed commands, preventing extraneous commands from corrupting received data or delaying the printer. In CRT mode, page formatting commands are added. Basic Printer mode adds character format commands, while in Intelligent Printer mode the 182 TTY functions exactly like a standard 182.

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

6-PART 64 HARMONY

The *Visible Music Monitor* and the VT-6 cartridge made six-part harmony possible on your C-64 or C-128, with the former adding an extra sound chip (three more voices) and the latter supporting both sound chips, allowing creation, editing, playing, displaying, and disk or tape storage and retrieval of music.

Editing features include moving or changing notes, measures, and segments, cut, paste, and copy, and control over all chip sounds. The user also has control over the sequence in which music segments are played or repeated. A playlist may be specified to play a group of songs automatically.

Price of the system is \$89.00.

V-Tech, Inc., 2223 Rebecca, Hatfield, PA 19440.

EXPERT SYSTEMS

Info Designs has released a line of expert systems designed to aid the businessman. Each C-64 program, priced at \$79.95, works by questioning the user extensively about himself and about a specific counterpart, and then generating a strategy.

The Sales Edge advises the salesman on the business style and personality most likely to make a hit with a given client.

The Management Edge explains how to get desired results from a specific individual.

The Communication Edge enables the user to operate more effectively in meetings and conversations.

The Negotiation Edge develops a detailed plan for any type of negotiation or bargain.

Info Designs, Inc., 445 Enterprise

Continued on page 94

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Reader Service No. 166



JEWEL QUEST

For the C-64

By Bob Blackmer



Famed adventurer Lars Layton, always ready for a challenge, stars in this arcade game. In it, you must maneuver Lars in his gyrocopter as he attempts to lay claim to the priceless gem collection of eccentric billionaire Killough Bhytes.

This adventure began when Lars attended a cocktail party, hoping to find a financial backer for his next endeavor. He was introduced to Mr. Bhytes, upon which he listened to a tale unlike any he had ever heard.

The aging industrialist told Lars of the unique system by which he protected his jewel collection. He first described the large room with shelves covered with a secret material. It saps energy from any who come in contact with it, man and machine alike. He went on to explain about the four robot sentries, covered with the same deadly substance, who patrol silently and thoroughly.

The ninety stone collection is further protected by a cloak of invisibility that allows only one gem to be seen at a time. When Killough Bhytes wants to view or move his collection, it is annoyingly simple. The secret substance is harmless to him exclusively, and when he takes

one jewel, another appears elsewhere on the shelves, and so on, until he has his whole collection.

Lars also learned of the many people who had tried in vain to get the treasure, since no one escapes unless he has all ninety stones.

Mr. Bhytes offers to finance all of Lars Layton's further exploits if he can succeed where others have failed. Layton's reply is simply this: "Ladies and gentlemen, start your gyrocopters!"

Instructions on flying are provided at the start of your first game. The key is learning to maneuver your gyrocopter, keeping contact with the shelves and the robots to a minimum. Once this is mastered, you'll still need energy for the later levels. After you complete level 7, the robots will double their speed, making it impossible to collect all the gems without some energy loss. You'll begin with 99 energy units; make them last because you'll get no more.

After thorough testing, the best I did was to finish with 61 energy units remaining. □

SEE PROGRAM LISTING ON PAGE 124

SAUCER ATTACK!



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A NOTE FROM JIM SACHS
OF SACHS ENTERPRISES

I wish to say thank you to our loyal fans who have purchased SAUCER ATTACK, and are waiting patiently for our next product, TIME CRYSTAL. Due to rampant copying in the C64 industry, TIME CRYSTAL will be delayed about two months while we look for new ways of raising capital, and investigate more sophisticated protection techniques.

Here is a brief synopsis of TIME CRYSTAL: As you are travelling through time in your Time Machine, the crystal which powers the machine suddenly splits into two pieces, one piece being thrown into the distant past, the other into the far future. Without the crystal, the Time Machine can only go to those times where the pieces exist.

Once the scene materializes in, your first task is to safely land the time machine. Using a joystick, the machine can be flown in 3-D, with its shadow following the terrain below. After landing, you must continue on foot to look for the crystal, dealing with any creatures or hazards you may encounter. This is not merely a text adventure, but features living scenes where waterfalls flow, waves lap the shore, volcanoes erupt, and many other effects not seen before on a C64 screen. The price, while not as low as SAUCER ATTACK, will be competitive with other games on the market. Below is one of the title screens, showing the Time Machine itself. See our ad in the OCT. ANDY for another screen photo.

I'm sorry for the delay, but I'm sure you will find TIME CRYSTAL worth the wait.

Jim Sachs



AHOY! 17

www.commodore.ca



CREATING YOUR OWN GAMES ON THE COMMODORE 64

The Gypsies reached Crete by 1252 and Paris by 1427. How long they had been wandering before that, no one can say. If *they* knew, they weren't telling. They camouflaged themselves in order to survive. In Christian Europe, they claimed to be pilgrims returning from shrines in Egypt—thus the name *Gypsies*. Standing aloof from every nation, they wandered from place to place to buy and sell and trade. They were accused of every imaginable crime. They were banished from Venice and Milan. Frederick William I of Prussia ordered all Gypsies over the age of 18 to be

hanged. Catherine the Great of Russia tried to make them serfs and tie them to the land. Hitler killed half a million Gypsies in his death camps.

Still they survived, wandering. Linguists discovered that their original language, called Romani, was actually an archaic dialect of Sanskrit—had they come from northern India, then, two thousand years ago? It didn't matter. They weren't looking to the past—they were looking to the future. To the stars.

Now, in second-hand starships, with gear cobbled together from a hundred different sources, they are still wandering from planet to planet, buying here, selling there, trying to turn a profit. In the process, they discover worlds no other human being knows. But they don't make maps and charts. They make deals.



Gypsy Starship

Machine-language interrupts combine with a "slow" BASIC program to let you discover a hundred different worlds in this complete game for the Commodore 64.

By Orson Scott Card

CUSHWA

You are the head of a Gypsy Family, which makes you captain of a Gypsy starship. Your two most important concerns are getting enough fuel to keep flying, and enough supplies that the Family won't starve. Fuel is easy enough to get—you simply dip down near the surface of a "gas giant," a large planet like Saturn or Jupiter. Those are a dime a dozen in this galaxy.

Supplies are a different matter. For that you have to visit worlds with life on them: small, rocky earthlike planets, or, more rarely, moons and artificial satellites orbiting the gas giants. Some planets are lifeless; some have no intelligent life; some are inhabited by aliens who have never seen humans before. When you do find humans, they might be hostile to Gypsies, or suspicious of you. They might be pirates. They might, sometimes, be friendly.


Friendly or unfriendly, known or unknown, you have to feed the Family. On some worlds you barter. On others you offer services, like repairing starships and other sophisticated machines. Sometimes you put on entertainments. Sometimes you ask for favors (you never actually *beg*). Sometimes, when you have to, you steal. And when things get hot, you dump your cargo and get moving. Because all that matters to you is for the Family to survive and move on.

PLAYING GYPSY STARSHIP

You'll need a joystick plugged into port 2. When the game begins, your starship is in the middle of the screen. Gas giant and earthlike planets will drift by on the screen. There are also stars in the background. The bottom of

TOM CUSHWA

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in our system. That's because it's "menu-driven," so beginners can simply read the menus (lists of options) that appear on their screens and then type in their selections.

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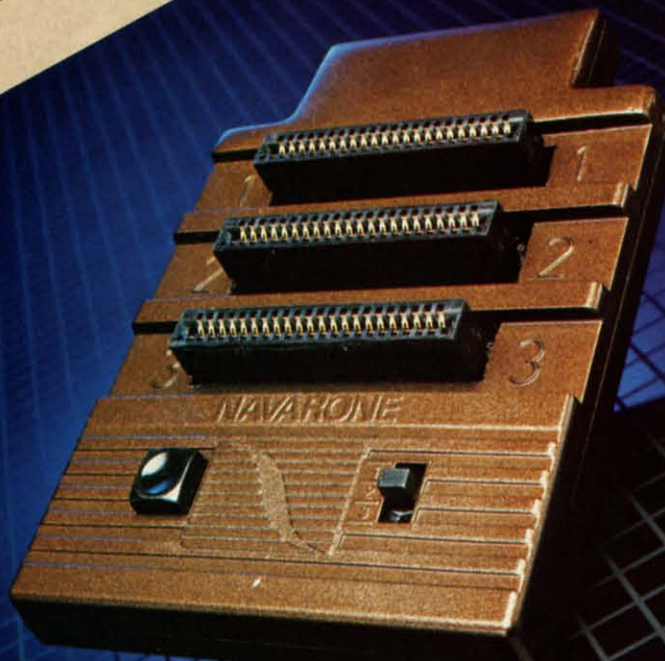
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the screen shows your current fuel level (yellow line) and amount of supplies (red line). Your fuel is used up by *moving*; the supplies are used up by the passage of *time*. So if you sit still and do nothing, you'll have plenty of fuel—but the Family will risk dying of starvation, or running out of oxygen and water!

To visit a planet, you must get into "stationary orbit." That is, you must move *with* the planet as it travels across the screen. This is easier than it sounds, though it takes a little practice. Since the planets move diagonally, the easiest technique is to get in front of the planet, let it pass over you, and *while it is passing* begin to move in the same diagonal direction. Since the program won't let you move over a planet, you will seem to be following along behind the planet, as if you were pushing it along its path. That is "stationary orbit," and if you keep doing it long enough, you will automatically replenish your fuel (if it's a gas giant) and *half* your supplies (if it's an earth-like planet).

Why only half your supplies? Because all you can get from an earthlike planet, without *landing*, is oxygen, water, and carbon dioxide—stuff you can scoop up from the atmosphere. To trade, explore, and get a complete resupply, you have to land.

To send down a landing party, just get in stationary orbit and press the joystick button. Depending on your difficulty level, it may take a while to successfully land. When you land, the entire outerspace display disappears. Instead, you see a screen consisting of information about the planet and your options:

LOOK AROUND
ASK QUESTIONS
PUT ON A SHOW
OFFER TO TINKER
DICKER WITH THE LOCALS
ASK FOR HELP
TAKE WHAT WE NEED
GET OUT OF HERE
RETIRE

By moving the joystick, you move a cursor to point to a choice; when you press the button, the program carries out whatever choice you made.

The game lasts for ten "years," at which time the value of your cargo is evaluated and you retire as head of the Family and captain of the starship. You either end up living in luxury, getting by on a pension, or begging in the streets. If you did a particularly good job as captain, the ship will be named after you and the Family will honor you forever.

Then, if you want, you can start over and play again.

HOW THE PROGRAM IS SET UP

If you typed in and ran the program *Starship* from last month's *Ahoy!*, you'll recognize the outer space screen display at once. It's the same starship, the same planets that you saw before. The purpose of last month's program was to demonstrate full use of sprites in machine language interrupts. This month's program shows how to turn that

mechanical shell into a real game.

The game plays in two parts. The first part, in outer space, is a pretty standard arcade-type movement game. You have to be dextrous enough to get the starship into position. You have to monitor the fuel and supplies and keep both replenished. You also have to decide when and where to land. Almost everything else is done in machine language.

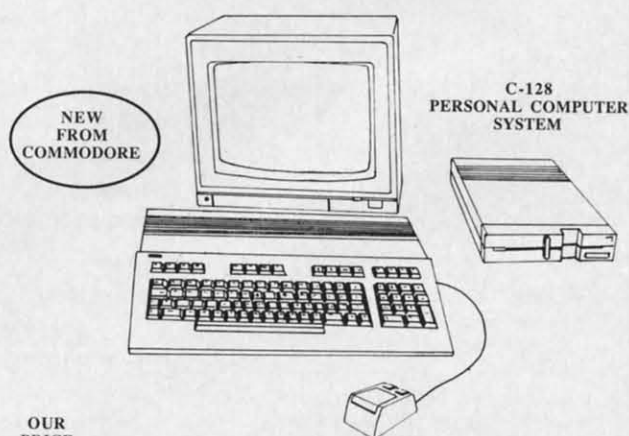
Once you land, you move into the second phase of the game. Since this involves reading information about the planet or moon that you've landed on, it doesn't have to move quickly. Almost everything is done in BASIC. Once you've made your choices and decide to GET OUT OF HERE, this section of the program sets up that particular planet-sprite to be another world, randomly selected from the available planet data.

If you choose to quit (RETIRE), you are shown the current outcome and given a chance to resume where you left off, start a new game, or continue playing.

WHAT'S ON DISK?

The game is listed here as four separate programs. The first program is *Video Setup*. It is essentially the same program as last month. It sets up all the machine language and sprite shapes in memory from 32K to 40K, and then saves that region of memory in a disk file called GYPSY VIDEO.

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The second program is *Planet Setup*. It READs the information about possible planets from DATA statements and stores them in memory from 16K to 32K. Then it saves this region of memory in a disk file called GYPSY PLANETS.

The third program is *Gypsy*. This does nothing more than load GYPSY VIDEO into memory from 32K to 40K, load GYPSY PLANETS into memory from 16K to 32K, and then load and run *Gypsy Game*.

Gypsy Game is the actual game program itself. Provided the video and planet data are all correctly in memory, *Gypsy Game* should move you easily into play.

Notice that you only need to run *Video Setup* and *Planet Setup* once. After GYPSY VIDEO and GYPSY PLANETS are on disk, the setup programs are never used again. (If you buy *Ahoy!*'s disk, GYPSY VIDEO and GYPSY PLANETS are already there—you just LOAD "GYPSY", 8,1 and RUN.)

FROM SHELL TO GAME

How did we get from last month's sprite-mover program to this month's game? It was a matter of story. There are lots of things you can do with a starship and a bunch of planets.

In fact, I didn't have to use a starship or planets at all. I could have changed the sprite shapes and made it Dorothy against the Nerds of Oz. (My son Geoffrey has been

after me for a year to program a game called "Toto," which he designed, in which Dorothy's dog is trying to get back to her without getting nabbed by any of the evil beings of Oz. Maybe I'll do that early in '86, just to show how versatile this animation and movement shell can be.)

Even with the starship and planets, though, there were many options. It could have been a shoot-em-up game with an enemy starship, but that's old hat. Or a blast-the-planets game, but I've blown up too many planets already as a science fiction writer. It could have been a military-invasion game, or colonization of the stars, or a rescue mission—but in all those scenarios, most of the action would have been on the planet's surface, so that the present animation shell would have been better used for the on-planet action rather than outer space.

Since the computer game I like the best these days is *Seven Cities of Gold* (Electronic Arts), I was naturally drawn to the idea of exploration. Now, if I were to do this in first-rate fashion, I would also animate the on-planet sequences, as *Seven Cities* does. But that would require setting up another section of video memory with sprites and a whole new set of interrupt programs in machine language. Instead, I decided to leave this section as a text game, though it is still handled entirely with the joystick. I'm a writer, after all—I think that sometimes a few words can do better than a thousand pictures. And since the text section can be in BASIC, it'll be easier for my fellow "intermediate programmers" to follow what I'm doing.

Given the limitations that the computer and the pre-selected forms placed on me, I still had to come up with a story that intrigued me, that made the events of the game interesting to me—and therefore, with luck, to you also.

For a short story I'm working on right now, I bought a book called *Atlas of Man* (St. Martin's Press), a marvelous collection of information about many of the different peoples of the Earth, sorted by ethnic rather than national boundaries. I happened to see the section on Gypsies, and realized that the Gypsies fit exactly what I needed my starship to do—wander from place to place, not caring whether it ever returned to the same spot again. And all that wonderful Gypsy lore from a thousand years of European contact with Gypsies made them at once familiar and mysterious. From there it was easy to imagine the kinds of things that Gypsies might do on a planet's surface. Once I knew who the people in the starship were, the rest of the game fell into place.

I've said in earlier columns that it's better to start designing a game with a *story* rather than a *programming concept*, and that's still true. But let's face it. A lot of times, especially for self-taught novices like you and me, we feel pretty lucky to know anything at all! So instead of imagining the perfect game, we try to think of the best game that we can program at our present level of expertise—or, maybe, just a few steps ahead of where we are now.

But the game still won't come to life until you have a story that you care about and believe in, an idea that delights you. The technique alone isn't enough. Just be-

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cause you can move sprites around and read the joystick doesn't mean that you've got a game. Last month we moved the sprites around, read the joystick, checked collisions, and animated the sprites, all at machine language speed—but it wasn't a game.

It isn't a game until it has a story or a puzzle or a problem. Then you can design the rules to make it challenging and yet playable. I hope you like this one. I think it's kind of fun.

It's also *long*. But I think you've caught on by now to the fact that the best games *do* eat up memory—because good video and good text take space.

In fact, it takes up so much space that for this game to be *really* good, it would need to have mid-game disk accesses. Then we could set up solar systems, with the planets orbiting stars, and let the stars drift, planets and all, the way stars really do. The starships could go into hyperspace and “jump” from system to system. And when we got to the planets, we could actually *see* the alien or human creatures we were meeting. There are a lot of fantastic things that *could* be done.

If I had six months to work on it. If I didn't know that the people who would use the game would have to type it in, letter by letter. If the good folks at *Ahoy!* didn't have this crazy idea that 300-sector programs take up too much space in the magazine. There are *limits* to what can be done in a monthly column.

But if *you've* got the time, you can do it yourself. That's what a magazine like *Ahoy!* is all about, isn't it? For you to do it yourself. Even when a game is as “complete” as this one!

A WRINKLE IN THE INTERRUPTS

Last month, when we first worked with machine language interrupts, we used the regular timer interrupt. But this time I needed to use a different interrupt source. So I disabled the timer interrupt by POKEing (actually, STA-ing) a 1 into location 56333. I replaced this interrupt with a raster interrupt.

The raster scan is the path followed by the cathode ray inside your TV or monitor picture tube, as it moves from left to right across each line, line by line down the screen. It takes less than a sixtieth of a second to scan the whole screen; then the ray returns to the upper left hand corner and starts over.

The VIC-II video chip in your 64 sends the TV or monitor all the information about what color to display in each dot on each line of the television screen. The VIC-II reads this data from screen, character, color, and sprite memory; interprets it according to the selected color and location codes; and then sends the fully interpreted and translated data to the TV in a form the television can understand.

Inside the computer, each time the VIC-II prepares to send a scan line's worth of data to the TV, it stores the number of the current screen line that it is scanning at location 53266. This is a number from 0 to 261. (The scan lines that are actually shown on the screen are from 50 to 249.) That's what you'll see if you PEEK(53266). But if you POKE a number into 53266, something completely different happens. The number you POKE will be remembered, even though you can't PEEK and see it, and every time the VIC-II scans the line with the same number as the one you POKEd there, the VIC-II will generate an interrupt request—an IRQ.

And when that happens, the current program (including BASIC), is stopped, the computer jumps to the address stored at locations 788 and 789, and it begins executing the machine language program stored there. It continues executing that code until it meets an RTI instruction (or jumps back into the regular interrupt routine). *Just like the regular timer interrupt.*

Of course, you have to enable the Raster interrupt by POKEing 53274 with 1, and each time the interrupt is executed, you have to clear the raster interrupt flag by POKEing 53273 with 15.

Also, since there are 262 scan lines and location 53266 can hold no value higher than 255, the last 6 scan lines are signaled by the high bit at location 53265 (the way that sprite locations to the right of the “International Date Line” are flagged at location 53264). However, I've found that the simplest solution is to make sure that the high bit is set to 0 with POKE 53265, PEEK(53265) AND 127 and then never try to generate an interrupt at a scanline higher than 255.

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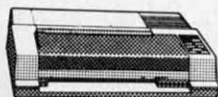
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What's the advantage to this?

Because the interrupt is tied to an actual position on the screen, the interrupt can *change the screen* in the middle of the display!

That's what this program does—it's the most important alteration from last month's animation routines. An interrupt is generated at scanline 234—the beginning of the penultimate text line. That interrupt executes a routine that clears the interrupt flag, resets the vector to point to a different interrupt routine, and then fiddles with video memory:

It sets the screen memory pointer at 53272 to point to a different location.

Since the sprite location table is the last eight bytes of the 1K block that contains screen memory, the VIC-II will look for sprite shapes at a completely different place—and in this case, all the sprite shapes will be completely blank.

The effect is simple. Now the BASIC program can completely ignore the stars in the background on the upper part of the screen. Instead, it will PRINT the fuel and supply gauges on the last two lines of a *different screen memory*.

While it's doing that, though, the sprites are still moving around on the screen. When a sprite reaches scanline 234, the VIC-II suddenly starts looking for its shape

in a different place; when it finds it, the shape is blank. Any part of the sprite that falls below scanline 234 is completely invisible.

What have we done? Why, moved the bottom of the screen up two text lines, as far as the sprites are concerned. If we cause the starfield screen to scroll upward, the screen memory that contains the fuel and supply gauges is not affected; if we clear the gauge screen, the starfield is not affected.

Don't look now, but that's called "windowing." The top 23 text lines are a window into one screen memory; the last 2 lines are a window into another.

That interrupt routine generated at scanline 234 also set location 53266 to generate another interrupt at a later scanline. So only a few scanlines later, the VIC-II causes another interrupt. This one sets everything back to normal—and then goes ahead and executes the animation and movement routines from last month's program.

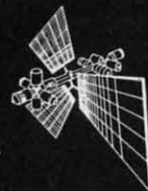
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Orson Scott Card will explain the extended background color mode used in this month's *Gypsy Starship*, and how you can use it to create windows in C-64 programs (along with providing a demonstration program).

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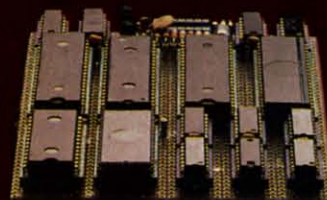
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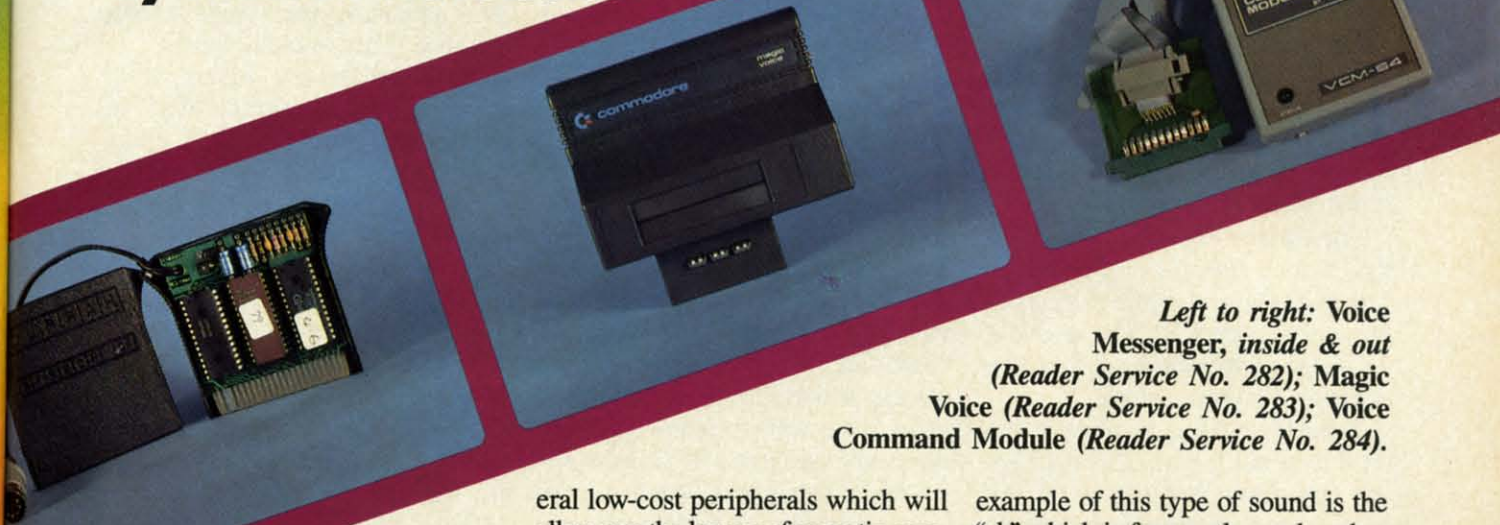
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SPEECH SYNTHESIZERS

for the Commodore Computers

By Morton Kevelson



Left to right: Voice Messenger, inside & out (Reader Service No. 282); Magic Voice (Reader Service No. 283); Voice Command Module (Reader Service No. 284).

INTRODUCTION: SPEAK TO ME ONLY WITH THINE ?????

The ability to converse with the computer is uppermost in the minds of most users.

The usual method of maintaining informative discourse involves tactile manipulation of the keyboard coordinated by visual stimulation via the video monitor. In other words, the user must bang away on the keyboard while paying attention to the video display. It doesn't take long to realize that the ability to indulge in verbal discourse with the computer could go a long way towards feeling up the tactile manipulators for other activities.

It isn't likely that the C-64 will ever attain the capability of a voice-activated typewriter. The technology for such applications just isn't with us yet, at least not in a \$100 package. The C-64 does not have the speed or memory to handle that sort of voice recognition. However, there are sev-

eral low-cost peripherals which will allow you the luxury of acoustic communication with your C-64. These products may be placed into two categories: speech synthesizers and speech digitizers. The former are self-contained devices, controlled by the computer, for simulating human speech. The latter create digitized images of the spoken voice for storage in RAM or on disk. These digitized images can subsequently be used for audible playback or, when properly processed, as recognition templates to permit verbal direction of the computer.

THE SOUNDS OF SPEECH

The human vocal apparatus is capable of producing two fundamental sounds. The vocal chords, essentially a vibratory apparatus, produce a buzzing sound. The fundamental, or lowest, frequency of this sound is in the order of 100 vibrations per second. The nature of this buzz is such that it contains a large number of harmonics, or integral multiples, of the fundamental vibration. These overtones, which vibrate at 200, 300, and so on times per second, are of nearly the same amplitude or loudness as the fundamental tone. A well-known

example of this type of sound is the "ah" which is frequently produced as a slender sliver of wood is introduced into the mouth.

In contrast, the lungs are a source of compressed air, which when forcibly expelled produces a rushing sound. The random nature of this "white noise" contains a mixture of all audible frequencies. A common unvoiced sound is the "sh" used to represent a request for silence.

The audible output of these two mechanisms is controlled by the throat and mouth, which by the positioning of the tongue and lips form a highly adjustable resonating chamber. Each fundamental resonance so obtained is called a formant. These formants are combined into complex vibrations, known as allophones, which are the fundamental speech components. The allophones are further combined to produce the various vowel or consonant sounds known as phonemes.

SPEECH DIGITIZATION

The first method used to digitize speech stores the actual speech information. The production of sounds in the real world is a continuous or ana-

log process. That is, speech sounds change in a smooth and continuous stream. On the other hand, information stored and manipulated in a computer is done so in a discrete or digitized form. In other words, a series of numbers are used to represent the original information.

The process of converting real world information to digitized form is known as sampling. In effect, a real time event is looked at briefly at periodic intervals. The quantity being digitized is carefully measured and the results are stored away. Thus two pieces of information are required, the interval between samples and the actual value of the sample.

The degree of accuracy with which this is done depends on two things. The first is how often the original information is sampled. The second is the range of measurement which is available for each sample.

The sample rate sets an upper limit on how fast the original information can change and still be record-

ed with any accuracy. For example, if we want to make sure that we know the position of a door which might open or close once every second, we have to look at it at least twice every second. Less frequent observations would leave open the possibility of missing an opening or closing. Sampling theory agrees with this concept by specifying the need to sample at twice the maximum rate of change of the sampled signal. In terms of sound or speech, a faster sample rate results in greater fidelity.

The measurement range determines how precisely each measurement is recorded. Using our door as an example, if we wish only to record if it is open or closed a single bit would suffice. In this case a 0 could represent a closed door, in which case a 1 would represent an open door. Of course this tells us nothing about the intermediate positions. If we wish to refine our measurement, say up to 256 different positions, a single byte would be re-

quired. In terms of speech or sound a greater range of measurement results in a greater spread between the loudest and softest sounds which can be recorded.

In music recording and playback equipment these two parameters are listed as the frequency response and dynamic range.

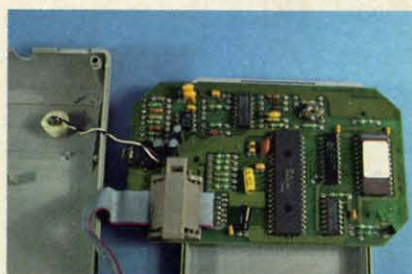
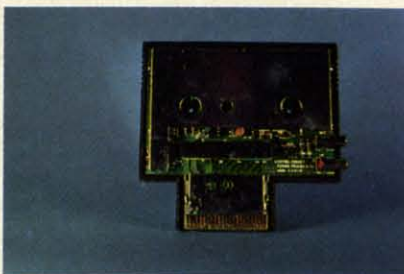
It turns out that for speech to be reasonably intelligible, a minimum of 3000 vibrations per second have to be heard. This would require a total of 6000 samples per second. If we use the same 256 possible levels, an understandable (although rather coarse) reproduction would result. In terms of computer memory, each sample would require one byte and each second of recorded speech would fill 6000 bytes of memory. Things aren't all that bad. Various mathematical compaction techniques have been developed to reduce the memory requirements somewhat. Nevertheless, speech reproduction in this way is memory intensive.

The second method of speech digitization turns a large part of the task over to the hardware. Electronic analogs of the vocal tract are constructed. A number of these circuits, representing the various positions of the vocal apparatus, are combined on a single chip. The task of speech production is reduced to controlling the speech circuits so as to reproduce the appropriate allophones. The problem of speech reproduction is thus reduced to one of selecting the appropriate circuits in the proper sequence for the correct lengths of time.

The data storage requirements for the hardware method are significantly less than for full digitization. Several tradeoffs exist. The hardware method is somewhat costly, although this is becoming much less of a factor. As with all semiconductor products, cost of the components are dramatically reduced after the initial development is complete. The most significant tradeoff is in flexibility. Digitization has the ability to record any sounds, not just the spoken word. The hardware devices are somewhat limited to a predefined set of acoustic characteristics. Both methods have



Aeronaut game included with Voice Command Module requires you to direct the hot air balloon by voice rather than by keyboard or joystick. That is, you use your own hot air to manipulate the balloon's hot air.



Interior views of Magic Voice (left) and Voice Command Module. Note the two kilobytes of ROM and the onboard microprocessor in the latter.

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their uses.

The reverse of speech digitization is speech recognition. The demands of a workable speech recognition system are far greater than those of a workable speech digitization system. In the ideal case, a speech recognition system would be both speaker independent and receptive of continuous utterance. That is, anybody could talk a blue streak at the computer and every word would be properly understood within the context of what was said. Even with the largest computer systems this is a yet-to-be-realized scenario.

A step down the difficulty ladder is a speaker-dependent continuous utterance system. These results may be achieved to a limited extent with existing hardware and software. The realm of the smaller computer is in the speaker independent discrete utterance field. That is, anyone will be understood, but only one clearly defined word at a time. In practice, most systems can be trained for a select group of individuals.

For the C-64 we come down to the speaker-dependent discrete utterance situation. That is, a select vocabulary discretely uttered by a single individual will be understood.

In actual practice a number of other factors must be considered. Perhaps the most important is the background or environmental noise which must be dealt with both during the training and recognition phases. Think of it as studying for a final exam in the cafeteria while actually taking the exam at a ball game. Things of this sort can drive the small system for a loop.

As Commodore users we are a fortunate group. The low cost and large

numbers of our computers which are in use prompt the development of a large variety of inexpensive yet powerful peripherals. At a very minimal cost, speech products which perform many of the above functions are readily available. We will now examine a selection of these. □

MAGIC VOICE SPEECH MODULE

Commodore Business Machines, Inc.

1200 Wilson Drive

West Chester, PA 19380

Phone: 215-431-9100

Price: \$59.95

No roundup of speech products would be complete without Commodore's own entry into the market. As is usual with Commodore products, the *Magic Voice* is an impressive piece of hardware for the price.

Connecting up the *Magic Voice* is straightforward if you are using a TV set. Just plug the module into the cartridge port and hook up the supplied audio cable between the module and the computer's video port. If you are using a monitor, things are a little more complicated. The audio connection to the monitor will have to be diverted to the *Magic Voice*. Audio for the video monitor is then supplied from the *Magic Voice*. A minimum of one and probably two user-supplied audio cables are required.

The *Magic Voice* speech module places its priorities on the production of clear, natural-sounding speech. To achieve this goal, Commodore has chosen to limit the module's repertoire to a total of 235 different utterances. The majority of these speech fragments are entire words, of which 25 per cent are devoted to the letters of the alphabet, numbers, and numer-

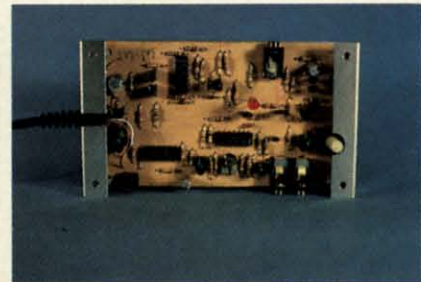
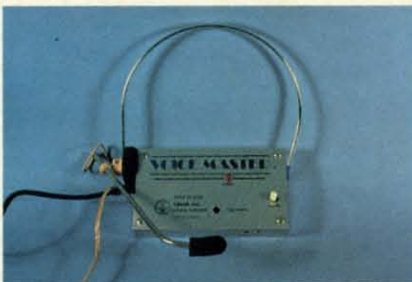
ical suffixes. This last set provides enough flexibility to allow the user to SAY any number up to 999,999,999. Speech is produced in a realistic female voice with just a hint of an "accent."

Attaining a high level of intelligibility is not without a price. The storage requirement for this limited vocabulary and its associated driver software exceeds 16 kilobytes. The bulk of this data is the speech module's resident vocabulary. Fortunately, the Commodore 64's architecture supports the acquisition of operating system extensions without affecting BASIC's user RAM. The speech extensions are mapped into the address space which is shared by the computer's built-in BASIC and operating system ROMs. Only one kilobyte, in the \$C000 block, is visible to BASIC. This area is normally reserved for machine language subroutines.

The voice module consists of a compact, enclosed plastic package which is installed in the Commodore 64's cartridge port. A set of hinged doors on top of the cartridge covers a spare socket which permits the use of additional cartridge-based software. Only an audio hookup is needed to complete the connection.

The addition of four commands to BASIC allows for simple programming of the device. The SAY command works very much like a print statement. It is limited to single words in the resident vocabulary or to the numbers 0 through 234, each of which corresponds to one of the available utterances. Thus, the rendition of complete sentences requires successive SAY statements.

The most significant shortcoming, aside from the limited vocabulary, is



Voice Master has both speech digitization and recording capabilities. The accompanying headset/microphone simplifies recording of voice patterns.

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BASIC's error routine. Any attempt to voice an utterance which is not part of the resident vocabulary results in the cessation of program execution and the display of the ?ILLEGAL QUANTITY ERROR message. A far more practical approach would have been to simply ignore the offending phrase or perhaps to utter a non-committal grunt. Fortunately, a simple out exists. POKE 49457,76:POKE 49458,174:POKE 49459,167 will harmlessly redirect the error routine.

The built-in RATE command varies the speed of the spoken word over a two-to-one range without affecting the voice's pitch. The RDY variable allows BASIC to test the speech module for completion of the current phrase. The VOC function alerts the module to any vocabulary extensions in user RAM.

TABLE OF BASIC EXTENSIONS

Magic Voice

SAY "text" or A\$ or N—utters text string or number

RATE (I)—sets speech speed

VOC (AD)—defines user speech dictionary

RDY—*Magic Voice* status variable
text=utterance in *Magic Voice* vocabulary

A\$=string variable

N=utterance number from *Magic Voice* vocabulary

AD=address of vocabulary data

I=1(fast) to 10(slow)

Do not expect to be able to encode your own vocabulary. The complexity of the process will force most users to depend on outside sources for supplementary vocabularies.

The *Magic Voice* has been around for some time now. When first introduced, numerous promises were made about the new games and software which would soon be available to support it. Aside from several cartridge-based games, very little if any of this software has materialized. This is a shame, as the *Magic Voice* has a great deal of potential.

The *Magic Voice* comes with a rea-

sonably detailed manual complete with a sufficient number of programming examples. For the advanced user, a chapter on interfacing to the machine language routines is included. □

THE VOICE MESSENGER-SPEECH 64

Welwyn Currah Ltd.

104 West 4th Street

Royal Oak, MI 48067

Phone: 313-547-8300

Price: \$59.95

The *Voice Messenger-Speech 64* offers a generalized approach to computerized speech. All speech is generated by combining allophones, the basic speech components. These consist of 58 speech sounds with four pauses of varying lengths. The resulting speech is quite intelligible with just a bit more "accent" than the *Magic Voice*.

Installation is as simple as plugging a cartridge into the expansion port. If you are using a TV, just plug the attached cable into the computer's video port. If you are using a video monitor, use the included "Y" adapter. We did discover an interesting quirk. If a disk drive connected to the serial port is not turned on, the *Voice Messenger* will not work. Either turn on the drive or disconnect it while using the *Voice Messenger*.

The user is not required to combine allophones to generate speech. The *Voice Messenger* has its own eight-kilobyte operating system which does a commendable job of translating ordinary text into speech. The SAY command, which has been added to BASIC, will convert any string or string variable. If the pronunciation is not to the user's liking, it is a simple matter to tweak the vocalization by modifying the spelling. The translator will also accept a mix of text and allophones for maximum flexibility.

The only limitation to be aware of when voicing speech is the 256-allophone speech buffer. In real time this amounts of about 25 seconds' worth of speech. In computer time the buffer can be filled in just a few milliseconds. The reserved variable, SP%, allows the BASIC programmer to test the status of the speech buffer.

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AHOY! 39

The *Voice Messenger* will also convert the Commodore 64 into an instant talking computer. The KON command causes vocalization of all keystrokes. All keys are sounded, including the function keys, with the exception of the CTRL, RUN/STOP, Commodore logo, and RESTORE keys. The Commodore graphic symbols are simply sounded by the word "graphic." Priority is given to the most recent keystroke, which cancels the sounding of the last keystroke in mid-utterance. Pressing the keys faster than they can be uttered results in a peculiar echo effect.

Speech is normally sounded by a distinctly male tenor voice. The pitch may be easily altered to a rich baritone. The intonation of either voice can be subtly varied when direct allophone voicing is used. The clever programmer can add considerable expression to the generated speech.

The *Voice Messenger* operating system does not utilize any of the Commodore 64's BASIC memory space. Some memory locations in the \$C000 block are used. A brief manual is supplied with the package. The commands are clearly described along with several examples. For advanced programmers, a chapter on the machine language interfacing is included.

A required DIN plug "Y" adapter, not included with early production models of the *Voice Messenger*, now comes packaged with the hardware.

The *Voice Messenger* is a good all-purpose speech synthesizer for the Commodore 64. Its performance flexibility and reasonable price make it a best buy. □

Voice Messenger

INIT—initializes voice messenger

SAY n "text" or n A\$—utters text string with specified voice

KON n—key voicing on

KOFF—key voicing off

BYE—suspends *Voice Messenger*

SP%—speech buffer status variable

A\$=string variable

text=any text data

n=0 or 1; 0=low voice, 1=high voice

EASY SPEECH 64

Research In Speech Technology, Inc.

1825 74th Street

Brooklyn, NY 11204

Phone: 718-232-7266

Price: \$24.95

It appears that we have discovered a genuine cottage industry (at least in what passes for a cottage in Brooklyn) right in our own backyard. Research In Speech Technology (RIST) has been dealing in personal computer speech products for several years. Until now they have been content to use indirect marketing to distribute their wares. RIST will now be offering, direct to the consumer, their own line of speech products.

The first of these, *Easy Speech 64*, is a disk-based utility designed to work with the Welwyn Currah *Voice Messenger*. In fact, you must have the *Voice Messenger* to derive any benefit from *Easy Speech 64*. If you have met the basic requirements, then *Easy Speech 64* can be set to automatically vocalize any text sent to the Commodore 64 screen or any other output device. This sleight of mouth is accomplished by intercepting all output as it is sent to the screen for display. Text is then vocalized in real time.

Easy Speech 64 is designed to be as transparent as possible to the normal workings of the C-64. The bulk of the code resides in the RAM which is hidden beneath the Kernal ROM (\$E000-\$FFFF). As a result *Easy Speech* will function with many commercial software packages. Most notably, it will work with the entire line of Infocom interactive fiction software from the original *Zork* to the latest *Wishbringer*. Just initialize *Easy Speech 64* and then boot the adventure game as per Infocom's instructions. Everything works as before, except every word is clearly enunciated in the *Voice Messenger*'s own peculiar accent.

The alert reader will realize that text is often displayed at a rate which is far greater than that of the spoken word. Herein lies the most significant disadvantage of the system. Operation is slowed up considerably when *Easy*

Speech 64 is active. The solution is quite simple. *Easy Speech 64* may be toggled on and off by a CTRL V (for voice) keystroke sequence.

Installation of *Easy Speech* is straightforward. Simply boot the program from disk. After a lengthy and unavoidable message, which is accompanied by the display of a talking disk, the main menu appears. At this point you have the option to accept the defaults and run your application software or customize *Easy Speech*. Upon choosing the latter, the modify menu appears, offering four possibilities:

1. The default device can be changed to anything from 1 to 255 (the screen is device 3). Thus text being sent to the cassette, printer, or disk drive can be vocalized. This may not even slow things down if you are using the cassette or a letter quality printer.

2. The memory location of the *Easy Speech 64* operating software can be changed to the RAM under BASIC (\$A000-\$BFFF). This provides some flexibility to accommodate additional commercial software.

3. If you are not happy with the tone of *Easy Speech 64* you can do something about it. The default is a low voice in a high pitch. An optional high voice and low pitch can be selected for a total of four combinations. These are two separate selections on the customize menu.

4. The most powerful option is the dictionary. This lets you customize the pronunciation of the words which are important to your application. Actually, entire phrases can be entered into the dictionary for subsequent recall by PRINTing a single character. This can be a significant memory saver for your BASIC programs. Over four kilobytes of dictionary space is available in the RAM under the ROM. An unlimited number of dictionaries can be stored on disk.

Dictionary entries are created with *Easy Speech*'s own custom editor. The screen is divided into three windows. The top window is for direct entry of text. Although the manual indicated a 67-character limitation, we found the editor would accept text of any length. *Easy Speech* includes a sophisticated algorithm to translate

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most text into the appropriate allophone for use by the *Voice Messenger*. Simply hit return and the allophone version of the text will appear in the second window. Of course, it is impossible for it to be 100% perfect. At this point you can voice the message and modify the allophones to fine tune the speech. Alternatively, the text entry stage may be bypassed to direct allophone entry.

The bottom window displays the available editor commands in abbreviated form. The window also displays user prompts when required. Four built-in help screens provide a slightly more detailed description of the commands, as well as an annotated listing of all the available allophones.

The editor worked well once we became accustomed to its unique conventions. The allophone window would only accept genuine allophones and not arbitrary text. Full disk support is provided, including the loading and saving of dictionaries, directory display, and the issu-

ance of disk commands. The editor did have several nonfatal flaws. It was all too easy to exit the editor without adding the current phrase to the dictionary. This results in the loss of whatever was in the editor's buffer. Although the editor listed the word identification in the dictionary, it did not permit the recall of an added phrase for further editing.

Once you have left the modification mode, *Easy Speech* parameters are fixed. There is no way to remodify any of the parameters without rebooting from the very start. None of these limitations detracted from the overall performance of *Easy Speech*. In general they are easily circumvented if you are aware of their existence.

We were disappointed in one aspect of *Easy Speech*, the vocalization of BASIC program listings. In the ideal case, the online text to speech converter would read back a program as it LISTs to the screen. This would enable you to proofread a program without the need for constant head swinging between the screen and the source code. Unfortunately, the text to speech algorithms were not up to the task of decoding a BASIC program. Characters which are crucial to BASIC (such as punctuation symbols) as well as key words and BASIC variables were all vocalized as normal text. The results were rather strange and of little value for proofreading. What is needed is a custom dictionary which examines the BASIC tokens stored in memory. In addition, all BASIC text would have to be vocalized one character at a time. We did pass these suggestions on to RIST. Perhaps some favorable results will be forthcoming.

Easy Speech 64 is a very useful utility. If you already have the Welwyn Currah *Voice Messenger*, you should definitely consider the purchase of *Easy Speech*. □

COVOX VOICE MASTER

Covox Inc.
675-D Conger Street
Eugene, OR 97402
Phone: 503-342-1271
Price: \$89.95

The *Voice Master* system from Co-

vox, Inc. is a combination of hardware and software for the digital recording of speech and sound with the Commodore 64. The digitized data is initially stored in the computer's memory and may be saved to disk for subsequent playback.

The package includes a compact hardware module about the size of a pack of cigarettes. Early versions of the *Voice Master* were installed in the user port. These were supplied with a simple hand-held microphone. More recent versions plug into the joystick port, leaving the user port free for other applications. A combination headband with earphone and microphone are presently supplied with the package. The latest versions are very similar to the one depicted on page 36, the primary difference being the elimination of the calibrate adjustment.

Early versions also used a single analog to digital integrated circuit conversion chip. Current models utilize more common integrated circuits, which seem to perform just as well. The hardware module is needed only for the recording of speech or sounds. Reproduction of digitized speech is via the Commodore 64 SID chip. Once the speech files have been digitized and saved to disk, they may be recalled for use by user-written programs. The only requirement here is that the *Voice Master* software (see below) must be LOADED into the computer.

The heart of the system software is a four kilobyte machine language program which LOADs into the \$C000 block. The major memory overhead is associated with the storage of the digitized sound data or vocabularies. The specific amount of memory available for speech data is user-adjustable. The minimum amount uses the RAM under the BASIC ROM. About six kilobytes or six seconds of speech is thus available. It is possible to allocate a maximum of 41,140 bytes for speech data storage.

The operating system includes a fast LOAD routine which makes possible the use of the disk drive for real time vocabulary storage. The fast LOAD

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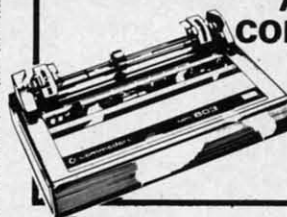
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routines may not be available on versions sold outside of North America.

The software extends the Commodore 64 BASIC with 18 new commands. These allow for very easy programming of the Commodore 64 for the recording and playback of digitized sound. For example, LEARN 5 records the next sound as phrase number 5. SPEAK 5 will play back the sound. As with other BASIC functions, the parameters may be explicitly defined or may consist of any BASIC expression. A total of 64 phrases may be addressed.

Disk or tape storage of the phrase file is by the PUT and FIND commands. These are analogous to SAVE and LOAD; however, they affect only the digitized sound data. The remainder of the commands allow easy adjustment of the recording and playback parameters, including sampling rate, playback speed, and volume.

The sample rate as set by the RATE command is important. The allowable range is from a minimum of 4,000 up to a maximum of 12,500 samples per second. The tradeoff is fidelity versus memory. The higher sample rates give better reproduction, but use up memory at a proportional rate. We found that voices were easily recognizable even at the slower rates.

Included with the software are several sample programs that demonstrate the use of the new BASIC commands. Among these are a talking alarm clock and calculator. Also demonstrated are the ease with which special effects can be created, such as generating echoes. Some of the demonstration programs are also used to adjust the hardware. The BAR program is a rudimentary spectrum analyzer which is also used to calibrate the gain or volume control. A spectrum analyzer is an instrument used to display the frequency content of a signal. Unfortunately, the version supplied was too crude for any serious use, although it did make for an effective display.

In use, the package performed well. Individual voices were clearly understood and easily recognizable. Voice quality was slightly harsh due to the

limitations of the SID chip. Best results were obtained with the screen blanked. Overall, the speech quality is quite good when compared with dedicated speech synthesizer devices. Even if we do say so ourselves.

The package includes speech recognition software, which performed surprisingly well. However, it did require some practice on the user's part to achieve consistent results. The important thing is to train your voice to repeat the key words in exactly the same way. As with the speech digitization software, the speech recognition routines have their own BASIC commands. These include special TPUT and TFIND commands for SAVEing and LOADing templates.

A special digitization process reduces each spoken phrase to a template which is only 96 bytes long. Thus real time manipulation of speech recogni-

tion templates is possible.

Three versions of the machine language routines are supplied. These consist of separate and combined versions of the speech digitization and recognition software. This allows the user to optimize the use of memory to suit the needs of the application. All commands also work under program control. All commands also work under program control. This makes it feasible to write a program which will LEARN a user's voice, be TRAINed to recognize it, and respond in kind when spoken to.

User documentation is thorough, with numerous examples. The demonstration programs may be listed for further study. The machine language routines can be disassembled. We would have preferred to see a commented source code listing as well. A detailed technical manual for the more sophisticated user would be a welcome addition. This would allow the technically inclined to experiment with other aspects of the *Voice Master* package. For example, although intended for speech applications, the hardware could be trained to recognize many other types of signals as well. Virtually any measurable parameter, when converted into a properly scaled electrical signal, could be fed into the microphone port.

The Covox *Voice Master* is a flexible, easy-to-use package. Many applications readily suggest themselves. The samples supplied with the package are a good place to start. The included *Voice Harp* is a case in point. This three-part program lets the computer sing along with you as well as compose music and print out the resultant score—all under your vocal direction. Just be careful with the volume setting on the video monitor. If it is too high, the microphone will pick up the generated sound. The result is the computer literally singing to itself.

Perhaps some day, with the help of the *Voice Master* or products like it, digitized voice libraries of famous personalities will be possible. So watch out, the person answering the phone may not be who you think. □

COVOX BASIC

Speech Digitization

LEARN n—digitizes spoken word

SPEAK n—voices digitized phrase
(n=0...63)

SPEED m—varies playback rate

RATE m—varies sample rate
(m=0...10)

VOLUME k—playback volume
(0...15)

PAUSE k—delay in 1/4 second increments (0...255)

SCREEN k—screen on or off

PUT "name",dn—saves vocabulary

FIND "name",dn—loads vocabulary

FFIND "name",8—fast load
(dn=device number)

CLEAR n—clears all speech, sets page for recording (16...160)

Speech Recognition

TRAIN n—records a template

BLANK n—erases a template

RECOG m—scans range of templates for a match (m=0...4, n=0...31)

TPUT "name",dn—saves a template

TFIND "name",dn—loads a template

MIN n—sets recognition threshold lower limit (0...100)

MAX n—sets recognition threshold upper limit (0...700)

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The *Voice Command Module* from Eng Manufacturing, Inc. is a combination of hardware and software that adds speech recognition capabilities to the Commodore 64. The word recognition "lexicons" are initially stored in the computer's memory and may be saved to disk for subsequent use. Unlike any of the other speech products we looked at, the *VCM-64* has no capability to generate digitized speech.

The package includes a compact hardware module about the size of a large pocket calculator and disk-based software. The module connects to the C-64's user port via a three-foot length of ribbon cable, terminated with the appropriate edge card connector. The arrangement leaves a number of electrical contacts exposed at the rear of the computer. These could be shorted out by a carelessly placed object. A short length of insulating tape, wrapped about the connector card, should eliminate the hazard. For voice recording a miniature microphone with a lapel clip is included in the package.

Internally, *VCM-64* displays a high degree of sophistication. The module contains two kilobytes of ROM and an onboard microprocessor. The module does all the speech preprocessing before passing the data along to the computer. This minimizes the data processing requirements of the C-64 itself. As we shall see, the Speech Operating System inside the computer requires a minimum of memory.

The heart of the system software is a four kilobyte machine language program which LOADs into the \$C000 block. The major memory overhead is associated with the storage of the digitized sound data or speech recognition lexicons. Each lexicon includes a maximum of 64 unique words. The maximum length of a word is 1.28 seconds. The data for each word requires exactly 128 bytes. Thus an entire lexicon fills

eight kilobytes. Since lexicons are LOADed into the RAM beneath the BASIC ROM (the C-64's \$A000 block), all of BASIC memory remains available for the user. Lexicons are always exactly eight kilobytes. If there are fewer than 64 unique words in a lexicon, the software will train more than one pattern for each word. Thus a single word lexicon will contain 64 versions of the word.

The software does not add any commands to the Commodore BASIC. Instead, a general utility program, the Speech Operation System (SOS), is included on the disk. This menu-driven routine, written in BASIC, provides a user interface to the machine language operating system. It lets the user easily create and manipulate lexicons for later use. The menu-driven functions include routines to copy and modify lexicons, as well as train and rehearse lexicons.

In addition to the SOS, several demonstration programs are included. All programs are accessed from a menu-driven loader. All the programs, which are speech-driven, require that a command lexicon be created by the end user. Included are a simple card file, a hot air balloon aeronaut game, and a word mix puzzle.

We derived considerable amusement from the aeronaut game. Although simple and unsophisticated, the uniqueness of directing the balloon by voice, rather than keyboard or joystick, resulted in considerable interest by our game testers. Particularly amusing was the body English employed as commands were given in a carefully controlled voice. Due to the limitations of the system, spoken commands must bear a high resemblance to the utterances as they were originally trained.

Among the demo programs is the Speech Graphics display generator. This generates a graphical representation of a spoken word. This snapshot is related to the format which is used by *VCM-64* for creating the word recognition templates. The program allows the user to compare repeated utterances of the same word. We found the routine to be of some assistance in

training the end user for uniform repetition of command words.

Using speech recognition in your own program is not difficult. Although *VCM-64* lacks any extensions to BASIC, the speech recognition features are easily accessed by a series of PEEKs, POKEs, and SYS calls. These allow the user to initialize the system, LOAD a lexicon, and listen to an utterance. All calls are done to location 50000 as follows:

SYS 50000,I: initializes system
SYS 50000,L: LOADs a lexicon
SYS 50000,F: recognizes utterance

The LOADing of a lexicon must be preceded by the OPENing of the lexicon file. The results of an utterance recognition are stored in series of memory locations starting at address 53000. These have to be examined by the user.

The accompanying manual described all of the above operations in some detail. Unfortunately, the accompanying example contained several significant errors. Fortunately, sufficient detail was included to allow a reasonably competent BASIC programmer to figure out what to do. Overall, the documentation was clear and concise. Use of the various demonstration programs and utilities was well-explained. Our biggest beef with the documentation is the lack of technical detail for what is actually an experimental product. Given the wide range of possible applications and the unusual technology, we felt that an educated user would be a better customer.

We encountered one additional bit of misdirection. The machine language program, which is the heart of the system, is referred to as "CHIRPEE" by all the documentation. In fact, the label on the back of the *VCM* is so marked. This file did not exist on the distribution disk. Instead the main program was listed as "VCM."

Overall, *VCM-64* is an interesting product. Speech recognition depended a great deal on the user's ability to voice commands in a repetitive manner. Once this trick was mastered, *VCM* performed acceptably. □

THE YEAR'S BEST COMMODORE ENTERTAINMENT SOFTWARE

Here Are 1985's Top 25 Games
and Recreations

By the *Ahoy!* Editorial Staff

Looking back on 1985's array of new programs should put broad smiles on the faces of Commodore owners. It was quite a year, perhaps the best in the history of computer entertainment software. Electronic publishers took dead aim at the huge Commodore audience and broke all records for both quality and quantity.

The writers who cover entertainment for *Ahoy!* have collaborated on this survey of the 25 best leisure programs. The compilers beg the indulgence of readers whose favorites are omitted and publishers whose worthy titles appeared too late to make the deadline. Such are the perils of "best" lists.

Strategy

At one time, virtually all strategy games were military simulations. Computer wargames are still very popular, but there's now a wider variety of subject matter.

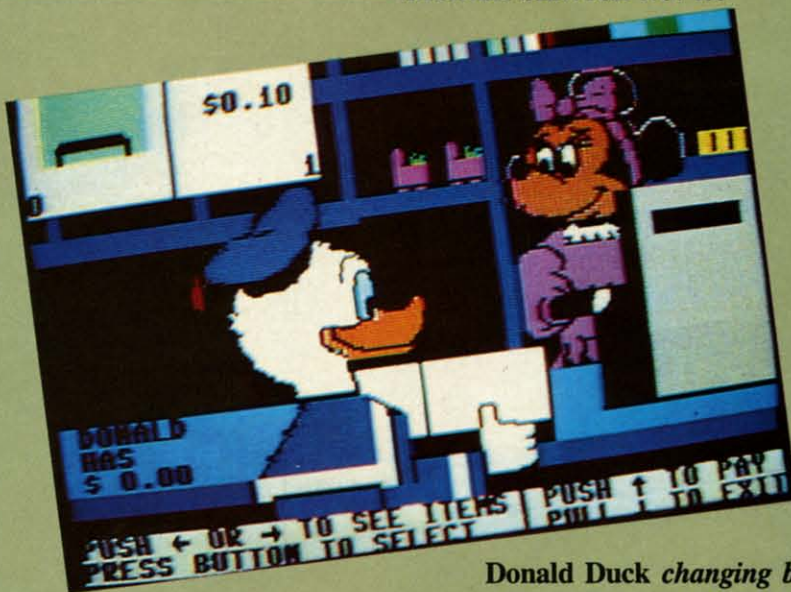
There are two distinct types of strategy contests, both of which are represented among 1985's best programs. Traditional strategy games let the players think as long as they want, while action-strategy contests require the player to concoct tactics to deal with more fluid situations.

Field of Fire (Strategic Simulations). Designer Roger Damon has created an unusually compelling military simulation by adding an element of role-playing to the fighting. The soli-

taire commander can gain insight into small unit actions during World War II at the head of Easy Company of the U.S. Army's First Division. Eight scenarios follow the glory road from North Africa to Europe. *Field of Fire* can be played as a single engagement or as a campaign which strings all eight battles together. The gamer can rename individual characters to put the conflict on a more personal basis.

Felony! (CBS Software). *Murder by the Dozen* earned praise as one of 1984's best strategy programs. The sequel smooths out the (few) rough edges of the original, and boasts a greater variety of cases to tickle the wits of would-be investigators. A doz-

Airwar made easy.
READER SERVICE NO. 153



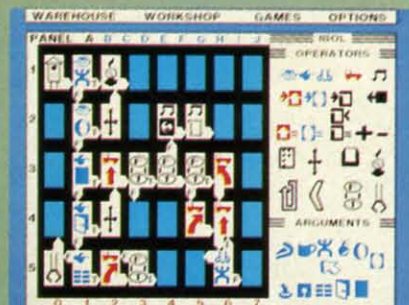
Donald Duck changing bills.
READER SERVICE NO. 154

en crimes, from vandalism to gangland murder, are baffling the Huxley police force. The mayor is putting the screws to the boys in blue to catch some crooks. *Felony!* is equally enjoyable solitaire or with up to four sleuths. As a detective moves around Huxley, he or she selects lines of inquiry from onscreen menus. The investigator deciphers the coded responses with the special clue book. Anyone who loves a rousing mystery should book passage to Huxley without delay.

Mail Order Monsters (Electronic Arts). This one- or two-player action-strategy program makes the gamer the owner/manager of an array of



Six Gun Shoot-out: slap silicon.
READER SERVICE NO. 155



Chipwits: enjoyable programming tutor.
READER SERVICE NO. 156



Karateka: combat in various styles.
READER SERVICE NO. 157

fighting creatures which even professional wrestling's Vince McMahon Jr. would envy. The confrontations take place in a variety of settings, each of which aids and hinders the contestants in a different way. There are three variations of the game. The beginner's level teaches the rules, the intermediate game focuses on single battles and the tournament is an extended contest involving stables of morphs. Victory points can improve a monster's abilities and equipment. The super-powered battling will excite younger computerists, while the interplay of tactics and the ability to customize the creatures make it just as suitable for adults.

Six Gun Shoot-out (Strategic Simulations). One or two gunslingers can relive 10 scenes drawn from the history and folklore of the Old West. Participants can play a stock situation such as the Gunfight at the O.K. Corral, modify any or all of the characters, or let the computer assign random values. There's even an easy method for designing original scenarios. Those who crave direct participation can enter the fracas as a substitute for any existing character. On-screen prompts make order entry surprisingly fast, even in scenarios with many characters. *Six Gun Shoot-out* hits the entertainment bullseye.

Squire (Blue Chip Software). Tired of hearing radio's financial advisors dispense wisdom? Jim Zuber's detailed simulation, the fourth in the series which includes *Millionaire*, *Baron*, and *Tycoon*, makes a fascinating game out of comprehensive financial planning. *Squire* challenges the player to accumulate a retirement nest egg of \$1,000,000 by trading stocks, commodities, collectibles and other investments. Each turn, the computer presents charts, graphs, and tables which outline the situation and provide the backdrop for the wheeling and dealing. Those who make their million can try the ultimate test: playing *Squire* using the computerist's real-life financial statistics.

Spy vs Spy: The Island Caper (First Star Software). Antonio Prohias' madcap spies return in a sequel that's even better than their first outing. The adversaries must search an island for three pieces of a secret missile. They battle natural hazards, fiendish traps, and a time limit to assemble the pieces and catch the submarine for home. The simulvision windows pan as the spy moves around the island instead of jump-cutting from location to location, and the pseudo-3-D graphics are even better than in *Spy vs Spy*.

Adventures

Gamers aren't complaining, but the traditional trickle of new Commodore adventures became a tidal flood in 1985. Manufacturers introduced more adventures for the C-64 last year,

considering both new designs and translations, than in any previous 12-month period.

The Fourth Protocol (Bantam Electronic Publishing). This icon-driven adventure employs characters and situations from Frederick Forsyth's 1985 novel of the same name. Agent John Preston is the only man in Great Britain who scents a nuclear plot which could shatter the delicate balance of world power. Preston must uncover the identity of the double-agent in the British government, then locate the miniature atomic bomb and finally disarm it. The icon-based interface facilitates fast play and eliminates the need to type lengthy orders.

Hacker (Activision). This joystick-controlled adventure plunges the gamer into the heart of a high-tech conspiracy. A freak accident throws the player into a secret computer network controlled by Magma, Ltd. Bit by tantalizing bit, the hacker learns about both the corporation's reckless scheme and a secret report which can blow the lid off the whole operation. Unfortunately, spies all around the world have acquired pieces of the document. The gamer uses a scout robot to visit these agents and buy or trade for the pieces. The trick is to learn what form of payment each spy wants. The simple control system, excellent graphics, and animated tunnel sequences keep *Hacker* fun to play again and again while the computerist gropes for the perfect strategy.

Mindshadow (Activision). The search for one's own lost identity is a staple of fiction. The same intriguing premise is the mainspring of this illustrated adventure designed by Interplay Productions. The protagonist, an amnesiac, must first find a way off the depressingly barren island. Shock follows shock in quick succession as the hero journeys around the world in the hunt for the secrets of his own past. A unique feature of *Mindshadow* is the "think" command. It is used to test any newly encountered person, place, or piece of information to see if it sparks any mental images. The situations in *Mindshadow* are exceptionally logical, though a

few are complex enough to keep veteran adventurers scratching their heads for awhile.

Sherlock Holmes in Another Bow (Bantam Electronic Publishing). Increased memory capacity has made possible adventures, like this Victorian mystery, which combine illustration with extensive text. The player becomes Sherlock Holmes, whose exploits aboard an ocean liner are recounted in excellent novelistic prose. Dr. Watson is at the detective's side, offering help. The cases aren't really that tough, but there are a lot of them to solve before the ship docks in America.

Recreations

Games are still the most popular type of entertainment software, but there's more than one way to have fun with your Commodore computer. Many computerists enjoy recreational software because it's interactive and mind-stretching without the tension of competitive contests.

Art and music programs ruled this category last year. Publishers grew more venturesome in 1985 and marketed recreational programs on subjects ranging from model railroads to electronic paper dolls.

Adventure Construction Set (Electronic Arts). The foremost author of action adventures, Stuart (Return of Heracles, Ali Baba) Smith has made it possible for any reasonably imaginative computerist to design a science fiction, fantasy, or mystery adventure without any knowledge of programming. The instruction booklet and playable tutorials provide ample instruction for producing an action adventure game, complete with graphics and music. Smith has refined and upgraded almost all the subsystems familiar to fans of his earlier hits, so the *Adventure Construction Set* can produce games which are as good as professionally published titles.

The Complete Computer Fireworks Celebration Kit (Activision). Parents who fear Fourth of July accidents would do well to buy this disk for their kids, though they'll probably end up elbowing the youngsters away from the console. The computerist

picks choices from menus to orchestrate a fireworks show, including music and special messages. The frame-by-frame construction system makes the process surprisingly simple. *The Complete Computer Fireworks Celebration Kit* even produces animated greeting cards which run on any Commodore 64 or 128 without the original program.

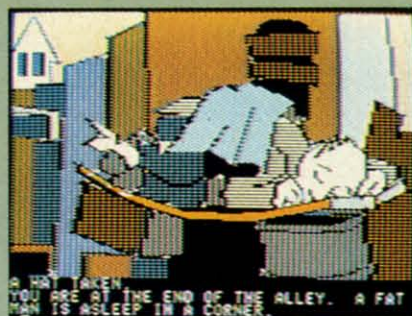
The Little Computer People Project (Activision). This unique cross between a doll house and an ant farm turns the monitor into a window to another world. The computerist observes, and periodically interacts with, a charming electronic family which "lives" inside the Commodore 64. The lifestyle of the computer people unfolds a little at a time over a year. For instance, the digital lord of the manor may start fooling around with a saxophone. After doing this a few times, he "learns" to play a tune. And if his rehearsals go well enough, eventually another musician enters the house and makes it a duet. The little computer people can do nearly 5,000 different things, and there's a supplemental disk already in the works.

Educational Games

Realism returned to the educational games market in 1985. Publishers have stopped over-producing ho-hum titles, a trend which swamped this category in 1984. This year's best entertain as they inform.

Chipwits (Epyx). This fascinating solitaire game transcends its original purpose: to teach the rudiments of programming. The user designs a tiny onscreen robot to deal with the conditions of an environment and then runs the miniature automaton through one of several obstacle courses. "Educational" can be the kiss of death when applied to an entertainment product. *Chipwits* does teach, but it never lets the lesson cut into the mind-stretching fun.

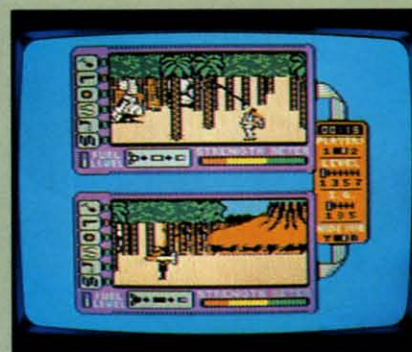
The Halley Project (Mindscape). Comet fever is spreading as Halley's pet rock swings toward the earth for its second and last visit of this century. This one-player space piloting game capitalizes on public interest in



Mindshadow has "think" command.
READER SERVICE NO. 158



Little Computer People in your C-64.
READER SERVICE NO. 159



Island Caper: new avian intrigue.
READER SERVICE NO. 160

this astronomical event to teach the constellations. It's exciting to fly the missions from Halley's Comet to each major planet, and the navigation process guarantees that any spaceship captain will know the names and configurations of all the major star groups after a few interplanetary trips.

Donald Duck's Playground (Sierra). Teaching youngsters about money is the object of this beautifully designed program. Ages 7 to 11 use the joystick to manipulate a well-drawn version of the famous Disney quacker as he tries to get playground equipment for his nephews. Donald must do odd jobs to earn the money with which to buy swings and teetertotters. Be-



Halley Project: scrutinize the stars.
READER SERVICE NO. 238



Field of Fire: combat role-playing.
READER SERVICE NO. 239



Dam Busters: recreates WWII air raid.
READER SERVICE NO. 240

sides instilling an appreciation for the Work Ethic, the grade schooler learns how to make change. *Donald Duck's Playground* meets the essential criterion of a great educational game: it is entertaining enough to keep the student interested in learning the lessons it teaches.

Sports

On-Court Tennis (Gamestar). The world of computer entertainment, which began with *Pong*, comes full circle with this one- or two-player action strategy program. The differences between these two titles shows how far electronic gaming has come

in the last 15 years. The program moves each onscreen athlete into position to return a volley, but the computerist picks the shot with the joystick. Cleverly implemented artificial intelligence gives each of the racquet-eers a unique personality and style of play.

On-Field Football While the computer football programs aspire to Super Bowl realism, this one- or two-player game evokes the anything-can-happen atmosphere of sandlot football. One or two coaches use the joystick to develop a variety of offensive and defensive plays for their four-man teams. Artificial intelligence endows onscreen athletes with individualized abilities. For instance, the gamer can choose possession receiver "Hands" Hannah or flyer "Legs" Lancer to play split end. *On-Field Football* is an easy-to-play blend of exciting action and gridiron tactics.

Micro League Baseball (Micro League Sports Association). Every baseball fan secretly dreams of piloting the home team to the pennant. This statistical replay game lets every arm-chair manager grapple with the same strategic and tactical questions which bedevil Tommy Lasorda and Earl Weaver. Each athlete in *Micro League Baseball* is a mathematical model of his real-life counterpart, but *Micro League* is more than just a number-cruncher. Excellent graphics buttressed by charming animation make *Micro League Baseball* a delightful play experience, even for those who don't eat, sleep, and dream hardball.

Summer Games II (Epyx). Eight great events make this a worthy follow-up to the award-winning *Summer Games*. From the lavish opening sequence to the new closing ceremony, *Summer Games II* is fast-action thrills with enough strategy to make it fun to play again and again. An excellent feature is that this program can be linked to the original so that participants can compete in a grand tournament of all 16 events.

Super Bowl Sunday (Avalon Hill). Twenty great Super Bowl teams of the past are ready for one or two computerists to coach in this statistical replay football simulation. Menu-

driven play-selection gives both offense and defense a wide variety of options, but doesn't require nearly as much memorization as comparable programs. Quest, the design team responsible, didn't neglect the visuals. After both sides enter their orders, full-screen animation shows the result. Additional disks, available for separate purchase, expand the range of available teams.

Action

The fall of the Videogame Era also signalled the end of the vogue for action contests. Even two years later, the quantity of action games is still well below the 1983 peak.

Action programs are beginning to make a comeback, however, because publishers are learning how to satisfy the more sophisticated and mature computer market. Today's action contests emphasize properly timed movements and good strategy rather than blinding reflexes, making them more suitable for adult computerists.

Beach-Head II (Access). This multi-scenario battle game continues the war which began with 1984's *Beach-Head*. The Carver brothers have expanded on their original concept to produce a game which can be played head-to-head as well as solitaire. The first scenario, in which a paratroop force attempts to knock out a machine gun nest, features the most chillingly realistic speech synthesis found on any microcomputer game. A leavening of humor keeps the horrors of war from becoming too overwhelming.

Dam Busters (Accolade). This solitaire action-strategy epic recreates the daring World War II air raid on key German hydro-electric installations which was celebrated in the mid-1950s movie, "The Dam Busters." The gamer pilots a Lancaster bomber on this perilous mission through the unfriendly skies in this pulse-pounding air combat program. Sydney Software, best-known for its designs based on "B.C.," turns realistic in this detailed real-time simulation.

Karateka (Broderbund). Author Justin Mechner brings the breakneck excitement of a martial arts movie to the computer screen. The player as-

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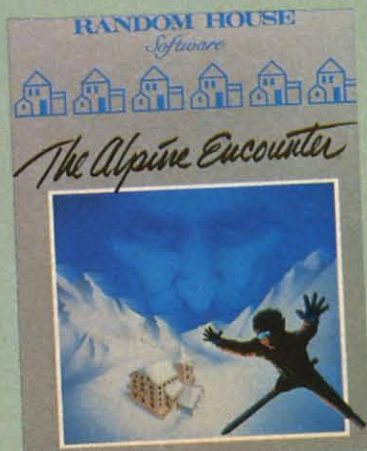
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sumes the role of a fighting hero who is the only one capable of liberating the beautiful Princess Mariko from a stoutly defended citadel. An ingenious joystick-activated command system lets the computerist's onscreen surrogate deliver an assortment of deadly punches and kicks to the tenacious defenders, each of whom employs a distinctive combat style.

F-15 Strike Eagle (MicroProse). The documentation for some flight simulators is the size of the New York City telephone book, but *F-15 Strike Eagle* snips away needless complexity to heighten playability. The gamer can pilot an ultra-sophisticated jet airplane with a minimum of advance study. Despite the ease of play, designer Sid Meier has created a challenging simulation with scenarios based on a range of actual and hypothetical modern airwar situations.

When you go software shopping, these titles are worth a good look. Any of them makes a fine gift or addition to your own collection. □



Alpine Encounter: snowballing action.
READER SERVICE NO. 164

THE ALPINE ENCOUNTER

Random House Software

Commodore 64

Disk; \$29.95

The Alpine Encounter is an illustrated adventure with a novel twist: this secret agent thriller includes an arcade-type skiing sequence. The player becomes Agent 456, who, as the game begins, has just arrived at the Alpenhof Hotel in Switzerland.

Agent 456's superiors have traced two seemingly unrelated crimes to

VODAC, the sinister secret organization responsible for everything from the breakup of detente to the common cold.

The Alpine Encounter is an acceptable, if somewhat dated, game. Unfortunately, it banged around for a couple of years before finding a home at Random House, and state-of-the-art has advanced appreciably during this interval.

The plot moves along at a nice pace, it is satisfyingly convoluted, and the Alpenhof Resort is an intriguingly offbeat setting.

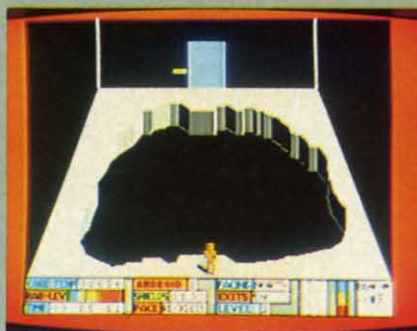
Once you locate skis, boots, and poles, the gamer may want to take a few practice runs down the mountain. The skiing sequence is a key plot element, not just a cheap frill. The player uses the joystick or keyboard to move left or right while zipping downhill. Although the graphics are hardly breathtaking, the real-time action is a stimulating diversion in what is otherwise a conventional design.

The parser is the essence of any adventure which requires the user to enter orders through the keyboard. The one used here is much too restrictive. The vocabulary is small with few synonyms. For example, when the player walks out onto the deck overlooking the slopes, he is told that the stairs lead to the cellar. However, the command "go cellar" elicits the response, "I don't know the word 'cellar'."

The storyline is too linear. The game often ignores player actions, because the writer has not anticipated the normal gamut of possibilities. Anything that isn't smack in the middle of the plot won't work. Try wandering around the hotel and asking Alpenhof employees where to rent skis. You'll slide down the hill barefoot if you wait for these stiffies to help you!

The quality of the illustrations is uneven. Inanimate objects, such as buildings, lobbies, and the tram, are just fine, but people resemble stick figures. The color scheme is one of the worst in recent memory. The white screen border and the excessive use of pastels makes everything look insubstantial: there are almost no dark colors, but there's no shortage of orange-on-grey and similarly revolting color combinations.

ENTERTAINMENT SOFTWARE SECTION



Countdown to Shutdown: beat the clock.
READER SERVICE NO. 165

Though *The Alpine Encounter* shows a flash of wit by naming the chalet midway down the slope the "Halfway Haus," even lines by Woody Allen wouldn't remedy its other shortcomings. Play it for the engaging plot and novel real-time action, but don't expect virtuoso programming.

Random House Software, 201 E. 50th Street, New York, NY 10022 (phone: 212-751-2600). —**Bill Kunkel**

COUNTDOWN TO SHUTDOWN

Activision

Commodore 64

Disk; \$29.95

Condition Red! Condition Red! A reactor buried deep beneath an underground complex is heating up fast. If a few carefully installed damper fields don't cool it soon, it's going to melt down! Of course, no human could survive the intense heat, radiation, and hostile attacks from haywire guardians for long—that's why the company built eight specialized, super-intelligent droids for the mission.

For all its action-game trappings, *Countdown to Shutdown* is a strategic race against time to penetrate eight levels of a technological labyrinth, locate the reactor control room, and then place enough damper fields on the inflamed machine to cool it down to a mere 1000 degrees or so. Succeed, and the world owes you a huge debt of gratitude. Fail, and the world might not exist much longer.

At the start of the game, the player gets a choice of eight different droids to control. Each is a little different: some are more powerful, some are smarter, and some have a higher level of technical know-how,



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a convenient collection of skills that makes it possible to fix broken door controls. The first order of strategy is to choose the one that has the best chance of surviving the various perils of the labyrinth.

As soon as the robot leaves the first elevator shaft, the core temperature starts rising one degree at a time. When the number indicator rolls over, meltdown begins and the game ends. The first order of business is to find a way down to the eighth level where the reactor control room is located.

Along the way, the droid may find useful objects like trans-mats, which teleport the user down a few levels, or techni-kits, which increase the droid's technical expertise. A few odd items, like fluted wine glasses and cigarette butts, serve no purpose. A single droid can't carry more than eight objects at a time, so choose possessions carefully.

Various enemies, like guardian droids and plasma, dog the robot's footsteps as it moves from room to room. They seem to be more of a nuisance than a real threat, since they can be destroyed by multiple blasts from the player's laser pistol.

The joystick guides robots through the maze. To open a closed door, the robot touches its control panel. Gray panels indicate broken or damaged locks which can be fixed by a technically adept droid. Other useful functions reverse the perspective of the room, making the bottom of the chamber appear at the top of the screen, transfer all inventory items from one Ranger droid to another, or use an item. There's also Help available for the baffled player.

Elevators and trans-mats are the surest, safest routes to the eighth level. Of course, finding them is the tricky part! Gaping holes in the floor provide a faster way down, but weaker droids are disabled by the damage sustained. If this happens, the player has no choice but to send another robot to the rescue.

Once the robot locates the reactor, it must insert dampening fields into the overheating core. This immediately starts lowering the temperature in single-degree increments. The re-

prieve doesn't last long, though, and total cooldown will probably require more fields than one robot can carry.

Countdown to Shutdown graphics feature careful details right down to the shadow cast by the droid as it walks. However, sound effects aren't the game's strong suit. The real fun starts *after* you've discovered the control room, when the first crucial damper fields are in place and the task is to find even more—without losing the way back to the reactor. Suspenseful? Absolutely. But if you can't stand the heat, get out of the control room!

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

SLAP-SHOT

Advantage-Artworx

Commodore 64

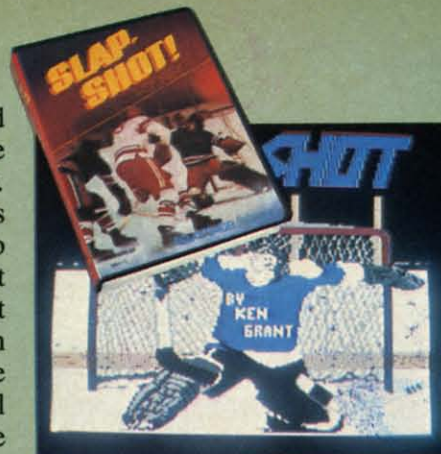
Disk; \$19.95

Computer hockey simulations, whether action- or statistics-oriented, are as scarce as a checking forward's front teeth. U.S. Software producers are reluctant to devote time and resources to the development of a game based on a sport which is popular only in some regions of the country.

It seems only appropriate, therefore, that the first major league hockey game should hail from Canada. Ken Grant's *Slap-Shot* does not represent a high-water mark in the history of computer programming, but it easily surpasses any previous puck simulation. It's a three-screen, full-scrolling contest, complete with bodychecks and penalties, and should certainly appeal to devotees of mayhem on ice.

Slap-Shot is the product of a hockey fan's consciousness. The game opens with a "dedication" to Team Canada and a list of available Olympic squads. Unfortunately, this encourages the player to expect much more than the program actually delivers. The team selection affects only the color of the uniform, not the squad's style or quality of play.

The coaches use the Commodore's function keys to choose from among three speeds of play. Each player uses the joystick to control one active skater



Best hockey simulation available.

READER SERVICE NO. 176

while the machine directs the movements of the rest of the team members.

The man currently under joystick control turns a slightly darker color than the rest of his teammates. Pointing the joystick and hitting the action button shoots the puck or passes it to another player. Similar control schemes maneuver the goalie and throw bodychecks. The ice scrolls horizontally in response to the movement of the onscreen athletes, and the entire rink occupies three full screens.

This game's greatest weakness is its two-player-only format. The computer can't coach a team against a human opponent. Advantage-Artworx plans to remedy this by producing a



Crusade in Europe: won't fatigue.

READER SERVICE NO. 177

new version with solitaire option.

Let's hope the design also addresses some of the program's other shortcomings. Computer control is one area which could use some fixing. The skaters not directly controlled by a human might as well be on the bench. They cruise around in aimless, phlegmatic patterns, sometimes moving right next to the puck without attempting to claim possession of it. It's awfully difficult to pass the

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—Technology Notebook/Gannett News Service

*"Just like in real life, there are no rules, no clues,
no instructions."*

—David Greising/Technology Memo

What more can we say? Well, someone as clever and smart as you certainly wouldn't want any hints, right? So all we'll say is it was created by legendary designer, Steve Cartwright.

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puck when the other player doesn't want it.

Making the selection of the team mean something would also improve *Slap-Shot*. It would be very nice if the computer-directed skaters of "Team Canada" played very physically, while the Swedish squad favored a wide open game.

Slap-Shot claims to include penalties, but it doesn't handle them realistically. Whenever an infraction is called, the game brings the puck back to the offending team's end of the ice for a face-off. Since the primary consequence of a penalty in hockey is that one team must skate for at least two minutes without one of its skaters, the simulation of this aspect is rather ineffectual.

The graphics are acceptable. The playing surface is large enough to keep the skaters from blending together and becoming hard to follow. Designer Grant wisely chose to depict the rink in three-quarter perspective with the players shown from the side. The puck is large and easily visible against the white background. Audio consists of the usual cheering and a few fillips of voice simulation by Electronic Speech Systems, which also produced the voice in *Ghostbusters* and *Impossible Mission*.

Slap-Shot, though far from perfect, is nonetheless the best computer hockey simulation available today. Let's just hope that it doesn't stay that way too long.

Advantage Computer Accessories, Inc., 1020 Meyerside Drive, Unit 8, Mississauga, Ontario L5T 1K7 Canada.

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

—Bill Kunkel

CRUSADE IN EUROPE

MicroProse Simulation Software

Commodore 64

Disk; \$39.95

No type of game has benefitted more from the application of computer technology than the military simulation. The non-electronic variety generally takes ages to set up, requires players to do a lot of record-keeping, and comes with roughly

three pounds of documentation. In short, the typical war boardgame is a major undertaking.

Crusade in Europe is an excellent example of how the computer makes wargames easier to learn and more fun to play. Authors Ed Bever and Sid Meier have produced a game laden with features which bring out the nuances of World War II fighting in the European theater, but this is no ponderous "monster game" which requires a couple of hours to complete a single turn.

This operational-level simulation utilizes division-size units (8,000-20,000 men) to recreate battles from D-Day to mid-October, 1945, the point at which Nazi Germany was driven back inside its original borders on the Western Front. There are five basic scenarios. All but the campaign version, "Crusade: The Battle for Europe" have a selection of variants. The Normandy scenario, for instance, can cover just the beach landing or extend all the way to the liberation of Paris. The "Rommel's Strategy" and "Quick German Reaction" options allow players to see how hypothetical changes in Hitler's strategy for the defense of France might have affected the situation.

Unlike most military simulations, *Crusade in Europe* unfolds in accelerated real time. The player is not fettered by discrete turns, but may enter orders whenever appropriate. Each unit usually has a chance to move approximately every eight scale hours as indicated by the time/weather strip located immediately above the map. The game is intended for either solitaire or head-to-head play, but it works better when one human general fights against a computer-directed foe. Although the program provides a method for switching between two human competitors, it is clumsy and too likely to lead to jostling for the controls when the battle reaches a critical stage.

The cursor, manipulated with a joystick, is the primary means by which a player issues orders and obtains information about men under his or her command. After positioning the cursor over a friendly unit,

pushing the button (or the space bar) establishes contact with division command. This elicits information about the number of men and tanks in the unit, the amount of supplies remaining, the formation, the experience level of the troops, the unit's current effectiveness rating, and the nature of the last command it received.

A second press of the button prepares a friendly unit for an action order: Move, Attack, Defend, Reserve. Once a player issues an action command to a unit, moving the cursor and hitting the button enters an objective command. This is the part of the order which tells the unit where to move, attack, or defend.

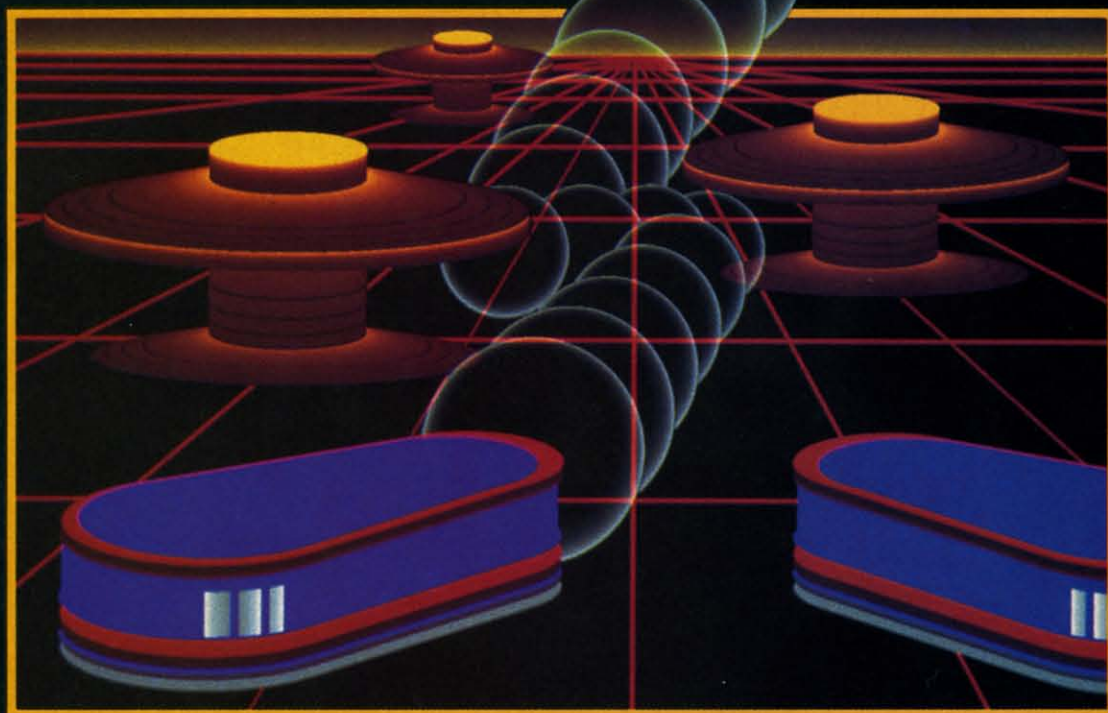
A third set of orders, the information commands, help the gamer keep on top of the developing situation and obtain data on which to base tactical decisions. Most of these use a combination of the stick and a keystroke. For instance, putting the cursor on a unit and pressing "G" produces a statement about the general who currently commands that division, while moving the cursor to a city or other critical location and pressing "C" generates a quick status report about the place. In addition, "O" calls up a strategic map, "B" allows the general to review the battle in progress, "T" temporarily removes all units so generals can study the terrain, "?" tells who's winning the battle, and "W" moves the cursor over the friendly unit which has sent the most recent message to your headquarters. This last order is handy for coming to the aid of a unit in trouble before disaster overtakes it.

Many computerists will no doubt feel that the most important command is "f7", which pauses the game. Since order entry is continuous, a minute here and there to plot strategy is an absolute necessity. A game-in-progress can be saved on a formatted disk and restored at a later point.

Supply plays a larger role in *Crusade in Europe* than in most other computerized wargames. Every night, units which have a path to a headquarters unit or depot are resupplied at night. These valuable units can't put up much of a fight if attacked,

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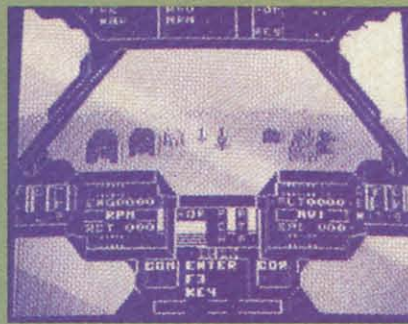
so the commander must always make sure to protect them against the ever-present danger of lightning raids by the enemy.

The documentation straddles the line between providing the essential facts needed to boot and battle, and giving the player enjoyment-enhancing background. The first three sections explain the rules, the fourth provides extensive historical notes and a reading list, and the fifth presents full data, including the order of battle and victory conditions, for each of the scenarios.

Crusade in Europe hits a new high in playability for computer wargames without sacrificing mental challenge or tactical scope. Those who have always felt overwhelmed by complex military simulations are entirely likely to find this one a great deal less threatening and, therefore, a great deal more entertaining.

MicroProse Simulation Software, 120 Lakefront Dr., Hunt Valley, MD 21030 (phone: 301-667-1151).

—Arnie Katz



Flying Super Huey is no milk run.
READER SERVICE NO. 178

SUPER HUEY

Cosmi

Commodore 64

Disk; \$19.95

Electronic gamers just l-o-v-e helicopters. Always have. From the earliest days of videogaming, the helicopter has been the preferred mode of travel. Classic programs utilizing whirlybirds include *Super Cobra*, *Choplifter!* and *Raid on Bungeling Bay*. It was obviously just a matter of time until the current vogue for flight simulators caught up with this primal affection.

Paul Norman's ambitious *Super Huey* takes on the challenge in a self-confident, straightforward manner. The video pilot flies a UH-IX, an ultramodern, high speed chopper intended primarily for surveillance and reconnaissance, but able to defend itself with rockets and machine guns.

Super Huey opens with a truly ostentatious introductory sequence, complete with pseudo-majestic theme music and elaborate credits. (Designer Norman's name is emblazoned on a helicopter which flies across the screen.) It's quite amusing the first few times, but the gamer will soon wish for a way to short-circuit all the hoopla.

Super Huey provides a marvelous view of the action, with a front window, two side portals, and floor vents. Unfortunately, it isn't always worth the effort to look down through the vents, because the terrain is a relentless green speckled with icons which represent houses, radar, and other points of interest. The blocky, largely uncolored symbols and graphics are a real wet blanket. Helicopters, unlike jet fighters, fly close to the ground, so the landscape should be

quite detailed to look realistic.

Flying the UH-IX presents further difficulties. The documentation breaks flight into two main elements; the control stick and the computer keyboard. *Super Huey* is a good choice for cooperative play by two gamers. One can control the joystick while the other monitors the onscreen gauges and presses the appropriate keys. Doing both at once calls for quite a bit of practice and coordination.

The documentation gets to the crux of the matter when it states: "Airplanes are inherently stable whereas helicopters are inherently unstable." In other words, once an airplane gets into the air, the pilot can take a deep breath. A helicopter, on the other hand, requires constant attention. In striving for verisimilitude, *Super Huey* overdoes the number of control functions. Flying a helicopter is not easy, and neither is *Super Huey*.

The documentation helps. It is co-gently written, but errs in combining factual instruction with aerodynamic theory. Step by step directions for booting the disk and getting airborne appear cheek-by-jowl with a dissertation on conventional helicopter control. Nonetheless, it has all the information, and there's even a handy four-page card with specific flight instructions.

Players can opt for any of four types of missions. "Flight Instruction" is an excellent prompt-oriented tutorial; "Exploration" is an aerial survey; "Rescue" sends the copter into mountainous terrain to save injured soldiers; and "Combat" is set in a secret desert installation under enemy attack.

Actually, the UH-IX is not a combat aircraft, despite its armament, so the "Combat" scenario is less of a blast-athon than gamers might expect. The object is reconnaissance and, only when absolutely necessary, defense.

Super Huey tries very hard and succeeds at much of what it attempts. Purists will wish for more detailed terrain, and a less complex control scheme would have been a blessing, but most chopper fans will gladly take this exciting flight simulator just as it is.

Cosmi, 415 N. Figueroa, Wilmington, CA 90744 (phone: 213-835-9687).

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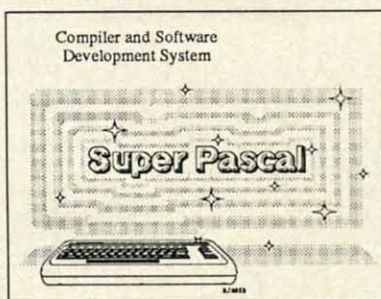
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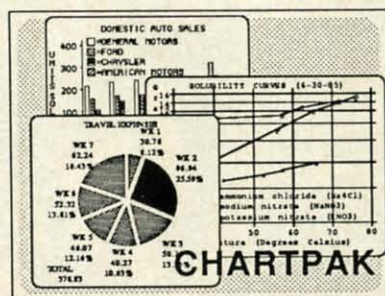


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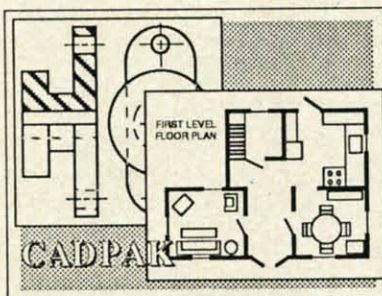
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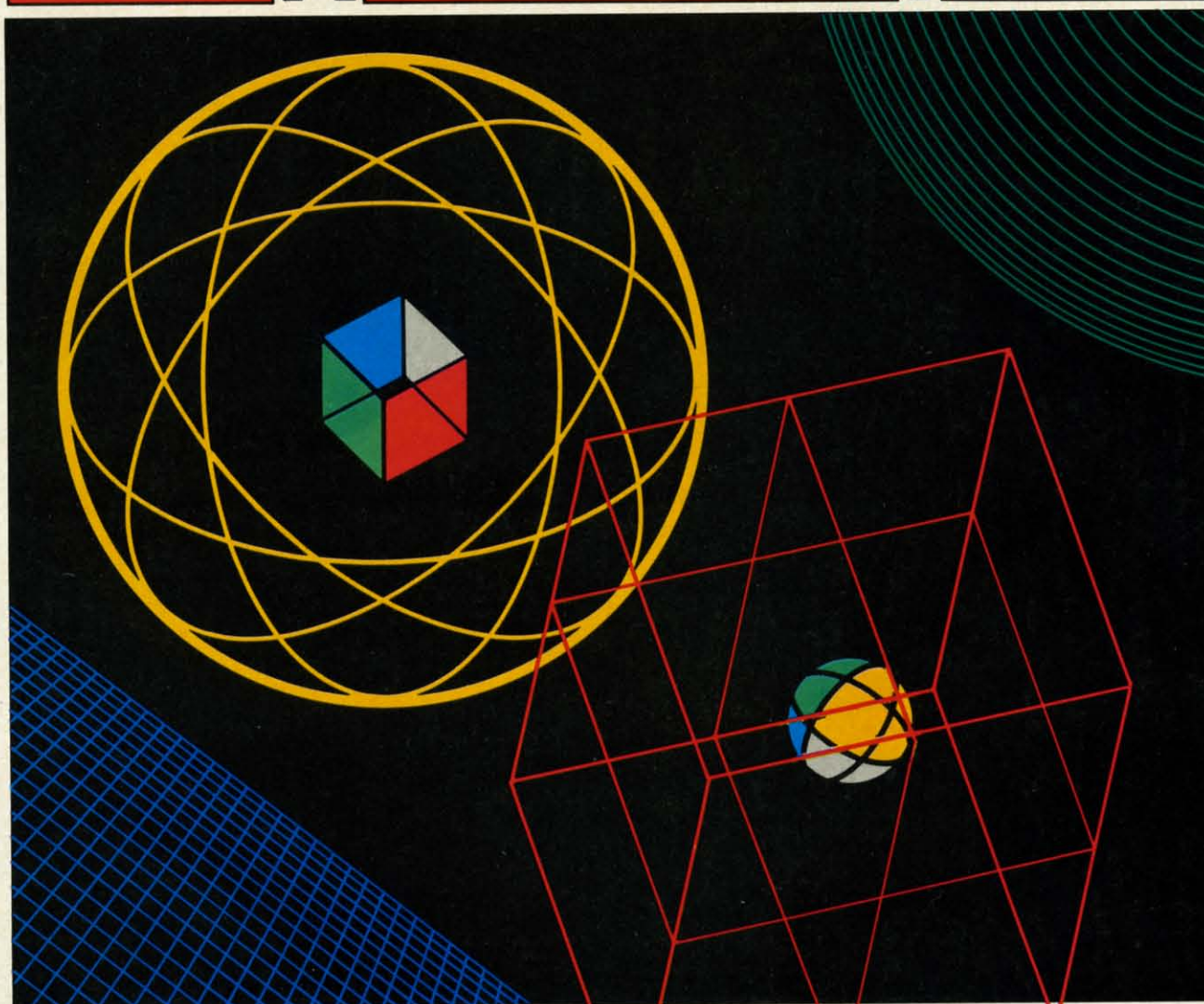


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THE IBM CONNECTION

One Electronic Brain Meets Another

By Dale Rupert

It's easy to link two computers and let them talk to each other. One computer might challenge the other to a quick game of checkers or chess. Through the concept of parallel processing, a lengthy task could be shared between two computers and finished in half the normal time. Fault-tolerant computer systems typically have three or more processors performing the same computations, comparing their results with the others' at crucial points. If two out of three agree, their result is used. If all three differ, the calculations are repeated or the problem is flagged. There are numerous other reasons to tie two or more computers together.

This month we will see what it takes to tie a Commodore 64 or a VIC 20 together or to almost any other computer. Specifically, we will discuss the hardware and the software needed for a Commodore computer to communicate with the IBM Personal Computer over a simple, three-wire RS-232 serial link.

We will deal with bare-bones, no-frills serial communication. The most difficult aspect of this month's project is to round up the proper connector for the User I/O port on the Commodore (C-64 or VIC 20) computer. Within minutes of getting the few required parts together, your computer can be happily chatting with another member

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of its family tree.

FIRST, THE HARD PART

Only minimal hardware is required to link two Commodore computers together. You need two twenty-four (24) pin card-edge connectors and three wires between them. The card-edge connector pins must be on 0.156 inch centers. The twelve pins on the upper half are numbered 1 through 12, and on the lower half they are labeled A through N (skipping G and I). The *User's Guide* and the *Programmer's Reference Guide* show the pin configuration of the card-edge at the rear of the computer. Look at your User I/O slot, then go to an electronics parts store for the proper connector. Besides the connectors, you need only wire and solder.

Figure 1 on page 114 shows the three-wire link to join two Commodore computers together. Table 6-1 in the *C-64 Programmer's Reference Guide* provides the signal names for the pins on the connectors.

To connect a Commodore computer to an IBM-PC or any other computer using RS-232 levels, you need two integrated circuits as well as a different connector for the IBM side of the cable. The IBM serial port uses a standard DB-25 female 25-pin submini D-type connector (Radio Shack #276-1548 for example). You also need a 1488 RS-232 line driver and a 1489 line receiver (Radio Shack #276-2520 and #276-2521 will work) as well as a 9 volt power source.

The Commodore User I/O signals are at TTL (transistor-transistor logic) voltage levels. A binary one output is any voltage from 2.4 volts up to the 5 volt supply, and a binary zero output is typically from 0.4 volt down to zero volts. RS-232 voltage levels are quite different. A logic one is a voltage below -3 volts and a logic zero is a voltage greater than +3 volts. The RS-232 logic levels are not only inverted but also shifted with respect to the TTL levels.

The 1488 line driver chip converts TTL signals into RS-232 signals. The 1489 line receiver chip converts RS-232 signals back into TTL levels. The 1488 needs two power supplies. The Commodore user port provides +5 volts which is used for the positive supply. A 9 volt battery may be used for the negative supply, although a 9 volt DC battery eliminator or power supply would be preferable for serious use of the interface. The 1488 draws as much as 17 milliamps from the -9 volt source, so a bargain battery won't have a very long life. It is also possible to build a negative DC supply from the 9 VAC outputs on pins 10 and 11 of the User I/O port. Figure 2 on page 114 shows the schematic for a Commodore to RS-232 interface.

I built the circuit on a solderless breadboard near the Commodore and ran a three-foot long three-conductor wire to the IBM. You may do the same, or for a more permanent circuit, you should solder the chips and wires to a predrilled PC board mounted near the Commodore's connector. The layout is not critical for transmissions up to 1200 baud over relatively short cables, and that is fast enough for use with BASIC.

If the hardware side of this project scares you away, consider having a friend at your user group help. If you've always wanted to try your hand at electronics, this is a perfect beginning project. Now over to the software side.

NEXT, THE SOFT PART

If you thought the hardware was easy, wait till you see the software! We will develop three levels of software for linking two computers together. We will begin with simple transmit-only and receive-only programs for the Commodore and the IBM computers. Next we will implement a bidirectional, software-handshaking pair of programs which let the computers communicate without human intervention. Finally we will present a computer v. computer Hi-Lo game in which one computer picks a number, and the other computer attempts to guess the number with clues of "too high" or "too low." The Hi-Lo program *almost* runs without human intervention (a human must type RUN on both machines!).

The programs COMMTX and COMM RX on pages 126 and 127 are transmitter and receiver programs for the Commodore computers. If you are tying two Commodore computers together, load COMMTX into one and COMM RX into the other. Type RUN on the receiver and then type RUN on the transmitter. An important note before you begin:

Do NOT use the Wedge program while running these
Continued on page 114

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You pay only \$139.95 when you order the powerful 84K COMMODORE 64 COMPUTER! LESS the value of the SPECIAL SOFTWARE DISCOUNT COUPON we pack with your computer that allows you to SAVE OVER \$250 off software sale prices!! With only \$100 of savings applied, your net computer cost is \$39.95!!

* C128 DOUBLE SIDED DISKS 79¢ EA.

Get these 5 1/4" Double Sided Floppy Disks specially designed for the Commodore 128 Computer (1571 Disk Drive). 100% Certified. **Lifetime Warranty.** Automatic Lint Cleaning Liner included. 1 Box of 10 - \$9.90 (99¢ ea.), 5 Boxes of 10 - \$44.50 (89¢ ea.), 10 Boxes of 10 - \$79.00 (79¢ ea.).

13" ZENITH COLOR MONITOR \$139.95

You pay only \$139.95 when you order this 13" ZENITH COLOR MONITOR. LESS the value of the SPECIAL SOFTWARE DISCOUNT COUPON we pack with your monitor that allows you to save over \$250 off software sale prices!! With only \$100 of savings applied, your net color monitor cost is only \$39.95. (16 Colors).

80 COLUMN

COMMODORE GRAPHICS PRINTER \$99.95

You pay only \$99.95 when you order the 803 Commodore Graphics Printer, 60 CPS, Dot Matrix, Bi-Directional, Prints 8 1/2" full size paper. Plug in direct interface included! LESS the value of the SPECIAL SOFTWARE DISCOUNT COUPON we pack with your printer that allows you to SAVE OVER \$250 off software sale prices!! With only \$100 of savings applied your net printer cost is ZERO!

4 SLOT EXPANDER & 80 COLUMN BOARD \$59.95

Now you program 80 COLUMNS on the screen at one time! Converts your Commodore 64 to 80 COLUMNS when you plug in the 80 COLUMN EXPANSION BOARD!! PLUS 4 slot expander!

80 COLUMNS IN COLOR

PAPERBACK WRITER 64 WORD PROCESSOR \$39.95

This PAPERBACK WRITER 64 WORD PROCESSOR is the finest available for the COMMODORE 64 computer! The ULTIMATE FOR PROFESSIONAL Word Processing. DISPLAYS 40 or 80 COLUMNS IN COLOR or black and white! Simple to operate, powerful text editing, complete cursor and insert/delete key controls line and paragraph insertion, automatic deletion, centering, margin settings and output to all printers! List \$99.00. **SALE \$39.95.** Coupon \$29.95.

COMMODORE 64 SYSTEM SALE

Deal 1 LTD. QTY. Deal 2

Commodore 64 Commodore 64
Com. 1541 Disk Drive Com. 1541 Disk Drive
Com. 803 Printer 13" Zenith Color Monitor
\$407 \$457

**PLUS FREE \$49.95 Oil Barons
Adventure Program**

SPECIAL SOFTWARE COUPON

We pack a SPECIAL SOFTWARE DISCOUNT COUPON with every COMMODORE 64 COMPUTER, DISK DRIVE, PRINTER, or MONITOR we sell! This coupon allows you to SAVE OVER \$250 OFF SALE PRICES!!

(Examples)

PROFESSIONAL SOFTWARE COMMODORE 64

Name	List	Sale	Coupon
Paperback Writer 64	\$99.00	\$39.95	\$29.95
Paperback Database 64	\$69.00	\$34.95	\$24.95
Paperback Dictionary	\$24.95	\$14.95	\$10.00
The Print Shop	\$44.95	\$27.95	\$26.95
Halley's Project	\$39.95	\$25.95	\$24.95
Practicals (spread sheet)	\$59.95	\$19.95	\$14.95
Programmers Reference Guide	\$24.95	\$16.95	\$12.50
Nine Princes in Amber	\$32.95	\$24.95	\$21.95
Super Bowl Sunday	\$30.00	\$19.95	\$17.95
Flip & File Disk Filer	\$24.95	\$14.95	\$12.95
Deluxe Tape Cassette (plus FREE game)	\$89.00	\$44.95	\$34.95
Pro Joystick	\$19.95	\$12.95	\$10.00
Computer Care Kit	\$44.95	\$29.95	\$24.95
Dust Cover	\$ 8.95	\$ 6.95	\$ 4.60
Injured Engine	\$39.95	\$27.95	\$24.95
Pitstop II (Epyx)	\$39.95	\$22.95	\$19.95
Music Calc	\$59.95	\$14.95	\$12.95
File Writer (by Codewriter)	\$39.95	\$29.95	\$24.95

(See over 100 coupon items in our catalog)

**Write or call for
Sample SPECIAL SOFTWARE COUPON!**

ATTENTION Computer Clubs We Offer Big Volume Discounts CALL TODAY!

PROTECTO WARRANTY

All Protecto's products carry a minimum 90 day warranty. If anything fails within 90 days from the date of purchase, simply send your product to us via United Parcel Service prepaid. We will IMMEDIATELY send you a replacement at no charge via United Parcel Service prepaid. This warranty proves once again that **We Love Our Customers.**

C128 COMMODORE COMPUTER

(Order Now)

\$289.95

Less \$30 FREE Software, your choice from our catalog (See Catalog Page 13)

- 340K 1571 Disk Drive \$259.00
- Voice Synthesizer \$39.95
- 12" Amber Monitor \$59.95

PRICES MAY BE LOWER

C128 COMMODORE COMPUTER \$289.95

We expect a limited supply for Christmas. We will ship on a first order basis. This all-new revolutionary 128K computer uses all Commodore 64 software and accessories plus all CPM programs formatted for the disk drive. **Less \$30 FREE Software, your choice from our catalog (See Catalog Page 13)** List \$349.00. **SALE \$289.95.**

340K 1571 COMMODORE DISK DRIVE \$259.00

Double Sided, Single Disk Drive for C-128 allows you to use C-128 mode plus CPM mode. 17 times faster than 1541, plus runs all 1541 formats. List \$349.00. **Sale \$259.00.**

SUPER AUTO DIAL MODEM \$37.95

Easy to use. Just plug into your Commodore 64 computer and you're ready to transmit and receive messages. Easier to use than dialing your telephone, just push one key on your computer! Includes exclusive easy to use program for up and down loading to printer and disk drives. **Best in U.S.A.** List \$129.00. **SALE \$37.95.**

VOICE SYNTHESIZER \$39.95

For Commodore-64 computers. Just plug it in and you can program words and sentences, adjust volume and pitch, make talking adventure games, sound action games and customized talkies!! FOR ONLY \$19.95 you can add TEXT TO SPEECH, just type a word and hear your computer talk — ADD SOUND TO "ZORK", SCOTT ADAMS AND OTHER ADVENTURE GAMES!! (Disk or tape.) List \$89.00. **SALE \$39.95**

12" AMBER MONITOR \$59.95

Your choice of green or amber screen monitor, top quality, 80 columns x 24 lines, easy to read, anti-glare! PLUS \$9.95 for connecting cable. Com-64 or VIC-20. List \$159.00. **SALE \$59.95.**

PRINTER/TYPEWRITER COMBINATION \$249.95

"JUKI" Superb letter quality, daisy wheel printer/typewriter combination. Two machines in one — just a flick of the switch. 12" extra large carriage, typewriter keyboard, automatic margin control and relocate key, drop in cassette ribbon! (90 day warranty) centronics parallel or RS232 serial port built in (Specify). List \$349.00. **SALE \$249.95.** (Ltd. Qty.)

13" RGB & COMPOSITE COLOR MONITOR \$259.95

Must be used to get 80 columns in color with 80 column computers (C128 - Atari ST - IBM - Apple). (Add \$14.50 shipping) List \$399.00. **SALE \$259.95.**

- LOWEST PRICES • 15 DAY FREE TRIAL
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- 90 DAY FREE REPLACEMENT WARRANTY
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GIANT PRINTER SALE!!

List \$399.00

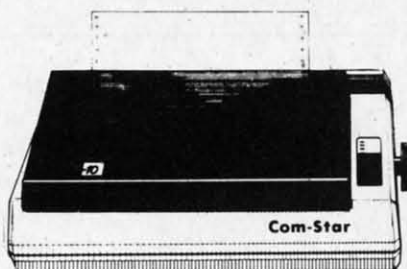
10" Printer

S A L E \$179⁰⁰

10" Comstar 10X — This Bi-directional Tractor/Friction Printer prints standard sheet 8½"x11" paper and continuous forms or labels. High resolution bit image graphics, underlining, horizontal tab setting, true lower descenders, with super scripts and subscripts, prints standard pica, compressed, expanded, block graphics, etc. Fantastic value. (Centronics parallel interface.)

List \$399.00. Sale \$179.00.

1 Year Warranty
120-140 CPS
Premium Quality



List \$599.00

15½" Printer

S A L E \$239⁰⁰

15½" Comstar 15X — Has all the features of the 10" Comstar 10X plus a wider 15½" carriage and more powerful electronics to handle large ledger business forms! (Better than FX-100). The 15½" Comstar 15X also prints on standard size paper and continuous forms and labels. Fantastic value. (Centronics parallel interface.)

List \$599.00. Sale \$239.00.

List \$499.00

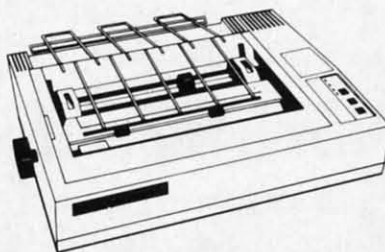
10" Printer

S A L E \$229⁰⁰

10" Comstar 160+ High Speed — This Bi-directional Tractor/Friction Printer combines the above features of the 10" Comstar 10X with speed (150-170 cps) and durability. Plus you get a 2K buffer, 96 user definable characters, super density bit image graphics, and square print pins for clearer, more legible print (near letter quality). This is the best value for a rugged dependable printer. (Centronics parallel interface.)

List \$499.00. Sale \$229.00.

1 Year Warranty
150-170 CPS
High Speed



List \$699.00

15½" Printer

S A L E \$289⁰⁰

15½" Comstar 160+ High Speed — This Bi-directional Tractor/Friction Printer has all the features of the 10" Comstar 160+ High Speed plus a wider 15½" carriage and the heavy duty electronics required for today's business loads. You can use large ledger business forms as well as standard sheets and continuous forms and labels. This is the best wide carriage printer in the U.S.A. (Centronics parallel interface.)

List \$699.00. Sale \$289.00.

List \$599.00

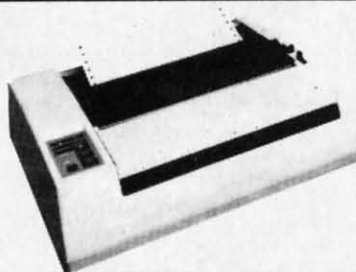
10" Printer

S A L E \$259⁰⁰

10" Comstar 2000 — The ultimate printer has arrived! This Bi-directional Tractor/Friction Printer gives you all the features of the Comstar 160 plus higher speed (165-185 cps), 256 downloadable characters, proportional setting, external dark printing mode and a *lifetime printhead warranty. PLUS ...

Lifetime warranty*

165-185 CPS
High Speed & Letter Quality



List \$599.00

10" Printer

S A L E \$259⁰⁰

With the flip of a switch you can go into the letter quality mode which makes all your printing look like it came off a typewriter. Turn in term papers, do articles or just print programs. Have the best of letter quality and speed in one package. Fantastic printer (Centronics parallel interface.)

List \$599.00. Sale \$259.00.

• 15 Day Free Trial — 1 Year Immediate Replacement Warranty
Parallel Interfaces

Commodore-64, VIC 20 — \$39.00

Atari — \$59.00

Apple II, II+, IIe — \$59.00

Add \$10.00 (\$14.50 for 15½" Printers) for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$20.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES, EXCEPT CANADA.

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EARN 21¢ per Disk^{*}

Buy 2 Boxes at \$24.80, receive \$4.00 mail-in rebate plus a \$25.00 value bonus pack for offers on other Fuji products (film, audio cassettes, video cassettes, cameras, etc.). If you use the entire bonus pack you earn \$4.20 (21¢ per disk)

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BUY 2 BOXES

(-21¢ each)

You Pay	\$24.80
Less mfg. rebate [*]	\$4.00
Net Cost	\$20.80
Bonus Pack Value	\$25.00
Net Earnings	\$4.20

BUY 1 BOX

You Pay	\$12.95
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Box of 10 with hub rings, sleeves and labels

Famous Brand FUJI Floppy Disks for those who care about keeping their data.

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Single Sided — Double Density

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^{*} With Mfg. Mail-in Rebate: \$4.00/2 boxes plus \$25 bonus pack value applied.

*** \$12.95**



Flip-N-File
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*** \$12.95**

Floppy Disk Filer

Everyone Needs a Floppy Disk Secretary



Facts:

- Dust and Dirt particles can hurt your disks
- Most disks go bad due to mishandling in storage
- Proper filing of your disk collection will reduce unnecessary handling of your disks

The Floppy Disk Filer is an inexpensive hard plastic Fliptop case that will allow for easy filing, and protect your disks from dust, smoke, and dirt. Plus, the Floppy Disk Filer will keep all your disks out of unwanted hands and in one place where you can easily find them. **(Holds Over 50 Disks)**

List \$24.95

Introductory Sale Price \$14.95

*** Coupon \$12.95**

Add \$3.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$6.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES, EXCEPT CANADA. Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail!!
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COLOR MONITOR



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(Premium Quality)

- Built in Speaker and Audio
- Front Panel Controls
- For Video Recorders
- For Small Business Computers
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(Premium Quality)

- Beautiful Color Contrast
- High Resolution
- Separated Video
- Sharp Clear Text
- Anti-Glare Screen
- 40 Columns x 24 Lines
- Supports 80 Columns
Requires special \$19.95 C-128 cable.

List \$329⁰⁰



13" Color Computer Monitor

IBM, C-128,
Apple, Atari ST

*C64/C128 connecting cable \$9.95

Sale \$159.95*
Add \$14.50 Shipping

13" RGB & COMPOSITE COLOR MONITOR

Allows use of C-128 and C64 mode - composite and 80 column RGB mode. Must be used to get 80 columns in color with 80 column computers (IBM, C-128, Apple & Atari ST). (add \$14.50 shipping)

List \$399.00

* C128 RGB cable \$19.95

Sale \$259.95*

13" ZENITH COLOR MONITOR

(add \$14.50 shipping)

List \$299.00

Sale \$149.95*

15 Day Free Trial - 90 Day Immediate Replacement Warranty

12" XTRON SUPER HI-RESOLUTION MONITOR

80 Columns x 24 Lines, Super Hi-Resolution 800 lines Green or Amber Super-Clear "Easy to Read" text with special anti-glare screen! (Ltd. Qty.) List \$249.00

Sale \$109.95*

12" **ZENITH** HI-RESOLUTION GREEN OR AMBER TEXT DISPLAY MONITOR

80 Columns x 24 Lines, Hi-Resolution, crisp clear easy to read text with anti-glare screen! A MUST for word processing. (Ltd. Qty.) List \$199.00

Sale \$89.95*

12" AMBER MONITOR

80 Columns x 24 Lines, easy to read up front controls (Ltd. Qty.)

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Sale \$59.95*

* C64/C128 connecting cable \$9.95

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Commodore - 64

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WORD PROCESSING BREAKTHROUGH!

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SALE

40 or 80 Columns
in Color

Paperback Writer 64

40 or 80 Columns
in Color

This is the easiest to use and most powerful word processor available for the Commodore 64. As you type on the screen, you will see your letters and words appear on the screen exactly as they will be printed (i.e. Italics will be *Italic*, Bold Face will be **Bold Face**). With the printer files you can customize Paperback Writer 64 to use all the fancy features of your printer. Loads EZ Script®, Paperclip®, & Wordpro 64® Files so you can easily upgrade your past wordprocessing text that you've written with obsolete wordprocessors. Take a look at some of the other features:



- **Wordwrap** — No Words Break At The Edge Of The Screen.
- **Flexible Cursor Movement**, Including Tabs And Other Timesavers.
- **Deletion And Insertion** Of Characters, Lines And Blocks Of Text.
- **On-screen Text Enhancement**, Such As Bold Face, Italics, Underlining, Superscripts And Subscripts, And Foreign And Other Characters.
- **Manipulation Of Blocks (ranges)** Of Text For Functions Such As Moving And Deleting, Even Between Files.
- **Sorting Lists** In Order Of Numbers And Letters.
- **Aligning And Adding Numbers** In Columns, Helpful With Tables.
- **Variable Margins** At Left And Right, And Paragraph Indentation.
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- **Variable Page Lengths And Line Spacing.**
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- **Flexible Printer Set-up** To Allow Use With Any Printer.
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- Complete Or Selective **Directories** Of Files On The Disk.
- **Sequential Files** For Mail Lists And Communication With Other Computers.
- **Spelling Checker**, Checks Your Spelling.

INTRODUCTORY PRICE

\$39⁹⁵

SALE PRICE

Coupon Price \$29.95

DOUBLE PROTECTO FREE TRIAL

We are so sure this is the easiest and most powerful word processor available, we will give you 30 days to try it out. If you are not completely satisfied, we will refund your purchase price.

☆☆☆ Plus ☆☆☆

Full help screens on line with additional help on the disks mean you don't even need a manual. If you're in the middle of a page and you want to know how to use a special function just hit F7 and the information will appear before your eyes. If you still don't understand hit F7 again and a more detailed explanation appears. Then simply hit F8 and you're back in the letter where you left off. No manual lookup necessary. This is the easiest word processor in the world to use. List \$99.00.

Introductory Sale Price \$39.95. Coupon \$29.95.

PAPERBACK DATABASE (Datafax) List \$69.00. Sale \$34.95. * Coupon \$24.95.

PAPERBACK DICTIONARY List \$29.95. Sale \$14.95. * Coupon \$10.00.

Add \$3.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$6.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES EXCEPT CANADA.

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Commodore 64

MODEM

Commodore 64



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**Telecommunications**

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Lowest Price In the U.S.A.**FOR CHILDREN · ADULTS · BUSINESS**

Complete Auto Dial Telecommunications Package

*"The only telecommunications package you will ever need."***(Exclusive Easy To Use Features)**

FREE VIEWTRON DATABASE MEMBERSHIP

• Only Good Color Graphic Database Service in the U.S.A. (C-64)**Viewtron Software Plus First Hour FREE (See the Protecto Software Catalog On-Line) \$9.95 value****• 300 Baud Modem • Auto Dial • Auto Answer • Upload & Download****Reach Out and Access Someone**

- Educational courses
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- Popular Games
- News Updates and Information
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- Research and Reference Materials

The Complete Telecommunications Package offers you all this plus ...

- Auto Log-on
- Dialing from Keyboard
- On-line Clock
- Capture and Display High Resolution Characters
- Download Text, Program or Data Files
- Stores on Disk Downloaded Files
- Reads Files from Disk and Uploads Text or Program Files
- Select Any Protocol (access almost any computer or modem)
- Plus Much, Much More

List \$99.00

Sale \$37⁹⁵ Coupon \$32.95**We are so sure this is the only telecommunications package you will need we will give you 15 days Free Trial.
Viewtron Membership sold separately — \$9.95.**

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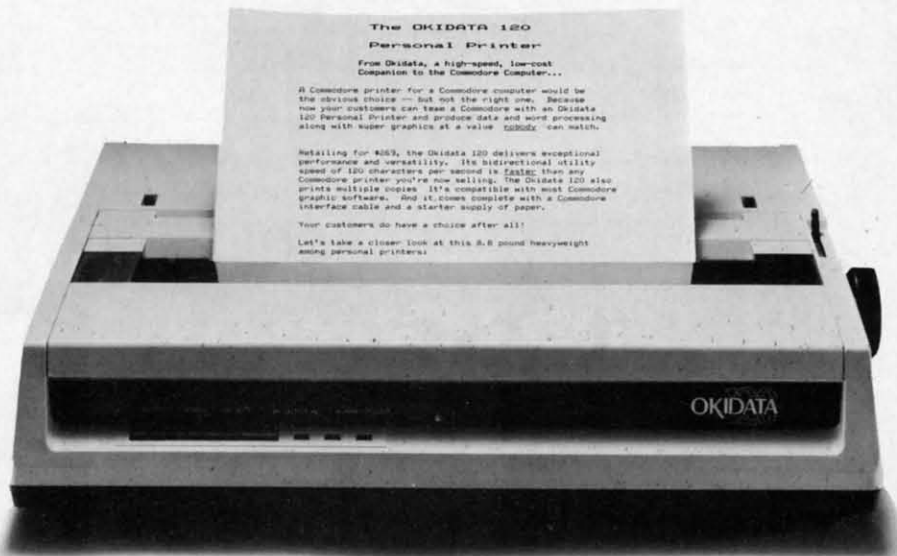
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Introducing the OKIDATA 120, the logical printer for your Commodore® computer.

Get results fast. With a utility mode that zips through letters and reports at twice the speed of any Commodore printer.

Switch to the enhanced mode. And print your most important ideas with typewriter clarity. Or illustrate your rationale with the 120's bit image graphics for high resolution charts, graphs and drawings.

Stay on target. With a self-inking "Clean Hands" ribbon cartridge. And Okidata's famous full year warranty on parts, labor and printhead.

The OKIDATA 120. At \$269*, it's the only Commodore-compatible printer that makes sense.

For more information, call 1-800-OKIDATA (in New Jersey 609-235-2600). Mt. Laurel, NJ 08054.

Get the OKIDATA 120 at these fine stores:

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Childworld/Children's Palace
Consumers Distributing
David Weis
Electronics Boutique/
Games & Gadgets
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Fred Meyer
Lionel/Kiddie City/
Lionel Playworld
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*Manufacturer's suggested retail price.

MS-8348

Right Brain.



Effervescent. Colorful. Outrageous.

Meet the OKIMATE 10, the \$208* color printer that takes your Atari® or Commodore® computer over the rainbow!

Dazzle 'em. With brilliant printing in over 36 eye-tickling colors. Reds, greens, golds and blues that breathe life into everything: from charts and graphs to original drawings and overhead transparencies.

And when you're forced to work in black and white, the OKIMATE 10 prints crisp, clean reports and papers—at 240 words per minute. You can even add spice with wide, bold and fine print.

Everything you need for color printing comes with the OKIMATE 10 and its Plug 'n Print package. Including a data cable, Learn to Print and Color Screen Print software diskettes, a color ribbon cartridge, a black ribbon cartridge and paper.

So c'mon, print on the wild side. With the OKIMATE 10 Personal Color Printer from Okidata.

For more information, call 1-800-OKIDATA (in New Jersey 609-235-2600). Mt. Laurel, NJ 08054.

OKIDATA®
an OKI AMERICA company
We put business on paper.

*Manufacturer's suggested retail price. Atari is a registered trademark of Atari, Inc. Commodore is a registered trademark of Commodore Business Machines, Inc. OKIDATA is a registered trademark of OKI AMERICA, INC. OKIMATE and Plug 'n Print are trademarks of OKI AMERICA, INC. To run Plug 'n Print software, the Commodore 64, 128 and PLUS 4 require disk drive. Atari requires disk drive and a 48K memory.

Buy Now!
\$15 Manufacturer's
rebate on OKIMATE 10.

Offer good from October 1, 1985 through January 31, 1986. See the following participating stores for details.

Advantage Computer
Accessories (Canada)
Arthur's Jewelers
Best Catalog Showrooms
Brendle's
Caldor
Childworld/Children's Palace
Consumers Distributing
Crazy Eddie
David Weis
Dolgins Catalog Showrooms
Electronic Boutique/
Games & Gadgets
Ellman's
Evans
Federated
Fred Meyer
Fred P. Gattas
G.C. Murphy/Murphy Mart
G.I. Joe
Great Western
Catalog Showrooms
J. Triesman
Jafco Catalog Showrooms
LaBelles Catalog Showrooms
Lionel/Kiddie City/
Lionel Playworld
McDade
Meijers (Michigan only)
Montgomery Ward
(at participating stores)
Prange
S.E. Nichols
Save-Rite
Sears, Roebuck & Co.
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Service Merchandise
Stereo Village
Stokes
Toys 'R Us
Videoland
Witmark
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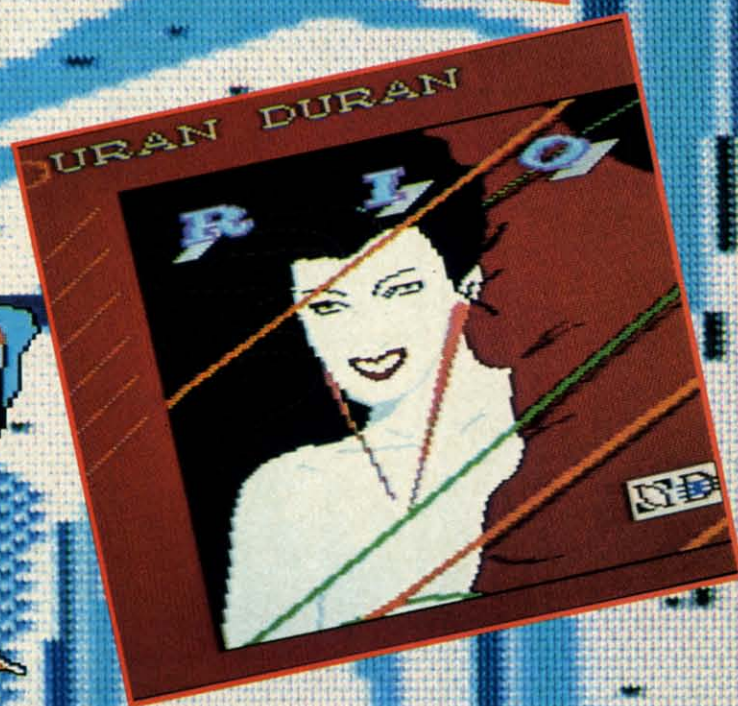
ART GALLERY DISK SALE

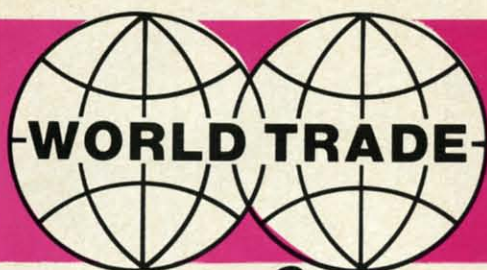
Art Gallery images are now available on disk. High resolution bit-mapped images are available in *DOODLE!* format. Multicolor bit-mapped images are available in *Koala* format. Each disk includes a slide show program for easy viewing. *DOODLE!* disks include a bit map screen dump utility for the 1525 or properly interfaced dot matrix printer. *Koala* disks include a set of custom routines for bidirectional conversion to other multicolor formats. The conversion routines were expressly developed for the *Art Gallery* by Michael Beutjer of K.T. Software, author of the *Koala Printer* program and *Quad Print* (June '85 *Ahoy!*). Formats presently supported are *Cadpic*, *Peripheral Vision*, *Paint Magic*, and *Flying Colors*. Disks are available for \$15 from Morton Kelson, P.O. Box 260, Homecrest Station, Brooklyn, NY 11229. Send a stamped and self-addressed envelope for a complete listing.

Contributors to *Ahoy!*'s *Art Gallery* will receive royalties based on the sale of disks. Send your best work on disk, accompanied by a stamped and self-addressed mailer, to Morton Kelson, P.O. Box 260, Homecrest Station, Brooklyn, NY 11229. Indicate the drawing package that was used to create the image. If you employed a bit map of your own design, indicate the appropriate file parameters, i.e., hi-res or multicolor, location of bit map, screen or color data.



Readers call us every now and then to complain about snow on their computer screens. We're sure they wouldn't complain if their snow was as attractive as that rendered by two of the contributors to this month's *Art Gallery*. *Winter* by Michael Montauck (Brooklyn, NY) was created on the Koala Pad with *Koala Painter* software. *Snowman* was submitted by Earl Hamner (Milpitas, CA). Forming the background of this month's *Art Gallery* (and shown unobscured at lower left) is *Ice Planet*, drawn on *Paint Magic* by Jeffrey Hart (Brooksville, FL). Segueing from ice to rock, the covers of the albums *Rio* and *Signals* were interpreted on the Koala Pad by Sean Huxter (Springdale, NF). Mr. Huxter is a commercial freelance artist and cartoonist who is seeking to get his original comic strip syndicated. We wish his strip as much success as the one from which he derived his third image featured here—*Zonker*.





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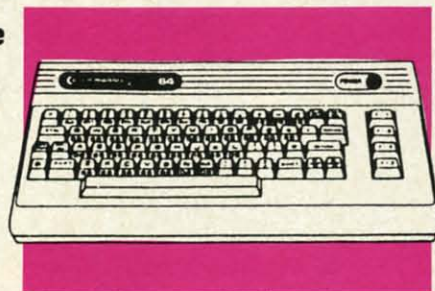
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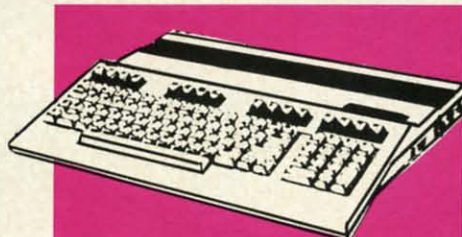
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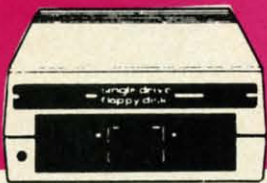
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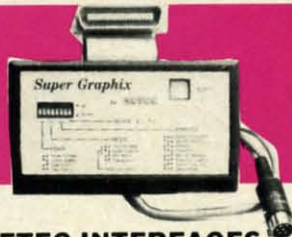
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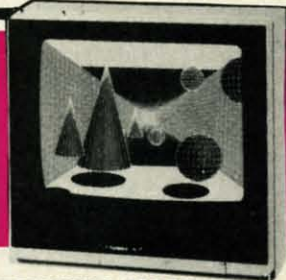
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Programed by Jim Drew

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Rather than give you more exaggerated claims about how many times faster our ROM chip is compared to the slower cartridge versions, a comparison chart is supplied listing MEASURED loading times.

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 1541 or MSD Version

*Will not fast load - defaulted back to regular load

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for Combo Version

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C-64 Book Only **\$19⁹⁵** US

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Track Trap disk expanded manual **\$9⁹⁵** US

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Programed by Jim Drew

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The programs include on each diskette are listed below

TOP SECRET STUFF I

The Dock (view/repair disk contents)
Sync Checker (diskette)
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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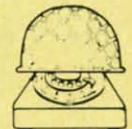
TOP SECRET STUFF II

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
Diskmatcher II (high speed version)
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3 Times Disk Drive Head Speed
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6. Continue will pick up dialing where it was interrupted.



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REVIEWS

FEATURED THIS MONTH: A brief survey of what's available for connecting low-cost IEEE-488 business peripherals to your Commodore 64 system, plus a close look at the SFD-1001 Disk Drive.

BY MORTON KEVELSON

SFD-1001

Progressive Peripherals and Software
2186 South Holly, Suite 400
Denver, CO 80222
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Price: \$199.00

It was the worst of times, it was the best of times. It was the year when Commodore, the company which introduced many of us to the wonders of personal computing, showed its first signs of faltering in its ongoing efforts to sell more for less. It was also the year when more products with unprecedented capabilities, in the form of the Amiga and C-128, were introduced to the consumer at lower prices per feature than ever before.

Although it is too soon to tell just how successful these products will be (they do look like winners), we are seeing some side effects. Along with the preparation for the new, Commodore is performing a general house-keeping. As users we have the opportunity to purchase tried and true high-powered performers at a fraction of their original costs. Although these are presently overshadowed by their newest high tech brethren, their fundamental powers and capabilities are in no way diminished. The venerable C-64, the computer which has made the greatest impact in the personal market to date, is now available for less than \$100—a mere pittance as compared to its original asking price of \$595 just a few brief years ago.

Existing C-64 users are truly fortunate. A bevy of high-powered Commodore peripherals, originally intended for the business market, have been "surplussed" into the consumer market at bargain basement prices. Perhaps the most dramatic example is the SFD-1001, a single 5¼" floppy disk drive with an online storage capacity that exceeds one million bytes. That is the equivalent of more

Figure 1

- A—Power Transformer
- B—Dual Read/Write Heads Below Shield
- C—Head Positioning Stepper Motor

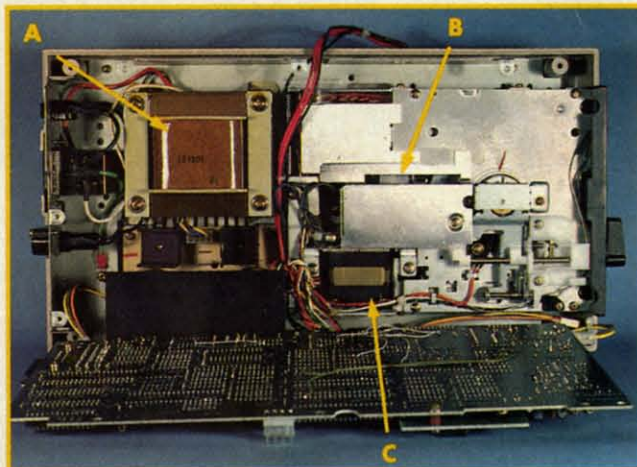
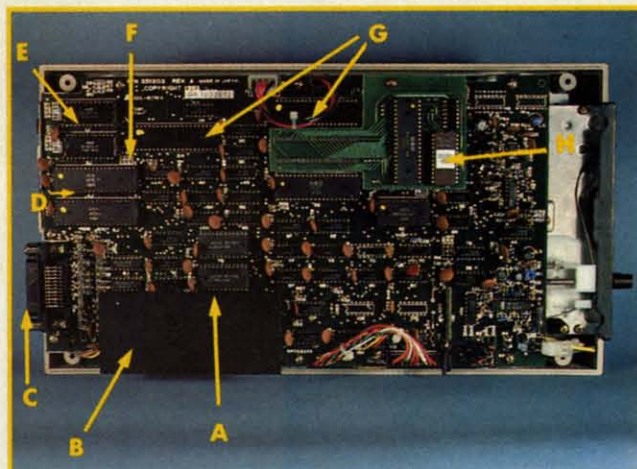


Figure 2

- A—2K RAM
- B—Voltage Regulator Heat Sink
- C—IEEE-488 Connector
- D—Pair of 6532 RIOT Chips
- E—DOS on ROM
- F—Device No. Pads
- G—Twin 6502 Microprocessors speed up internal disk operations
- H—2K EPROM



Drive chassis (top) and main circuit board of SFD-1001 drive.
READER SERVICE NO. 144

than six full 1541 formatted disks. This esteemed piece of hardware is being offered to us at a giveaway price of just \$199 by Progressive Peripherals and Software. A true bargain, if you have an immediate or anticipated need for its capacity.

Under the circumstances, we felt the SFD-1001 merited a closer look. To start with, we call your attention to Table 1 where certain vital statistics are listed for easy comparison against the capabilities of the 1541 disk drive, that oft-maligned workhorse of the C-64 community.

A closer look at some of these parameters will be instructive. The SFD has more than four times the number of tracks used by the 1541. These data tracks, equally divided between both sides of the disk, contain more data than any single track of a 1541 disk. This means that double sided double density diskettes are required for the SFD-1001. These disks may cost significantly more than the single sided single density disks used by the 1541. Of course, each SFD disk will hold over six times the data of a 1541 disk.

Take note of the average file size

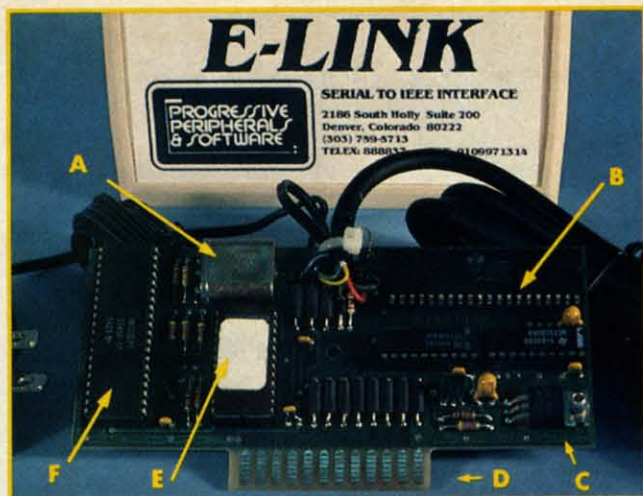


Figure 3

- A—1MHz Clock Crystal
- B—6522 VIA Chip
- C—5-volt Voltage Regulator (the hot spot)
- D—PET/IEEE Connector
- E—4K EPROM
- F—65C02 Microprocessor

number of blocks still free. The small average file size of the 1541 makes many users forget about this directory limitation, since it rarely happens.

Interestingly enough, the SFD uses the GCR recording format, which is unique to Commodore disk drives. You will also note that Commodore's practice of putting more data on the outer tracks than on the inner tracks has been retained. Table 2 compares the sector distributions of the 1541 and the SFD.

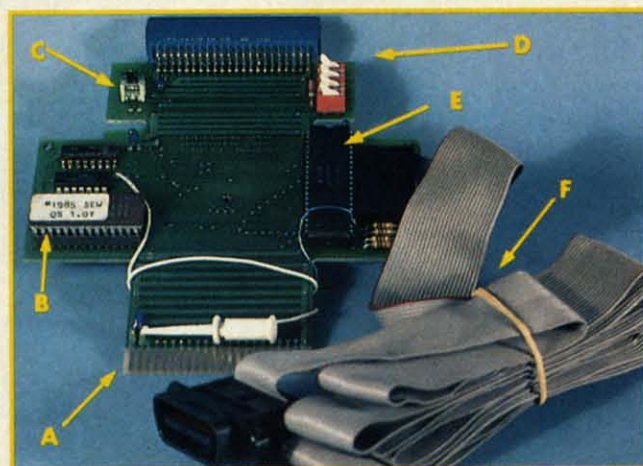


Figure 4

- A—To C-64 Cartridge Port
- B—8K EPROM
- C—Reset Button
- D—Set-up Switches
- E—6520 PID
- F—IEEE Cable

THE HARDWARE

The physical size of the SFD-1001 is identical to the 1541. Were it not for the labels it would be difficult to tell the two drives apart. Getting past the surface, things start to look a bit different. The most important concern to prospective users is the IEEE-488 interface over which the disk drive communicates with the computer. This parallel interface, which transfers data a byte at a time, is used on Commodore's PET and business series of computers. Although conceptually related to the disk drive serial bus on the C-64, this connection differs in both hardware and software from the disk drive serial port found on VIC 20, C-64, Plus/4, C-16, and C-128 computers. Thus an additional hardware interface will be required for most users. A detailed look at three of these peripherals follows immediately after this report.

Disks are locked into place by a twist lever. Do not attempt to close the disk door without first inserting a disk. The latching mechanism is mechanically interlocked to sense the presence of a disk. You cannot close the door unless a disk is in the slot. This is to prevent the hard, glass-smooth surface of the twin heads from coming into contact without the mitigating presence of the three-mil-thick disk mylar. Inadvertent contact of these polished surfaces could mar their finish beyond repair.

Internally, quality is visible throughout. Head position is checked by an optical sensor. The elimination of the head rap, familiar to all 1541 users, should go a long way towards

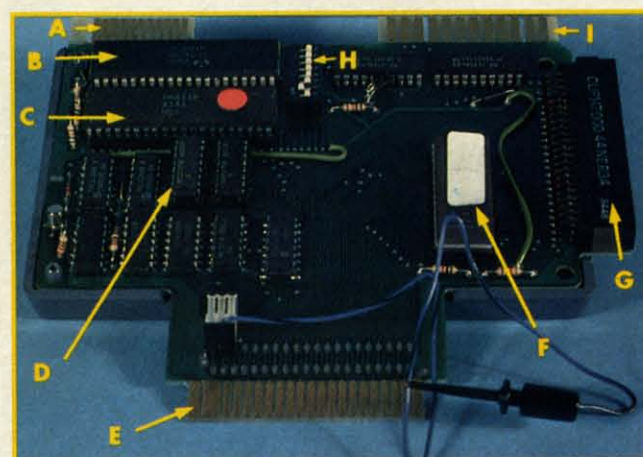


Figure 5

- A—Parallel Printer Connector
- B—6532 RIOT Chip
- C—6821 PIA
- D—256 Bytes PROM
- E—To C-64 Cartridge Port
- F—8K EPROM
- G—C-64 Cartridge Port Extension
- H—Set-up Switches
- I—PET/IEEE Connector

Top: E-Link (Reader Service No. 145)

Middle: Quicksilver (Reader Service No. 146)

Bottom: BusCard II (Reader Service No. 147)

parameter in Table 1. This was obtained by simply dividing the total capacity of the disk by the number of available directory entries. The significance of this parameter lies with your own data habits. As you can see, the average file size on the SFD is 18.5 sectors, more than four kilobytes.

Compare this to the 1541 which is only 4.6 sectors, or one kilobyte. This means that the SFD-1001 is more likely than the 1541 to run out of disk space due to a full directory if your application creates large numbers of small files. This could result in a full disk even if there are a significant