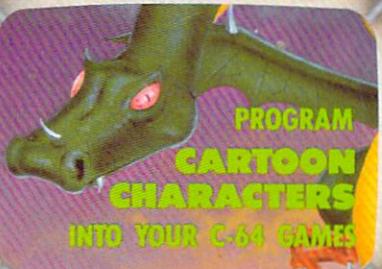


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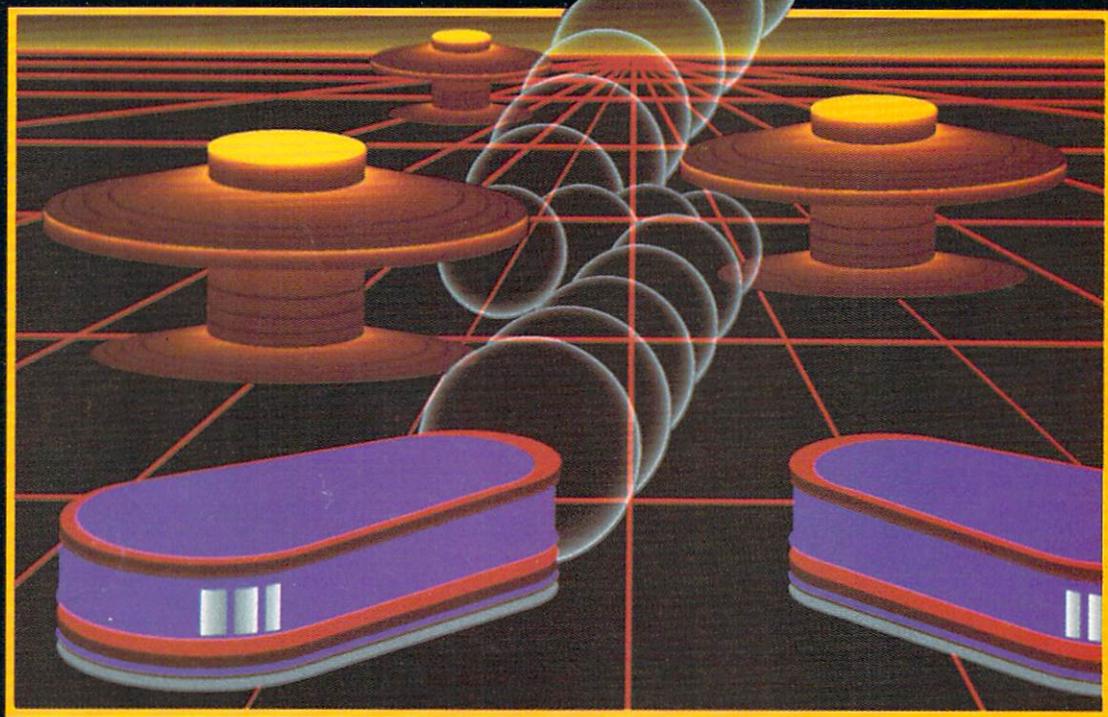


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*Includes program: *Dragon* (for the 64)

**Includes programs: *Molecular Motion* and *Radioactive Decay* (for the 64)

***Includes program: *Disk Error Checker* (for the 64)

****Includes program: *The Name Game* (for the 64)

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Cover art by James Regan; art inside screens by James Regan, Tom Cushwa, Sandra Steele

Publisher
Michael Schneider

Editor
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Managing Editor
Michael Davila

Senior Editor
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Technical Editors
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Bulletin Board SYSOP
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Circulation Director
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Advertising Director
Lynne Dominick

Director of Promotion
Joyce K. Fuchs

Controller
Dan Tunick

Managing Director
Richard Stevens

Advertising Representative
JE Publishers' Representative
6855 Santa Monica Blvd., Suite 200
Los Angeles, CA 90038
(213)467-2266
Boston (617)437-7628
Dallas (214)660-2253
New York (212)724-7767
Chicago (312)445-2489
Denver (303)595-4331
San Francisco (415)864-3252

ISSUE NO. 22 OCTOBER 1985

Ahoy! (#8750-4383) is published monthly by Ion International Inc., 45 W. 34th St., Suite 407, New York, NY, 10001. Subscription rate: 12 issues for \$19.95, 24 issues for \$37.95 (Canada \$26.95 and \$49.95 respectively). Second class postage paid at New York, NY 10001 and additional mailing offices. © 1985 by Ion International Inc. All rights reserved. Under Universal International and Pan American Copyright conventions. Reproduction of editorial or pictorial content in any manner is prohibited. No responsibility can be accepted for unsolicited material. Postmaster, send address changes to Ahoy!, 45 W. 34th Street, Suite 407, New York, NY 10001. Direct all address changes or matters concerning your subscription to Ahoy!, P.O. Box #341, Mt. Morris, IL 61054. All editorial inquiries and software and hardware to be reviewed should be sent to Ahoy!, 45 W. 34th St., Suite 407, New York, NY 10001.

VIEW FROM THE BRIDGE

A competitor of ours recently ran an editorial page explaining why their magazine had shrunk to 96 pages. Not that any explanation was really necessary--obviously, business had gone a little sour. Nor is any explanation really necessary for us this issue as we jump to 146 pages--business is going through the roof!

And we're not through yet. Premiering next issue will be an eight-page monthly addition that will make the best Commodore magazine on the market better still!

In order to provide our copious monthly collection of programs and articles geared to the more serious Commodore user, we've historically neglected some of the elementary aspects of Commodore home computing--among them, entertainment software. But now that we've grown in size we're going to correct that fault, with a monthly entertainment software section edited by *Ahoy!* game reviewer Arnie Katz, founder and former editor of *Electronic Games* magazine. Beginning next month, *Ahoy!* will feature more complete game coverage than any other Commodore magazine!

For this month, though, we'll have to content ourselves with leading the field in every *other* aspect of Commodore

home computing, with articles and programs like the following:

Continuing his series on sprite programming, *Creating Your Own Games* columnist Orson Scott Card tells you how to create animated cartoon characters that are *Alive and in Living Color*. (Turn to page 18.)

Dale Rupert continues doing some of the most original work in computer magazines today with *Infinitesimal Intrigue*, computer simulations of sub-microscopic activity. (Turn to page 51.)

As the debate over copy protection continues, let's take a month off to learn what makes it tick with George Trepal's *Copy Protection: The Guarded Secrets*. Included is *Disk Error Checker*, a program that allows you to examine copy protection schemes. (Turn to page 59.)

It may sound like a cheap motel, but *ShadeyDump* is actually a boon to graphic artists, permitting them to dump multicolor screens in shades of black and white. (Turn to page 93.)

Mystery at Mycroft Mews is a murderously entertaining adventure game for the 64. (Turn to page 29.)

Shotgun takes its name from the speed with which programs can be loaded and run from the disk menu it generates. (Turn to page 97.)

The 1541 Disk Drive Cleaning Utility is a necessary complement to the many drive-cleaning disks on the market. (Turn to page 107.)

The leading playing card manufacturers begged us not to print it, but *Solitaire* appears in this issue anyway. It plays so much like the real game, you may never buy another deck of cards! (Turn to page 37.)

Gravinauts requires you to fight for survival in the hostile environment of the planet Arkion. (Turn to page 32.)

Maestro simplifies making and editing music on the C-64. (Turn to page 39.)

Mark Andrews continues to put the power of machine language under your control with this month's installment of *Commodore Roots*, dealing with performing single bit manipulations on binary numbers. (Turn to page 103.)

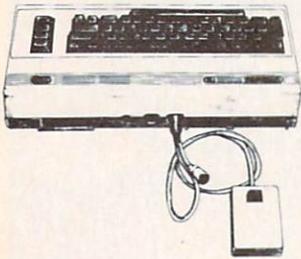
Our popular *Cadet's Column* continues this issue, with advice to beginning Commodore computerists on organizing their workspace while the organizing is good. (Turn to page 109.)

Also inside is a special *Scuttlebutt* report on Commodore's new Amiga computer; a modest first installment of *Tips Ahoy!*, our new programming hints column; *Reviews of Beach-Head II, Isepic, FAST-HACK'EM*, and other recent Commodore releases; the latest monthly batch of *Commodores*; and many other surprises.

Meanwhile, we dedicate this largest issue in *Ahoy!* history to you, the loyal readers who made our success happen. As long as you continue to support us, we'll continue to support you, with the best we can deliver, month after month.

—David Allikas

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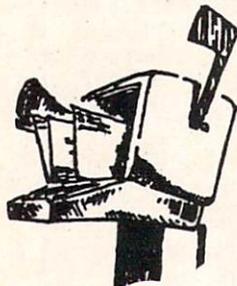
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UNVEILING THE AMIGA

By Tom Benford / Ahoy! Business Press Correspondent

NEW YORK (July 24, 1985)—The long-awaited Commodore Amiga made its official debut last night. The coming-out party was very similar to a debutante's ball—the trappings and festivities of the occasion fully befitted this dazzling new machine.

The event was held in Manhattan's Lincoln Center. Several celebrities, including Andy Warhol and Debbie Harry, participated in showing off the machine's fantastic graphic capabilities. But the real star of the evening was the Amiga itself. The power, features, and performance of the machine are all truly stellar in scope. It was exciting to be there, to be among the first people to get a look at what personal computing will be like in the future.

The Amiga is obviously intended to do battle with the Macintosh and IBM-PC/AT in the personal computer market. Several speakers at the presentation mentioned superior features of the Amiga in direct comparison to these competitive machines. The Amiga's creators have endowed it with impressive armor that should be able to withstand repeated jousts with Big Blue and the Mac.

Unlike the PETs, VIC, C-64, Plus/4, C-16, "B" series, or even the C-128 computers, which utilize an 8-bit microprocessor, the Amiga's heart is a Motorola 68000 16/32-bit CPU—the same as the Macintosh. The PC uses an 8/16-bit chip, the Intel 8088; the AT is driven by an 8/24-bit CPU,

the Intel 80286.

The Mac and IBMs rely heavily on the CPU to handle many mundane chores, such as graphics mapping, controlling the I/O ports, and managing keyboard input and functions; these necessary tasks all sap strength, speed, and power from the CPU. Since less of the CPU's power is available for actual computations, the microprocessor is never fully available to the user—he must share the CPU with the machine itself. The Amiga makes a radical departure from such "traditional" task-networking at this point; the prospect of having the 68000 totally available for use is positively awesome. The Amiga's heart is strong, fast (7.8 MHz), and accessible.

The soul, however, comes from three independent, dedicated VLSI chips. One handles the audio/sound capabilities, disk control, and other I/O functions; another chip handles the graphics screen mapping and sprites; the third custom chip takes care of the Amiga's dual animation capabilities. All the while the CPU is barely used, which leaves its power available for data handling and computing—this remarkable engineering feat is what sets the Amiga apart from the competition.

But that's only the tip of the iceberg. Though jaded from witnessing the introduction of several "revolutionary" computers first-hand, I was genuinely excited by the Amiga. And

the more I saw, the more excited I grew. With the introduction of the Amiga, we're into a whole new ballgame of personal computing. "Wow!" was an utterance used very frequently by myself and others who attended the Amiga's premier. And the "wows" continued throughout the 2-hour presentation of the machine; the more I saw and heard, the better it got.

Out of the box the Amiga comes with 256K RAM and 192K ROM. Like the Mac, the Amiga's RAM can be "hardware" expanded to 512K (Tecmar already has a 1MB expansion module available); it also handles external hard-disk expansion up to 8MB. Wow!

The Amiga comes equipped with a built-in 3.5" disk drive which has a formatted capacity of 880K, more than double that of the Mac and PC. Additionally, RS232, parallel, and serial ports are all standard on the machine. Wow!

Three video output formats are supported by the Amiga: RGB, composite, and color TV; the high-resolution mode yields an incredible 640x400 pixel display; any 16 of the Amiga's 4,096 colors may be displayed at one time. It's important to note that multiple windowing is also supported, and each window may display its own set of 16 colors; an impressive demonstration of this capability displayed all 4,096 colors on the screen simultaneously. Double wow!

In the music and sound depart-

ments, the Amiga is in a class by itself. A built-in four-voice synthesizer with stereophonic output capability only belies the aural goodies available within the machine. Add built-in voice synthesis with unlimited text-to-speech capabilities, MIDI compatibility, full polyphonic capabilities with superior synthesis features, and you have a machine which the competition can't even come close to. The Mac can support four voices by sapping the CPU heavily; the PC and AT offer only single-voice sound. None have speech synthesis capabilities. Wow!

An 89-key keyboard with numeric keypad is the standard input device on the Amiga; in contrast, the Mac sports only 58 keys while the PC and AT provide 82 and 84 keys respectively. The Amiga also handles input from a two-button mouse, joystick, light pens, and a host of external input devices including video digitizers, audio A/D (analog to digital) converters, MIDI-equipped instruments, and numerous other input/control devices either already available or nearing completion.

Microsoft developed the powerful dialect of BASIC supplied with the Amiga. All of the computer's abundant features and capabilities—sound, music, speech, graphics, animation, windowing, etc.—are directly accessible through BASIC programming. Additional programming languages for the Amiga include Pascal, C, Logo, Lisp, Assembler, and others. The machine is very flexible as to which programming language is used, since all languages—including BASIC—are disk-based and are booted into the system prior to use.

Another highly innovative feature of the Amiga is that it uses a "kick-start" disk to configure and control the machine. Unlike a boot disk which places the operating system directives into RAM memory locations, the "kick-start" disk addresses the three custom-designed VSLI chips solely, leaving the machine's entire 256K of RAM available for use. Wow, again!

Since the CPU's computing power is available to do useful work at



The Amiga includes 256K of ROM, built-in 3.5" drive (format capacity of 880K), and parallel, serial, and RS232 ports. It has 4 voices, 4096 colors, and a 640X400 pixel display. But can it type? Yes—with an 89-key keyboard that includes a numeric keypad. Scheduled for September release, at a price of \$1295. READER SERVICE NO. 192

all times, multitasking is a powerful reality on the Amiga. An impressive demonstration of multitasking was provided by having word processing, data sorting, animated graphics, business graphics, sound, and spreadsheet programs all running simultaneously within the Amiga's multiple windows. While we witnessed this very busy display, we were told that less than 9% of the 68000 CPU's power was being utilized—trying to imagine what you could do with the remaining 91%+ simply boggles the mind. No wow—utterly speechless this time!

With a suggested retail price of \$1,295 and September availability, the Amiga has without a doubt broken new ground on the scene of personal computing. Optional equipment including an ultra-high-res monitor, hard-disks, tape back-ups, modems, laser videodisc controllers, video interfaces and digitizers, and external musical keyboards, promise to shatter the creative chains that have hindered computers and users in the past.

The Amiga can even be de-tuned to emulate an IBM. A demonstration of this was provided in grandiose style in keeping with the theme of the

evening. A PC Emulator program was booted via the 3½" built-in drive and, lo and behold, the PC-DOS message visible on the screen indicated that the Amiga had just changed its normal way of doing things to conform to the IBM standard. Another disk was inserted into the drive, and the word "lotus" entered at the "A>" prompt. We waited in suspense for several seconds while the screens of the three large video monitors in the theatre remained blank. Then a comment from Bob Parasal, one of the Amiga's patriarchs: "Lotus 1-2-3 takes just as long to load on the Amiga when it is emulating a PC as it does on a PC!" The opening screen and spreadsheet video display of Lotus's best-selling program became visible on the giant screens. Parasal commented dryly, "You'll notice the display looks identical to the PC...same flavor...standard IBM vanilla," referring to the white characters on black background.

Software support was evidenced by such companies as Arktronics, Broderbund, Mindscape, Electronic Arts, EasyWare, Metacomco, Cherry Lane Technologies and others (see below). The features and creative

hanced version of the popular games. (Electronic Arts, 2755 Campus Dr., San Mateo, CA 94403.)

The following from the Infocom canon: *Zork I, II, and III, Enchanter, Sorcerer, Suspect, The Witness, Cutthroats, Deadline, Seastalker, Infidel, Planetfall, Suspended, Starcross, Invisi Clues, and The Hitchhiker's Guide to the Galaxy.* (Infocom, Inc., 125 CambridgePark Drive, Cambridge, MA 02140.)

CalCraft, a spreadsheet with pull-down menus and flexible formatting options. (Synapse Software, 5221 Central Ave., Richmond, CA 94804.)

RAGS to RICHES Sales, a register program for point-of-sale income accounting (integratable with other *RAGS to RICHES* programs described above). (Chang Laboratories, Inc.)

Texture, a modular music recording program. (Cherry Lane Technologies.)

Archon and *Skyfox*, two more game adaptations. (Electronic Arts.)

Musicraft, which turns the Amiga

into a synthesizer and sequencer. (Everywhere, Inc., P.O. Box 3418, Northridge, CA 91323.)

Enable/Calc, a spreadsheet with Lotus-like macros and over 50 math functions. (The Software Group.)

Telecraft, a communications and terminal emulation package. (Software 66, 3119 East Des Moines, Mesa, AZ 85203.)

Scheduled for November release: *The Print Shop*, presumably an enhanced version. (Broderbund Software, 17 Paul Dr., San Rafael, CA 94903.)

Deluxe Video Construction Set, for creating animated business graphics with sound effects; and *Marble Madness* and *Return to Atlantis*. (Electronic Arts.)

Enable/File, a database manager that can handle up to 1301 bytes of information with over 26 fields per record. (The Software Group.)

Scheduled for December release: *Enable/The Office Manager*, consisting of integrated word processing, spreadsheet, database, telecommuni-

cations, and graphics programs. (The Software Group.)

Scheduled for the nebulous "4th quarter 1985":

The Helley Project: A Mission in Our Solar System, playable with joystick or mouse; and *Keyboard Cadet*. (Mindscape, Inc.)

Radar Raiders, a flight simulation game with 3D imaging, color graphics with shading, hidden surface removal and patterning in real time. (SubLOGIC Corporation, 201 West Springfield Ave., Suite 1001, Champaign, IL 61820.)

Scheduled for 1st quarter 1986:

Turbo Pascal, a single-pass, native code compiler. (Borland International, 4585 Scotts Valley Drive, Scotts Valley, CA 95066.)

Sargon III, chess simulation with nine levels of play. (Hayden Software Company, 600 Suffolk St., Lowell, MA 01854.)

And for January 1986:

Scorewriter, allowing musicians to score and print music. (Cherry Lane Technologies.)

♣ BridgePro[®] ♠

BridgePro is the first program I've seen that provides a challenge for the average-to-excellent bridge player. . . The documentation is excellent and allows a new bridge player to learn the basics.

—Harvey Bernstein, *Antic Magazine*, Feb. 1985

After having tried three other bridge programs, I find that BridgePro is indeed a pro game. . . It is designed for both the beginner and the advanced player. . . I didn't find anything that could be improved upon.

—Helen Garret, *Apple-Dayton Journal*, March 1985

If you like to play bridge and don't have three other players ever-eager to play, this software is a must. For bridge freaks it's good enough to justify buying a computer. . . Whether you are a "master" or a beginner, this is great software.

—Christian Basler, *NY Commodore Users Group Review*, Sept. 1984



BridgePro is designed to let you learn, improve, or just enjoy the card game of bridge. The program provides complete bidding, play and scoring for 1 or 2 players. Features include random hands, bidding help, demonstration mode, hand replay/quit, best hand, auto finish, duplicate mode, and fast machine language speed.

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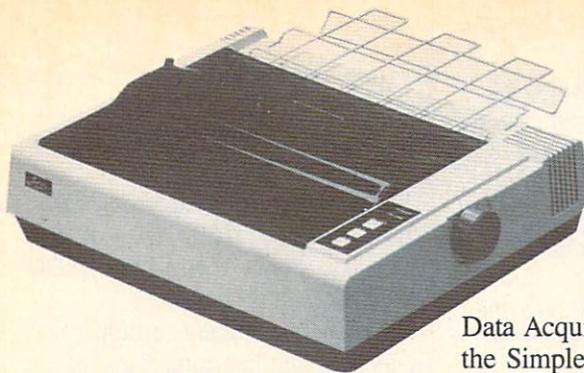
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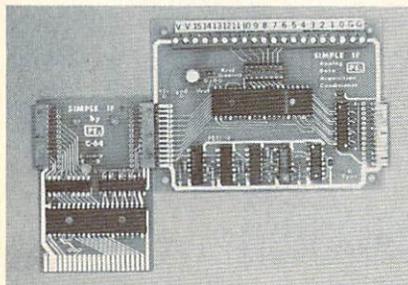
SAKATA PRINTER

Sakata's SP-1200 Plus printer offers 120 character per second speed, double-print and near letter quality modes, and the capacity to print eight international character fonts. Price will be \$359.00.

Sakata U.S.A. Corporation, 651 Bonnie Lane, Elk Grove Village, IL 60007 (phone: 312-593-3211).

OUTSIDE WORLD INTERFACES

Two devices designed to link your Commodore computer with the outside world:



Proteus' Simple IF & conditioner.
READER SERVICE NO. 194

With an X-10 Powerhouse in your C-64's user port, you can automatically control up to 72 lights, appliances, heating and air conditioning units, and other electrical devices. The unit contains its own microprocessor, and memory backed up by a battery that can sustain it without AC power for more than 100 hours. Price of interface, software disk, and connecting cable is \$120.

X-10 (USA) Inc., 185A Legrand Ave., Northvale, NJ 07647 (phone: 201-784-9700).

Enabling VIC 20, C-64, and C-128 users to digitize 16 channels of analog signals (and thus use their computers to perform heating/cooling/solar control, voltage measurement, weather station monitoring, and

SP-1200 Plus has German, Spanish, Italian, Swedish, Danish fonts.
READER SERVICE NO. 193

other tasks), the Simple Interface Analog Data Acquisition System consists of the Simple IF card and the Analog Data Acquisition Conditioner. Price is under \$100; demo disk is \$9.95. Other plug-in conditioning boards are also available.

Proteus Electronics Inc., Spayde Road RD2, P.O. Box 693, Bellville, OH 44813 (phone: 419-886-2296).



X-10 Powerhouse handles 72 appliances.
READER SERVICE NO. 195

C-128 80-COLUMN ADAPTER

Cardco's C-128/80 video adapter cable will enable the Commodore 128 to output 80-column monochrome displays to any standard composite video monitor. (The unaided C-128 will output to non-RGB monitors only in 40-column mode.) The 5' cable, which connects to the computer's RGB port and the monitor's video input jack, will sell for \$9.95.

Also coming from Cardco: a 32K printer buffer that will return the computer to the C-64, C-128, C-16, or Plus/4 user up to 15 times sooner than when you send data directly to the printer.

Cardco, Inc., 300 S. Topeka, Wichita, KS 67202 (Phone: 316-267-6525).

ENGINEERING PROGRAM

Intended to make life easier for engineers, technicians, and students, BAMTEK's *Professional Electronic Engineering Software* for the C-64 provides electronic circuit analysis,

neg/pos feedback active filters, frequency response plots, and a polynomial root finder. Price is \$39.95 plus \$1.95 shipping (CA residents add 6% sales tax).

BAMTEK, 1541 N. China Lake Blvd., Suite 584, Ridgecrest, CA 93555 (phone: 619-446-5311/ext. 584).

\$4.95 SOFTWARE

Hoping to singlehandedly drive software pricing down several strata, Green Valley Publishing is offering a number of disks for the C-64, each containing three programs, at \$4.95-\$9.95 each. Available at K-Mart (under the name Load 'N' Go!), Target Stores (as One-Step Software), and other chains, current titles include the following:

Games: *Championship Gambler, Bits, Pieces & Clues, Board Game Challengers, Star Trek Evolution, Maze Madness, Board Games I, Chess Champion, Adventure Master.*

Utilities: *Home Financial Organizer I, My C-64 Computer Tutor, Pro Financial Organizer II, Home Property Manager, Home Income Manager, Personal Spreadsheet, Personal File Keeper, Recipe Box, Word Writer.*

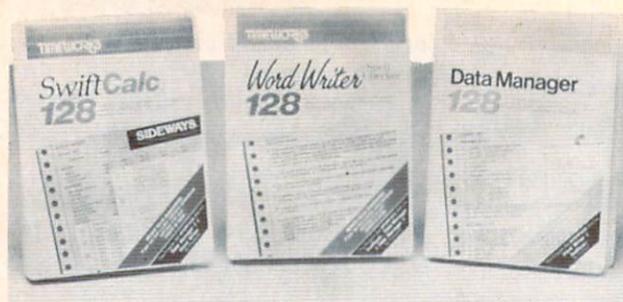
Green Valley Publishing, Inc., 7122 Shady Oak Road, Minneapolis, MN 55344 (phone: 612-829-0398).

BOOK RELEASES

Commodore 64 Assembly Language Arcade Game Programming includes advice on topics like the use of macros and subroutines, and entering graphics data by use of a graphics tablet. Two sample games are included. \$14.45 from TAB Books Inc., Blue Ridge Summit, PA 17214 (phone: 717-794-2191).

The Minute Manual for the Dot Matrix Printer guides the non-programmer through buying, using, and understanding a dot matrix printer. \$12.95 plus \$2 shipping from MinuteWare, P.O. Box 2392, Columbia, MD 21045 (phone: 301-995-1166).

Epson, Epson, Read All About It! teaches the user the ins and outs of his Epson or Epsonworkalike printer. \$14.95 from Addison-Wesley General Publishing Group, Reading, MA 01867 (phone: 617-944-3700).



Timeworks' C-64 spreadsheet, word processor, and database manager stepped up to 128 capability.
READER SERVICE NO. 196

THREE 128 UTILITIES

Timeworks, Inc. has announced enhanced C-128 versions of three C-64 products, each at \$69.95:

Word Writer 128 includes an 85,000-word spell checker, a 5-function calculator, and word processing features like document chaining, form letter printout, page separations, and horizontal/vertical scrolling.

Data Manager 128 includes report-writing and label-making capabilities, in addition to search, sort, and chart functions.

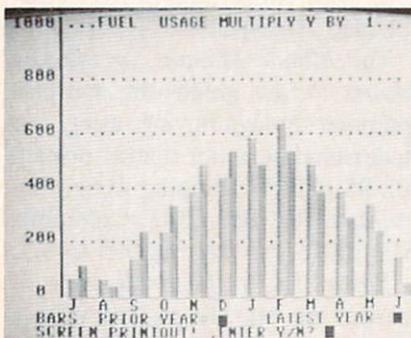
Swiftcalc 128, incorporates the *Sideways* vertical spreadsheet printing utility (see Aug. '85 *Scuttlebutt*).

Timeworks, Inc., 444 Lake Cook Road, Deerfield, IL 60015 (phone: 312-948-9200).

ENERGY USE ANALYZER

Energy Manager lets C-64 users analyze use of heating and cooling energy in homes and buildings by comparing utility bills for the same months in different years. Information is displayed in tabular and bar chart form. Price of \$39.95 includes shipping and handling.

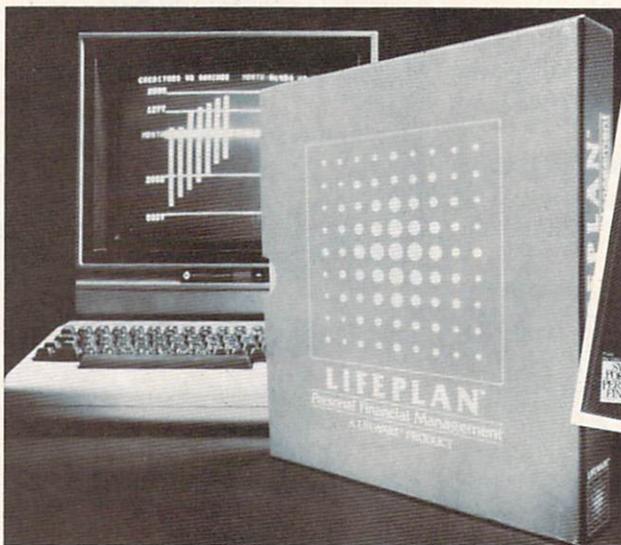
Powerline Software, P.O. Box 635, New Hartford, NY 13413 (phone: 315-735-0836).



Analyze energy use in homes, buildings.
READER SERVICE NO. 197

HOME BUDGET SOFTWARE

Plan Ahead consists of three integrated modules, each of which accounts for inflation: *Retirement Planning*, *Life Insurance Planning*, and *College Funding*. Price of any one



Lifeplan: for middle-income families.
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Sylvia Porter: first in a series.
READER SERVICE NO. 199

module is \$29.95, any two \$49.95, and all three \$59.95.

Advanced Financial Planning, 20922 Paseo Olma, El Toro, CA 92630.

Timeworks has released *Sylvia Porter's Personal Financial Planner* and scheduled for fall release the second in the series — *Sylvia Porter's Personal Investment Manager*. Both for the 64; \$59.95 each.

Timeworks, Inc., 444 Lake Cook Road, Deerfield, IL 60015 (phone: 312-948-9200).

Completing the series begun last year, *J.K. Lasser's Your Money Manager* provides a check writer, financial statements, balance sheets, and budget reports. If records are kept accurately all year, they can be downloaded to *J.K. Lasser's Your Income*

Tax (1986 version available in December) which will calculate a return in a single step. Price of each C-64 program is \$69.95.

Simon & Schuster Electronic Publishing Group, 1230 Ave. of the Americas, New York, NY 10020 (phone: 212-245-6400).

Lifeplan is designed to help middle-income families control and eliminate debts, increase savings, and improve their financial security. A 100% money-back guarantee is included. For the C-64; \$99.95.

Lifeware, 2318 Second Ave., Seattle, WA 98121 (phone: 206-322-5454).

SUPER PASCAL

A complete Pascal development system for the C-64 and C-128, *SUPER Pascal* includes a source file editor with renumber, auto, find, and other functions, an assembler for optionally coding in machine language routines, and a comprehensive utility package. The program utilizes a DOS that speeds up 1541 read and write operations by 300%. Included for the \$59.95 price is a handbook of over 200 pages.

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

PAPER AIRPLANE MAKER

Why settle for one of the numerous slight simulation programs on the market when your C-64 will now let

you pilot an actual craft? Based on the famous book, *The Great International Paper Airplane Construction Kit* is a set of over a dozen paper airplane templates (to be printed and folded) and a library of aeronautical art for the wings and fuselage, including logos, rockets, and windows. Scheduled for fall release; \$24.95.

Simon & Schuster Electronic Publishing Group, 1230 Ave. of the Americas, New York, NY 10020 (phone: 212-245-6400).

lation are handled by onboard ROM, eliminating the need to load additional software.

Price of ProVoice will be \$99.95; a complete talking telecommunications package consisting of ProVoice, a 300 baud auto-dial/auto-answer modem, and communications software will sell for under \$150. (A Talking Word Processor will be available from Genesis by year-end.)

Genesis Computer Corporation, Ben Franklin Technology Center, Le-

OWI Inc., 1160 Mahalo Place, Compton, CA 90220 (phone: 213-638-4732).

Also to be included in next month's robotics feature, the Versatile Mobile Robot Kits from Spectron Instrument include computer interface circuits for the C-64 or VIC 20 that provide remote manipulative output (specify computer when ordering). Pictured is the basic Micro-Kitten.

Base list price is \$80 (assembled, \$120); with radio control, \$195 (assembled, \$330). Postage included.

Spectron Instrument, Robot Div., MS 22, 1342 W. Cedar Ave., Denver, CO 80223 (phone: 303-744-7088).



The 10' grounding cord of the Model 9250 is fastened to a 3.5' right angle strip extension that folds down and underneath the keyboard. The cord's opposite end should be fastened to a suitable ground. READER SERVICE NO. 200

ANTI-STATIC STRIP

The First Touch Model 9250 Keyboard Strip (\$19.95) sticks to your Commodore (or other microcomputer keyboard, where by touching it periodically you help prevent equipment malfunction due to operator-induced static electricity. No, it isn't magic—it's attached to a 10' grounding cord.

3M, P.O. Box 33600, St. Paul, MN 55133-3600 (phone: 612-736-2355).

PROVOICE

The second generation of Genesis' COMvoice speech synthesizer, ProVoice features an unlimited English vocabulary, screen echoing (allowing almost any BASIC program to become a talking program), and variable translation modes for conversational, verbatim, and character by character speech output. Thirteen new BASIC commands can be accessed with a single keystroke.

The plug-in device contains a built-in speaker/amplifier. New BASIC commands and text-to-speech trans-

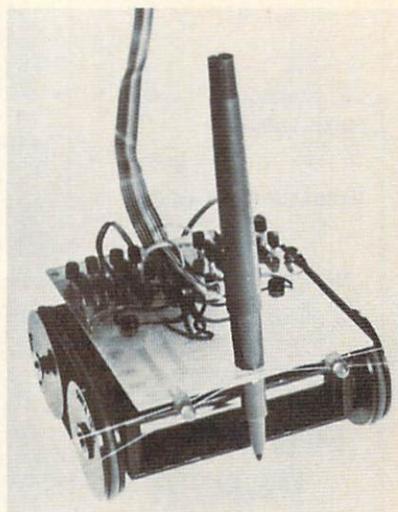
high University, Bethlehem, PA 18015 (phone: 215-861-0850).



ProVoice: 13 new BASIC commands. READER SERVICE NO. 201

MOBILE ROBOT KIT

The latest in the Movit family of robot kits (see next issue's feature on *Robotics and the Commodore User*), WAO (Wise, Argent, Orb) includes a microcomputer chip that stores a system program in ROM (2K) and a user program in RAM (128 X 4 bits). The robot can solve high-grade problems and (via the penholder in the center of its mechanism) perform graphics.



Micro-Kitten: robot for C-64/VIC 20. READER SERVICE NO. 202

BETTER WORKING WORD PROCESSOR

The *Better Working Word Processor* pre-announced in July's *Scuttlebutt* (see page 10) has been released by Spinnaker. The program includes a 50,000-word spellchecker based on the American Heritage Dictionary. For the C-64; \$49.95.

Through the Christmas Season, Spinnaker will offer consumers a free Spinnaker product of their choice when they purchase any three of the 50 products offered by Spinnaker's five brands: Spinnaker, Fisher-Price, Telarium, Windham Classics, and Better Working. Details can be found inside appropriately marked packages or with your dealer.

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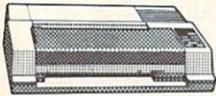
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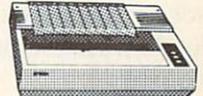


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NEW GAME RELEASES

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

Scheduled for fall release are three war simulations for the 64 from MicroProse: *Acrojet*, *The Advanced Flight Simulator*; *GunShip*, *The Daring Attack Helicopter Simulation*; and *Silent Service*, *The Submarine Simulation*.

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

Two introductory-level strategy contests for the C-64 from SSI, each \$39.95.

Colonial Conquest recreates the struggle for world dominance waged in the late 1800's and early 1900's by Germany, France, England, Japan, Russia, and the United States. The computer controls countries not represented by a player.

A solitaire WWII game, *Panzer Grenadier* depicts platoon/company level warfare between the Germans and the Russians on the Eastern Front. Five scenarios are included, each lasting 1-2 hours.

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

Powerline Casino Roulette allows for most styles of play popular in European and American casinos. On cassette or disk for the C-64; \$39.95 (free shipping in Continental US).

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



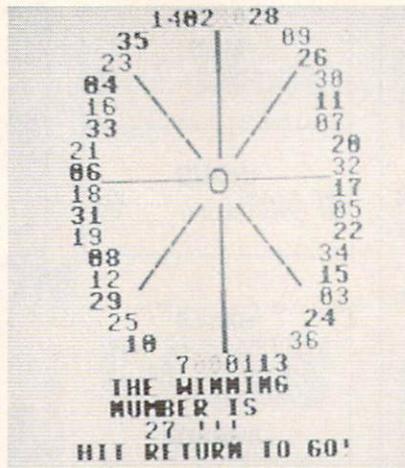
Included with *Wishbringer*: a map of the town, a sealed special delivery letter, and *The Legend of Wishbringer*, a booklet explaining how to use your seven Magick wishes.
READER SERVICE NO. 203

The Wizards have announced that the Cubological Formulation (also known as Rubik's Cube, etc.) will be released in the form of a game for the C-64 by Christmas.

The Wizards, P.O. Box 7118, The Woodlands, TX 77387.

Incorporating 50 animated screens, *Maxwell Manor* requires you to solve the mystery of the previous owner's murder. The man-eating bugs in the garden and the huge spiders downstairs number among your obstacles. For the C-64; \$25.00.

Microcomputer Games (division of The Avalon Hill Game Company), 4517 Harford Road, Baltimore, MD 21214 (phone: 301-254-5300).



Onscreen wheel of Casino Roulette.
READER SERVICE NO. 204

EDUCATION PROGRAMS

Ten new C-64/C-128 compatible releases from Learning Technologies:

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The Thinking Strategies Series also consists of five programs, these designed to develop problem-solving skills through observation, deduction, and evaluation: *Scrambled Eggs*, *Sliding Block*, *Monkey Business*, *Speedy Delivery*, and *Alpine Train Ride*.

Learning Technologies, Inc., 4255 LBJ, Suite 131, Dallas, TX 75224 (phone: 214-991-4958).

ED SOFTWARE NEWSLETTER

Though the flood of educational software releases have tapered off to a trickle, *The New England SoftNews* will advise users and parents on what's newest and best in home educational programs for children, high schoolers, and adult self-improvers. The newsletter is published six times a year.

New England Software Company, P.O. Box 1154, Kennebunkport, ME 04046 (phone: 207-967-5977).

MIDI PRODUCTS

The latest releases in the burgeoning field of MIDI (Musical Instrument Digital Interface) products for the 64, allowing your computer to interface with MIDI-equipped electronic instruments:

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Continued on page 98



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HOW TO TURN YOUR
COMMODORE 64 SPRITES INTO
FULL-COLOR ANIMATED CARTOON
CHARACTERS—COMPLETE WITH
A PROGRAM THAT ANIMATES
AND MOVES A DRAGON.

Not all action games require realism. Remember when *Asteroids* was new in the arcades? The vector graphics were very abstract—your spaceship consisted of a little wedge, the enemy ships were only slightly more detailed, and the asteroids were nothing but jagged outlines.

At the time, we didn't care. We didn't think it was primitive—it blew us away. To have the little spaceship completely under our control, acting the way it really would in null gravity, with dozens and dozens of things going on at once—I remember crowds standing around the first machine in Orem, Utah, just watching the game.

But we got more sophisticated. The little ghosts in *Pac-Man* with their roving eyes, Mario's padding feet and chugging arms in *Donkey Kong*, the dragons and other odd little creatures in *Dig-Dug*, all led us to expect much more believability, detail, *life* in our games.

Even games that could have been abstract—*Galaxians*, *Galaga*, *Firebird*—came ablaze with color and startling, pleasing designs and animation. But there was a limit to what computers could do. Raster graphics couldn't escape from the bumpy look of drawings made out of little square pixels. Animation ate up memory. The more detailed it was, the more memory each shape required. And speed—if your new, lifelike shape used sixteen times as many bytes, then of course it took sixteen times as long to draw it on the screen.

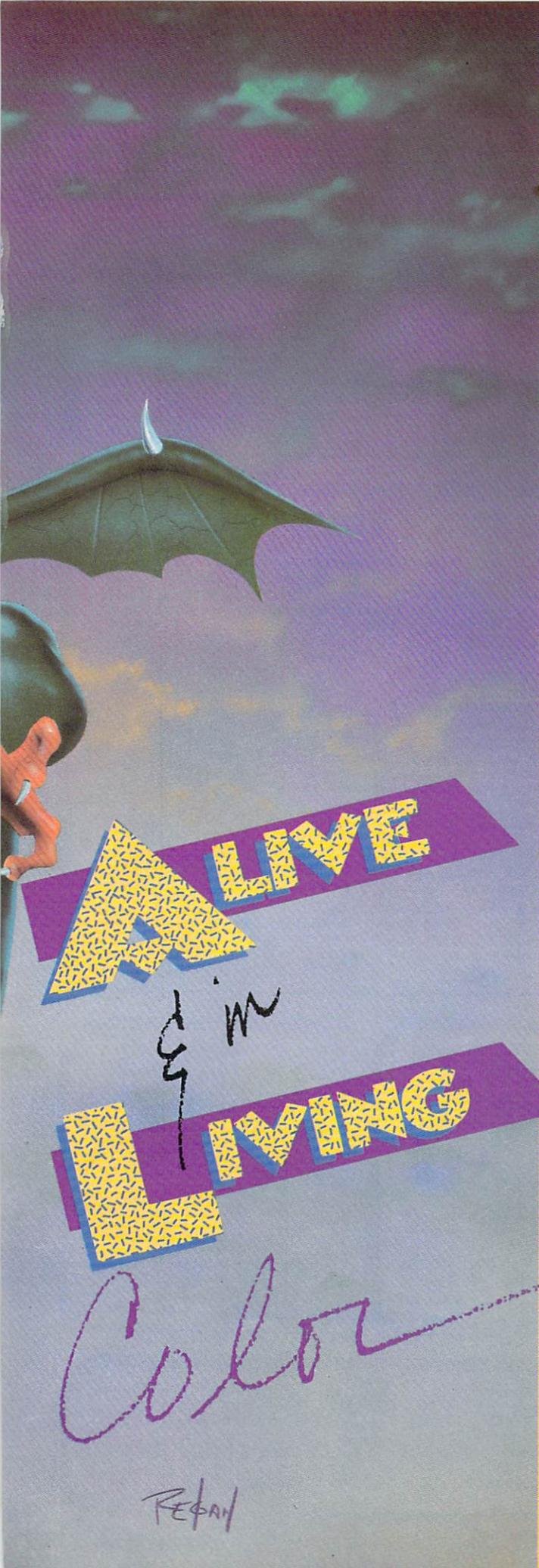
So computer animation became very good—but it reached a limit. Until just a couple of years ago, when they hit us with laser disc games. First-rate cartoonists were going to show us how computer graphics ought to be done, with smooth animation like the best Disney cartoon features.

It should have been nirvana. But it wasn't. And the reason is that once the computer "knows" the shape of a figure, it can "draw" it anywhere on the screen, at any time; but laser disc animation couldn't do that. It was more like a movie. If the hero is two inches from the left side of the screen in frame 1044, then he will *always* be two inches from the left side of the screen in frame 1044.

JAMES REGAN

In other words, while the action became more realistic and lifelike and smooth-moving and pleasing to the eye, the players lost control of the game. You had very little more to do than choose between option A and option B at certain key points. The fluidity, the dexterity of animated games like *Dig-Dug*?

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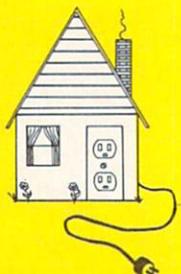
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Out of the question for the laser disc.

The power of computer action games is not just in the lifelike animation, though I believe that it is very important. The greatest power is in the fact that the player is in control.

This isn't just a subtle difference. In a movie—animated or live—the finished product is the finished product. The audience comes and sees it, and that's it. The audience can't do anything to change the story as it unfolds (except by stamping and screaming and making it impossible to hear, but that's mere aural vandalism).

Now, a computer action game loses the complexity of plot and character and sacrifices much (but not all) of the visual realism. In exchange, however, we players get to create the story ourselves. The gamewright creates a milieu of sights and sounds and gives us certain powers and limitations—you can move here but not there, you can attack this but not that, you have only this many seconds and that many "lives."

Then, within those limitations, and using those powers, we players tell the story ourselves. No, I take it back. We don't tell the story, we live the story, we control a figure that acts it out for us. That's something no other art form can do—let the artist and the audience collaborate in creating related but non-identical stories every time we play.

As the makers of laser disc games discovered, the right balance between realistic animation and player control was struck by the best raster graphics games; the cartoon graphics games were too forced, too predictable, too *uninteresting* for most of us, once the novelty wore off. We were used to being in charge. The laser disc games were like going back to kindergarten.

ANIMATED SPRITES

Which brings us to animating sprites on the Commodore 64. If you've been following this column for the past many months, you'll remember an earlier demonstration of character-graphics animation through character-set flipping (January '85). The sprite shape-flipping technique is closely related. For the sake of newcomers to *Ahoy!*, however, I won't take anything for granted.

Computer animation depends on the same basic technique as cartoon animation. Many pictures are displayed in series for a fraction of a second each. Every picture, called a "frame," is almost identical to the one before, showing only a slight change. In the movies, each frame lasts about a sixteenth of a second. In the old days, the frames came every twelfth of a second—the audience could detect a slight jump or flicker between frames. Today's faster speed has smoothed out the picture completely. Our brain, in the effort to make sense of the image before our eyes, ignores the momentary darkness between frames and "sees" smooth movement.

With sprites, we animate using the same technique. In the example program included with this column (see *Dragon* on page 120), we want to move a dragon around on the screen. We want to create the illusion that the dra-

gon is walking swiftly and breathing fire.

To do this, the program sets up four different shapes for the dragon. Each shape is very similar to the one before it in the sequence. In the shape created using the DATA statements in lines 1020-1031, we see the dragon with its mouth closed, its legs and arms balanced.

The next shape (1040-1051) moves the dragon's farther leg forward, as if he were stepping with his right foot. Also, his mouth opens and flame starts to emerge.

The third shape (1060-1071) evens out the dragon's legs again, just as in the first shape. However, the flames have come farther from the dragon's mouth. The tail is also undulating.

The fourth shape (1080-1091) moves the dragon's nearer leg, as if he were stepping with his left foot. The flames have burst far to the left; the dragon's mouth is now closed.

This sequence is completely circular in suggesting a walking movement. Legs even, step right, legs even, step left, and back to the beginning again. The undulation of the tail also completes a cycle. In other words, by repeating the sequence over and over, we can create the illusion of a walking, fire-breathing dragon.

However, the dragon does not always move from right to left. Sometimes he must move from left to right. So we need four more shapes, held in the DATA statements from 1120 to 1191. They are the mirror images of the left-facing shapes from 1020 to 1091.

When the dragon moves to the left, we cycle through the first four shapes, one after the other.

When the dragon moves to the right, we cycle through the last four shapes, one after the other.

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SPRITE SHAPE-FLIPPING

In last month's column, we went over sprite creation and movement in detail. If you missed that issue, you can still probably figure out what's going on by consulting the Sprite Memory Map reprinted here, which lists all the key locations for sprite control.

When it comes to animation, the vital locations are the last eight bytes of the 1K block of memory that holds screen memory. When your Commodore 64 powers up, screen memory is at location 1024. That 1K block runs, then, from 1024 to 2047. The last eight bytes are 2040-2047.

These bytes, together, form the Sprite Shape Location Table. The first byte holds the code for the location of the shape for sprite 0; the second byte, the shape for sprite 1; and so on. Since all the sprites are handled similarly, from now on we'll only discuss animating a single sprite, sprite 0.

For the purpose of defining sprite shapes, the VIC-II video chip "thinks" of the 16K video block as being divided into 256 sprite shape blocks consisting of 64 bytes each. Each 64-byte block has its own unique code number, consisting of a number from 0 to 255. The code number for the first sprite shape block in video memory is 0; the code number for the second sprite shape block, the one starting in byte 64, is 1; the code for the last block, the one starting at byte 16320, is 255.

SPRITE MEMORY MAP

For easy reference, here are the sprite-control registers in the Commodore 64. For full explanations, see the text of this month's and last month's articles.

Floating Memory Locations

1016-1023 after the start of screen memory (default 2040-2047): The eight **shape location registers**. (If you're using bit-map mode, they are found at bytes 1016-1023 after the start of bit-map color memory.)

0-63: The codes for the possible location of each sprite shape block within the video block. The actual address is found by multiplying this code by 64 and adding the result to the absolute address of the start of the video block. The first 63 bytes of the sprite shape block determine which dots will be "on." Every 1 bit causes a dot to be displayed; a 0 bit allows the playfield display to show through.

Permanent Control Registers

53248, 53250, 53252, 53254, 53256, 53258, 53260, 53262: Horizontal position registers for sprites 0 through 7, in order.

53249, 53251, 53253, 53255, 53257, 53259, 53261, 53263: Vertical position registers for sprites 0 through 7, in order.

53264: Flag-bit register for horizontal position of all eight sprites.

53269: Sprite enable register. (255 enables all sprites; 0 disables all sprites.)

53271: Sprite vertical expansion register. (255 expands all sprites.)

53272: Screen and character memory location register. Where screen memory is located determines where the sprite shape location registers are located. The high four bits are significant for screen memory location:

$$\text{screen location} = (\text{PEEK}(53272) \text{ AND } 240) / 16 + \text{video block starting address}$$

53275: Sprite priority register. (0 means all sprites appear in front of foreground; 255 means all sprites appear behind foreground.)

53276: Sprite multicolor enable register. (255 makes all sprites display using multicolor option.)

53277: Sprite horizontal expansion register. (255 expands all sprites.)

53278: Sprite/sprite collision register. (0 means no collisions; PEEKing this location clears the register.)

53279: Sprite/foreground collision register. (0 means no collisions; PEEKing this location clears the register.)

53285: Sprite multicolor register 0, controlling the color of 01 bit-pairs.

53286: Sprite multicolor register 1, controlling the color of 11 bit-pairs.

53287, 53288, 53289, 53290, 53291, 53292, 53293, 53294: Sprite color registers for sprites 0-7, in order. Default colors are white, red, cyan, purple, green, blue, yellow, and medium gray. (In multicolor mode, these registers control the color of 10 bit-pairs.)

53276: Video block selection register. Bits 0 and 1 determine which video block the VIC-2 chip will read.

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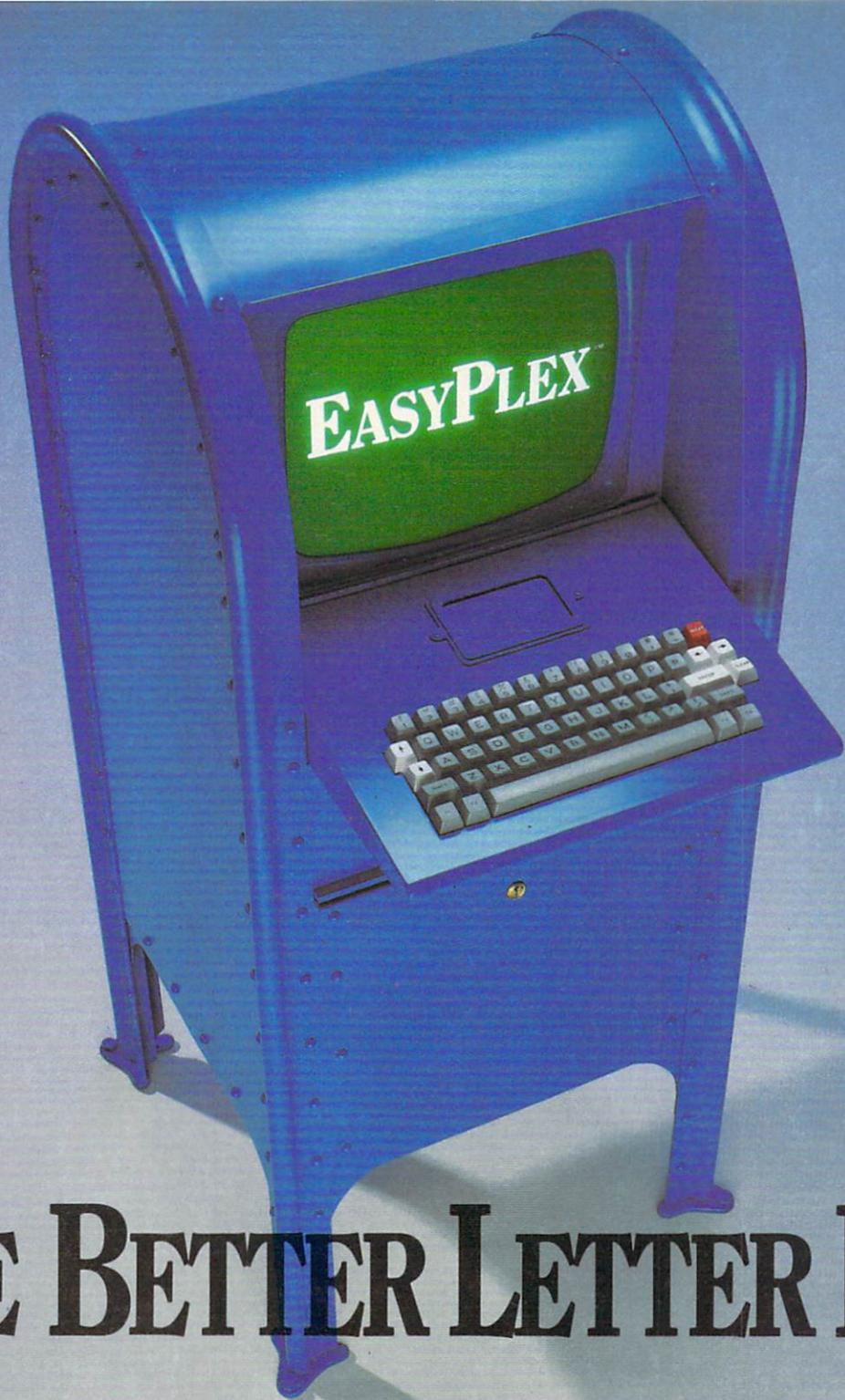
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To tell the VIC-II chip where to find the shape for sprite 0, you POKE the code number into location 2040 (or the first of the eight bytes of the Sprite Shape Location Table, if screen memory is somewhere else).

Our dragon relies on two separate animation sequences, one for leftward movement, the other to move right. Each sequence consists of four shapes. The routine at lines



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1000-1010, after deciphering the DATA statements and converting them into bytes, POKES the bytes of the sprite shapes into eight sprite shape blocks, the ones with code number 16 through 23.

Now, to display the sprite shapes in order, the main loop in lines 100-196 keeps POKING different codes into the Sprite Shape Location Table. The variable LT(0) holds the address of sprite 0's shape location register. Line 140, which is executed every time the dragon moves, POKES a different shape code into location LT(0).

If the dragon is moving to the left, line 140 POKES the codes 16, 17, 18, and 19, and then starts over again with 16. Each time this happens, the VIC-II chip instantly "flips" to the new sprite shape block and displays whatever shape it finds there. If the dragon is moving to the right, the codes 20, 21, 22, and 23 are repeated in an endless cycle.

(The codes, of course, are held in the array ST(XK,AN). XK is either a 0 or a 1, depending on which direction the dragon is facing. AN is a counter variable. Notice that line 100 puts the entire main loop within a FOR-NEXT loop: FOR AN=0 TO 3. Thus, every time the dragon moves, AN changes from 0 to 1, 1 to 2, 2 to 3, and from 3 back to 0. By using AN as an index into the variable ST(XK,AN), we automatically cycle through all four sprite shape blocks for whichever direction the dragon is moving.)

Smoothness—and the Lack of It. When you run the program *Dragon*, you'll find that the animation is not particularly smooth. There is a detectable jump from one shape to the next.

That's because of the speed of BASIC. Every time through the loop, we PEEK location 653, make a few tests, and then POKES three locations. Alas, POKES is a slowish command; it takes time. If the movement lines were omitted, of course, the animation would speed up considerably—but the dragon would just stand in place, which isn't what we had in mind.

Imagine what would happen if we were trying to animate all eight sprites! Each animation step would mean at least one more POKES, and all smoothness would be lost.

If we were using machine language, each change could come very quickly, with plenty of time left over for many other activities. It would be simple to have all eight sprites being animated at once, and each sprite's animation sequences could include dozens of shapes—sequences for movement in four directions, for instance, each of which might include six or seven steps.

Shared Shapes. Since any sprite's register in the Sprite Shape Location Table can point to any of the 256 64-byte blocks in video memory, there's nothing to stop you from having many or all of the sprites point to the same shape at the same time. You could easily have eight sprites on the screen, all of them cycling through the same dragon animation sequences. The VIC-II doesn't care whether two sprites are using the same shape block at the same time.

Animation and Movement. Keep in mind that movement and animation are two different things with sprites. Movement is taken care of by POKING the horizontal and vertical position registers. The dragon moves three horizontal dots at a time in this program; it would do this just as smoothly (or jerkily) whether the dragon were animated or not. Movement has to do with the sprite's location on the screen. Animation has to do with the changing shape of the sprite.

MULTICOLOR SPRITES

Besides cycling through animation sequences, you can greatly increase the realism and visual appeal of your sprites by letting them display more than a single color at a time. This is done by "enabling" sprite multicolor mode by turning on the correct bit of the sprite multicolor enable register at 53276.

Bit 0 controls sprite 0. To enable multicolor mode for that sprite, you would POKES 53276, PEEK(53276) OR 1. Bit 7 controls sprite 7. To enable multicolor mode for that sprite, you would POKES 53276, PEEK(53276) OR 128.

If a multicolor mode has been selected for a sprite, the VIC-II looks in the same location to find its shape, but it interprets the shape data differently. In one-color mode, which we discussed last month, the data is arranged like this:

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| | | |
|--------|---------|---------|
| BYTE 0 | BYTE 1 | BYTE 2 |
| BYTE 3 | BYTE 4 | BYTE 5 |
| BYTE 6 | BYTE 7 | ... |
| ... | BYTE 61 | BYTE 62 |

Within each byte, each bit controls one dot on the screen. If the bit is a 1, that dot on the screen displays the sprite's color. If the bit is a 0, then the sprite is "transparent" for that dot, and the regular screen display shows through.

Multicolor mode doesn't see each bit individually. Instead, the VIC-II sees the bits in pairs, four bit-pairs per byte. Each byte, then, looks like this:

00 00 00 00

Each bit-pair, instead of controlling a single dot, controls two dots. Both dots on the screen, side by side, will display the *same* color, whichever color was called for by the bit-pair.

The bit-pair 00 causes the dot-pair to be transparent. The bit-pair 01 causes color 1 to be displayed. The bit-pair 10 causes color 2 to be displayed. The bit-pair 11 causes color 3 to be displayed.

Color 2, displayed by "10" bit-pairs, is individually selected for each sprite. The sprite color registers at 53287-53294 allow you to select any of the 16 possible colors (from 0 to 15) for each sprite.

Color 1, displayed by "01" bit-pairs, is the same for all sprites; that color is set at location 53285. Likewise, color 2, displayed by "02" bit-pairs, is controlled for all sprites at location 53286.

Thus, if all eight sprites were in multicolor mode, and all eight sprites were displaying the same shape, all the 01 bit-pairs in every sprite would display the same color; all the 11 bit-pairs would display the same color; but all the 10 bit-pairs might have different colors. If you plan to have sprites that share the same shape, and you want the player to be able to tell them apart, make sure that the color you want to change from sprite to sprite is represented by 10 bit-pairs.

The dragon in this program is primarily composed of 10 bit-pairs, and sprite 0 is set to green. If another dragon were on the screen, its individual color could be set to blue, and the two dragons would be clearly and obviously different. In a two-player game, this difference in color would let the two players tell their dragons apart. However, if the 10 bit-pairs had been used for the dragon's flame, then the only visible difference between the dragons would come when the dragons were moving and flame was coming out of their mouths; when they were still, with no flame, they would be exactly alike.

HOW THE PROGRAM WORKS

This program, like last month's example programs, reads the sprite shapes from DATA strings. This is not the fastest way to load sprites. The fastest way is to have the sprite data in numeric form in a special disk file and load it with machine language. In BASIC, the fastest way is to have the sprites as numbers in DATA statements.

But for my purposes in these example programs, it's a lot more helpful to give you sprite shapes in a form you can easily edit and change. The idea is for you to type in my dragon program, then change the shapes so the sprite displays whatever shape you want. So instead of speed, I've designed the program for easy editing.

For multicolor sprite shapes, there are twelve bit-pairs in each row of the sprite shape. Therefore, each DATA string consists of twelve characters. Wherever you want the sprite to be transparent, put a period (.) in the string. (Actually, any character except "1" or "2" or "3" would work in the program, but I use the period because it is unobtrusive—but easier to count than blanks.)

Wherever you want color 1 to display, type a 1; for color 2 (10 bit-pairs, remember, the ones individually selectable for each sprite), type a 2. For color 3, type a 3.

The routine at 1000-1010 reads all the strings, converts them into numeric bytes, and POKES them into memory. There are 21 possible rows in every sprite shape; for the dragon, however, I only used 12 rows. Therefore in line 1000 I set the variable TS to 11 (that is, 12 minus 1). If you want more or fewer rows, make sure you adjust line 1000 accordingly. Likewise, if you want more shapes in your animation sequences, set the variable AS to the number of shapes in your sequence *minus 1*. *Dragon* uses two animation sequences, one for left movement and one

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for right. To have more sequences, change the variable NS in line 1000 to the number of sequences *minus 1*.

The variable MS(*n,n*) is used to hold the possible values for each bit-pair. The values for each bit-pair position are as follows:

| BIT-PAIR | POSITION IN BYTE | | | |
|----------|------------------|----|----|---|
| | (DECIMAL VALUES) | | | |
| 00 | 0 | 0 | 0 | 0 |
| 01 | 64 | 16 | 4 | 1 |
| 10 | 128 | 32 | 8 | 2 |
| 11 | 192 | 48 | 12 | 3 |

If you want the leftmost bit-pair in a byte to display color 2 (10), you would OR that byte with 128. If you want the bit-pair second from the right to display color 3 (11), you would OR the byte with 12.

The Variables. To help you keep track of what is going on in the program, here's a list of the main variables used in *Dragon*. I deliberately kept it as consistent as possible with last month's programs.

| | |
|------------------|---|
| VB | Address of the video block |
| SB | Address of the screen memory |
| BB | The screen memory page number (used by BASIC) |
| LT(0-7) | The address of each sprite's shape location register, located starting at byte 1016 after the start of screen memory. |
| CT(0-7) | The address of each sprite's color register. |
| HT(0-7) | The address of each sprite's horizontal position register. |
| VT(0-7) | The address of each sprite's vertical position register. |
| HR | The address of the flag-bit register for horizontal movement across the "International Date Line." |
| ES | The address of the sprite enable register. |
| VE | The address of the vertical expansion register. |
| HE | The address of the horizontal expansion register. |
| PR | The address of the priority register. |
| EM | The address of the multicolor enable register. |
| MR | The address of the first multicolor color-selection register. |
| CS | The address of the sprite/sprite collision register. |
| CF | The address of the sprite/foreground collision register. |
| BS(0-7) | The bit-set values for each sprite. |
| BC(0-7) | The bit-clear values for each sprite. |
| MS(0-3,0-3) | The bit-pair values for multicolor byte selection. The first index determines which bit-pair is called for (numbered from <i>right to left</i>), and the second index determines which color is being called for. |
| ST(<i>n,n</i>) | The codes for the location of each sprite shape block; these numbers are POKEd into the sprite 0 location register LT(0). The first index determines which animation sequence is being used, left or right; the second index determines which step in the four-shape sequence is to be displayed. |
| NS | The number of sprite animation sequences, minus 1. |
| AS | The number of shapes per animation sequence, minus 1. |
| TS | The number of three-byte (12 bit-pair) lines per sprite shape. |
| VV(<i>n</i>) | The vertical position array; these values are POKEd into the vertical position registers at VT(<i>n</i>). |
| HH(<i>n</i>) | The horizontal position array; these values are POKEd into the horizontal position registers at HT(<i>n</i>). |
| HB(<i>n</i>) | The horizontal flag-bit array; these values are POKEd into the flag-bit register at HR. |

| | |
|----|---|
| VZ | The lowest vertical position allowable on the screen, minus 1. |
| HZ | The rightmost horizontal position allowable on the screen, minus 1. |
| VP | The current vertical position (a number from 0 to VZ). |
| HP | The current horizontal position (a number from 0 to HZ). |
| AN | The current step in the animation sequence. |
| XP | The direction the dragon is currently facing. |
| Q | A flag. If it is 1, it means the dragon has been moved since it was last at rest; if it is 0, it means the dragon is at rest and has not been moved. It is used to determine whether the dragon needs to be set back to "resting" position—with no flame showing. |

Starting and Stopping. The program relocates video memory and disables the RUN-STOP/RESTORE, and SHIFT/COMMODORE interrupts. If an error interrupts the program, you will probably have to turn off the machine and reload the program. So *please* SAVE the program *before* you RUN it, since the slightest typo can crash the program and make it very hard to recover it.

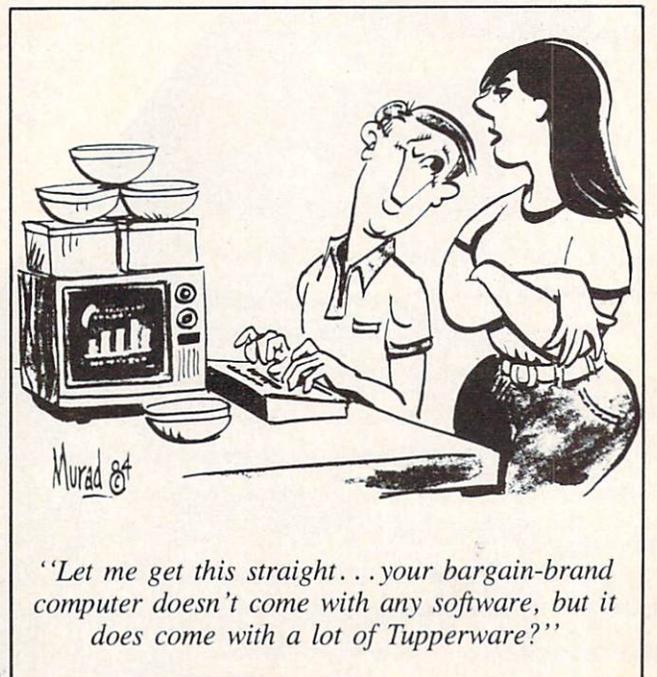
To stop the program once it is running, press SHIFT/COMMODORE/CTRL. This restores all the video pointers and reenables the interrupts.

To move the dragon to the left, press COMMODORE. To move the dragon to the right, press SHIFT.

NEXT MONTH

Next month we'll conclude this series on sprites with a program that creates a spaceship that can move in eight different directions, along with a few celestial objects. The BASIC version of the program will be quite slow, unfortunately; if I'm feeling particularly ambitious I'll create a machine language interrupt routine to read the keyboard and move the spaceship, in addition to the BASIC movement method. □

SEE PROGRAM LISTING ON PAGE 120



"Let me get this straight... your bargain-brand computer doesn't come with any software, but it does come with a lot of Tupperware?"

MYSTERY AT MYCROFT MEWS



Scandal has rocked the small village of Mycroft Mews: a prominent citizen has been callously murdered for reasons unknown. Your job as a detective is to ensure that justice triumphs. It won't be

easy. The bank president won't talk. The hotel clerk's alibi is clearly bogus. The vicar's fingerprints are on the elephant gun you found at the Pawnshop. Any of these shifty characters could be the killer!

Mystery at Mycroft Mews is a game for the Commodore 64 that requires all the logic and cunning you can muster. Competing against you will be as many as five other detectives; you'll have to outfox them to solve the mystery first. There are nearly 5000 possible solutions, but the single correct answer is chosen anew each time the program runs. To crack the case, you must correctly deduce this unique answer before the other players do.

To play, type in the program from the listing on page 127 exactly as it is shown. It is especially important that you do not alter the DATA statements which appear from line 30000 onward. If you wish to use a joystick, you may insert it into either port. The game accommodates from one to six players, who can compete as individu-

als or as teams of equal size. You may want to supply pencils and paper for each player to use in taking notes.

MOVING THROUGH TOWN

As each player begins his or her turn, all other players should

position themselves so they cannot see the screen. After all, one goal of the game is to acquire information that other players do not have. To help preserve secrecy, you will have to type in a password at the start of your turn whenever two or more players are competing. This password can be any two characters from the keyboard...letters, numerals, or even special keystrokes such as the function keys. Only after you type your code will you be allowed to continue with your turn. This prevents other players from illegally using your turn to gather information for themselves.

After you type in your code, you may travel to any of the 16 buildings in *Mycroft Mews*. A sprite "detective" will appear on the screen; he moves from building to building on the map under joystick control. If you wish to play without a joystick, use function keys f1, f3, f5, and f7 to move, respectively, North (up), West (left), East (right), and South (down). To enter a building, position

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the detective immediately to the right of the door and press the joystick button or RETURN key. Of course, if you start your turn in a building, you may remain there for as long as you wish, merely by pressing the button instead of moving.

One of the buildings—the home of the victim—has been locked by the police at the start of the game. It can be entered only by a player who carries the Master Key, which is originally located at the Police Station. The map of the village changes every time the game is run, so finding the Police Station is a challenge in itself. Be sure to note the nature of every building you enter!

After you enter a building, the computer will describe your surroundings. It tells you what building you occupy; notes what object you carry; lists all suspects, weapons, and useful items in view; and names any other players that are present.

TURN OPTIONS

Following this description, you may press the joystick button or RETURN key for a list of options for your turn. The menu of options will vary, depending on your location and the items immediately available. To choose from any menu, use the joystick or function keys to position the highlighted bar at your choice, and press the joystick button or the RETURN key.

The SEARCH option is available every turn. Choose it if you believe an object may be hidden in the building you occupy. Initially, all 12 of the possible murder weapons are hidden in one building or another. Each time a player searches a given area, there is a 60% chance of finding each item hidden there. For this reason, a location may have to be searched repeatedly before all the objects hidden there have been found. The Magnifying Lens, initially located at the Police Station, allows the player carrying it to search with 100% effectiveness. A successful search gives you the choice of taking the object that you have found.

Choose the TAKE option to pick up a weapon or useful item in the area you occupy. Since you may carry only one item at any time, you will drop any object that you carry when you take another. If you select this option, you may even take objects that other players possess. The DROP option allows you to get rid of an object that you no longer wish to carry. If you so choose, you may even hide the object that you drop, so that other players will have difficulty tracking down specific clues.

Certain options are limited to specific locations. Only at the Morgue can you choose to READ THE CORONER'S REPORT, which will reveal the gender of the murder victim and provide a hint about the weapon used. At the Police Station, you may FINGERPRINT an item to determine its owner, or you may ACCUSE a suspect in hopes of winning the game. At the Bank, Law Office, and Mental Health Clinic, EXAMINE THE RECORDS about a suspect to discover useful facts about the motive behind the crime.

Hidden somewhere in the victim's house is a vital piece

of evidence: a will, diary, or ledger. Find it. READ it. You will learn the motive behind the slaying and obtain a list of suspects that includes the murderer. Try to hide this clue where the other detectives won't find it.

GRILLING SUSPECTS

At the heart of the game are the suspects: the dozen leading citizens of Mycroft Mews. You will encounter only eleven of them in the course of the game, for the twelfth was the victim. One of the survivors is the killer. Although each suspect has a particular building as his or her "home base," they move about from turn to turn, so you can encounter anyone in any location except the victim's house. A suspect will return to his home building, however, on the turn after you arrive there.

If you are in a location with one or more suspects, you may choose the INTERROGATE option. If several suspects are present, you will be asked to choose one to question. You may ask three questions of your informant by moving the highlighted bar to the subject you want to know more about. Press the joystick button or RETURN key to ask about the item or suspect currently highlighted. If you move to the bottom line of the menu and press the joystick button or RETURN key, you will be presented with a new menu of topics for your inquiries; changing menus in this manner is not counted as one of your three questions.

Interrogating will help you enormously by revealing alibis, motives, and interests of the suspects. Remember, though, that the character you are questioning answers on the basis of rumor and hearsay, and his answers are not always reliable. Often, too, suspects are too busy to gossip with a nosy detective...although they will not refuse to answer if you possess the Police Badge, which lends an air of authority to your investigations. Like the other two useful items, the badge is originally found at the Police Station.

Most important, the murderer himself is free to lie. He will always deny ownership of the murder weapon, even though his fingerprints are on it! For this reason, it is vital that you jot down not only the testimony that you gather, but also the source who disclosed it.

WINNING THE GAME

When you are certain that you have all the pertinent facts at hand, go to the Police Station and choose the ACCUSE option. You will need to identify the victim, the murderer, the weapon used, and the motive behind the crime. If your answer is not correct, you are eliminated from the game. A correct solution wins! If all players have made incorrect guesses, or if the case is solved, the correct answer will be displayed.

Finally, to cut down on trips to the dictionary: an "arquebus" is an antique form of rifle that is greatly prized by gun collectors, and a "herpetologist" specializes in the study of reptiles, and might well have a vial of snake venom on hand. Happy sleuthing! □

SEE PROGRAM LISTING ON PAGE 127

GRAVINAUTS

for the C-64

BY CLEVELAND M. BLAKEMORE

 In the world of Arkion, survival is a tough business. Because the surface of the planet is covered by a deadly acidic ocean, the inhabitants must remain continuously in the air, supported by rocket backpacks. To stay up, they engage in a never-ending war for fuel. The loser is doomed to a very short lifespan.

The Gravinauts, as they are called by the colonies of the Milky Way, battle each other by trying to reach a higher vantage point in the air than their opponents and smashing into them, destabilizing their gyros and causing their backpacks to explode.

Because the fuel tanks stored higher up in the atmosphere are more closely guarded, they are entrusted with greater fuel supplies. They are therefore more important than the ones resting on the lower "ice glaciers," which are huge bodies of frozen chemicals floating in the air above the ocean.

The purpose of the game is to take fuel off the glaciers,

destroy your opponents for points, and advance to the next level. The game gets increasingly more difficult at each level, as the speed of the game increases, and at the highest level your visibility is affected when a fog bank of chemicals sets in, obscuring your view of the glaciers.

You must conserve fuel, using rebounds off objects as much as possible, and try to knock out your enemies with as little effort as is necessary. If you run out of fuel, your rocket backpack will explode.

The game is played with a joystick in control port 2. The controls are simple. Push the fire button with the joystick centered to fire a straight thrust of exhaust, push the fire button with the joystick to the left to propel yourself left, and with the joystick to the right to go right. These are the only controls!

Gravity is the only thing that will make you sink, so if you fire too much fuel you may begin gyrating out of control, rebounding off glaciers until you can stabilize yourself. Because you are in "Zero G" gravity, there is no loss of kinetic energy when you bounce off something—so you could keep bouncing *ad infinitum* until you slow yourself down with short bursts of fuel.

Each enemy gravinaut is worth 250 points—you may occasionally get a double score of 500 off one opponent. The fuel tanks contain fuel supplies in increments of five from top to bottom, with the tank at the lowest level worth five and the highest worth twenty. If you manage to destroy all three of your opponents, and pick up all the tanks of fuel, the screen color will change and you advance to the next level. Each time you start out on your platform at the bottom, the only safe spot on the sea of acid. Any contact with this solution at the bottom will destroy your player. You can also score points by leading your opponents into the acidic sea, where they will be quickly burned up.

You only have one man per game. If he blows up, push fl to start a new game at level one.

There are situations where you may have to hit an object solidly for it to be affected. Sometimes you can take a glancing blow on the surface of the acid sea or from one of your opponents without being killed.

High score since the game was started is displayed in light blue in the upper right corner. My highest so far is 7550, which you will have to beat by passing through several of the upper level "invisible" screens, where the screen is the same color as the glaciers and they cannot be seen.

The game is typed in as a hex listing. Be sure to use *Flankspeed* (see page 118) when typing it in so that you can be assured of an error free program. □

SEE PROGRAM LISTING ON PAGE 143

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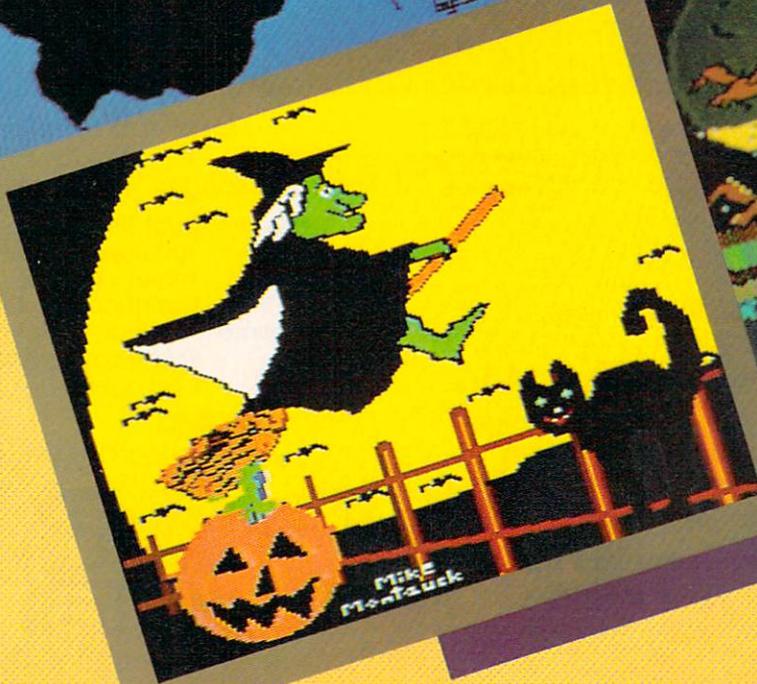
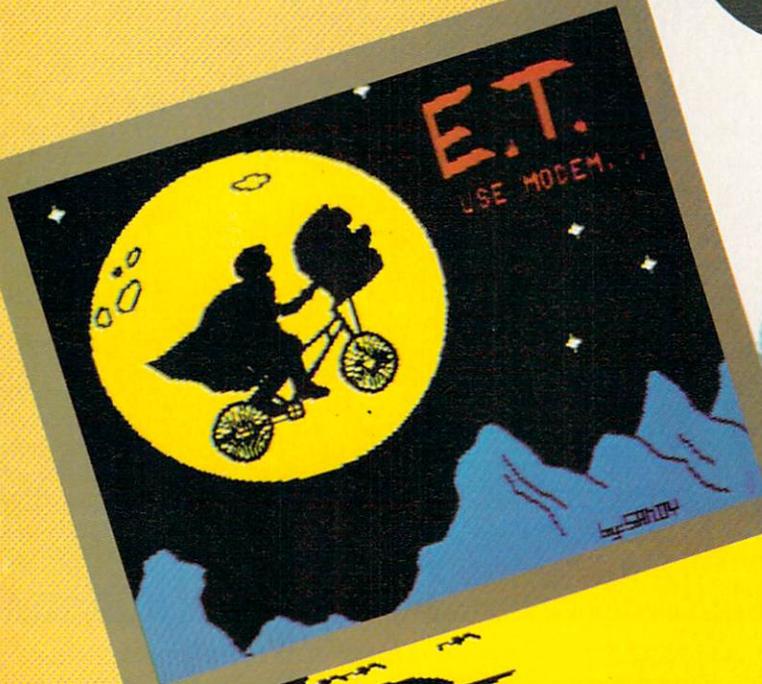
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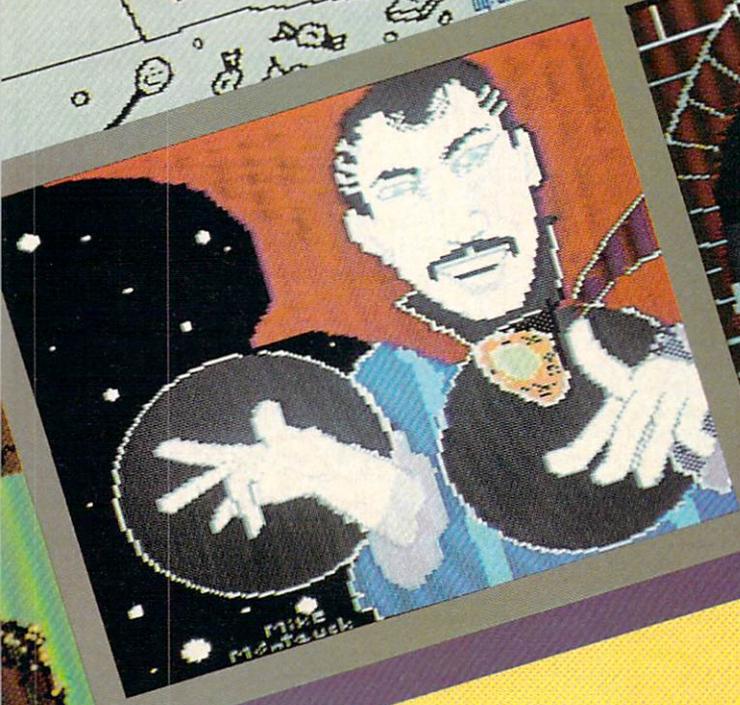
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Thanks to the tremendous response to *Ahoy!*'s *Art Gallery*, we're able to present collections of computer-generated art with seasonal themes, like the Halloween spread seen here. Why not help to keep our inventory fat and healthy, while earning (if your pictures are published) royalties based on the sale of our *Art Gallery* disks? Send your best work on disk, accompanied by a stamped and self-addressed mailer, to Morton Kevelson, P.O. Box 260, Homestead 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.

Top row, left to right: *E.T.* by Sandra Steele (Rockford, IL), drawn on *DOODLE!*; *Our Cat*, a *Koala* rendering by Mark Richey (Boulder City, NV); *Trick or Treat*, another *DOODLE!* from Sandra Steele; and *Wizard* by David Moroz-Henry (Downington, PA). This last was done completely using programmable characters—no mean feat. The dragon inside the crystal ball is actually composed of four sprites. When the program is run, the wizard appears first. A few seconds later the dragon appears inside the crystal ball. Bottom row, left to right (all drawn on *Koala*): *Witch* by Michael Montauk (Brooklyn, NY); *Nightfall* by Don Cadle (Riverside, CA); *Dr. Strange* by Michael Montauk; and *Skull* by Mark Richey.

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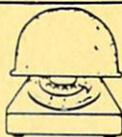
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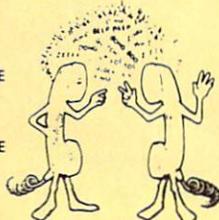
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SOLITAIRE 64

By Eric W. Sink

Almost everyone has lost at solitaire. This computer version is your chance to get even. Sure, you'll still lose, but when you get really frustrated, you can just turn the computer off.

I'm not going to go into the rules of the standard game. If you don't know how to play solitaire, someone around you certainly does.

Type the game in and save it immediately. Then run it. A title screen will appear and disappear, followed shortly by the game selection screen. *Solitaire* will ask you if you wish to play Las Vegas style or regular. For now, choose regular by responding with a joystick in port 2. I'll explain Las Vegas style later.

A graphic display of your "table" will appear, complete with your beginning cards. All the blue numbers above the seven piles indicate the number of cards that are still hidden from your view. The blue numbers above the two stacks of the deck at the bottom indicate how many cards are in each stack.

Notice the blue arrow in the middle of the screen. This is your pointer. All facets of gameplay are controlled by moving this pointer with your joystick. To move a card from anywhere to anywhere else (assuming it's a legal move!), move the pointer, with the joystick, to the card you wish to move. Press the fire button to pick the card up. The card to be moved will turn blue. Now move the pointer to the card's destination. Press the button again to drop the card and the move will be executed. If the move is illegal, the computer will buzz at you and give you a chance to try again. If you make a mistake and pick up the wrong card, simply drop it right back where it came from.

To move more than one card at a time, pick up the first card in the group you wish to move. For example, if you wished to move a King and all the cards on top of it to a blank pile, simply pick up the King, and the computer will assume you wish to pick up all the cards on top of it. You may move only one card at a time up to the aces.

Very soon, this process of moving your pointer around will become second nature to you. When it does, here are a couple of shortcuts you will probably have figured out on your own. First, to drop a card on the aces at the top of the screen, simply move the pointer anywhere above the blue numbers and drop it. The computer will put the card where it belongs, since it can have only one destination. Second, when dropping cards to a pile, vertical positioning doesn't matter as long as you are below the blue numbers (at top) and above the top of the deck (at bottom). To turn up the next three cards, move the

pointer to the deck and press the button. When you get to the bottom of the deck, the words "Turn deck over" will appear in place of it. Press the fire button on these words to do just that. Press the fire button on the word "Concede" at the bottom right to quit a game.

The computer is the judge in this game. It will not allow you to cheat. It will play out the rest of the game if it sees that you cannot lose. It will never tell you that you have lost. You get to keep trying until you concede.

Now a word about Las Vegas style. In this variation, you buy the deck for \$50. You turn up one card at a time instead of three, but you may only go through the deck once. You get \$5 for each card that is in the aces section at the top. At the end, the computer will tell you how much you won or lost. Everything else is the same as the regular version.

I hope you enjoy playing the game, and may the luck of the cards be with you! □

SEE PROGRAM LISTING ON PAGE 123



YOUR MISSION: TO EXPLORE NEW WORLDS

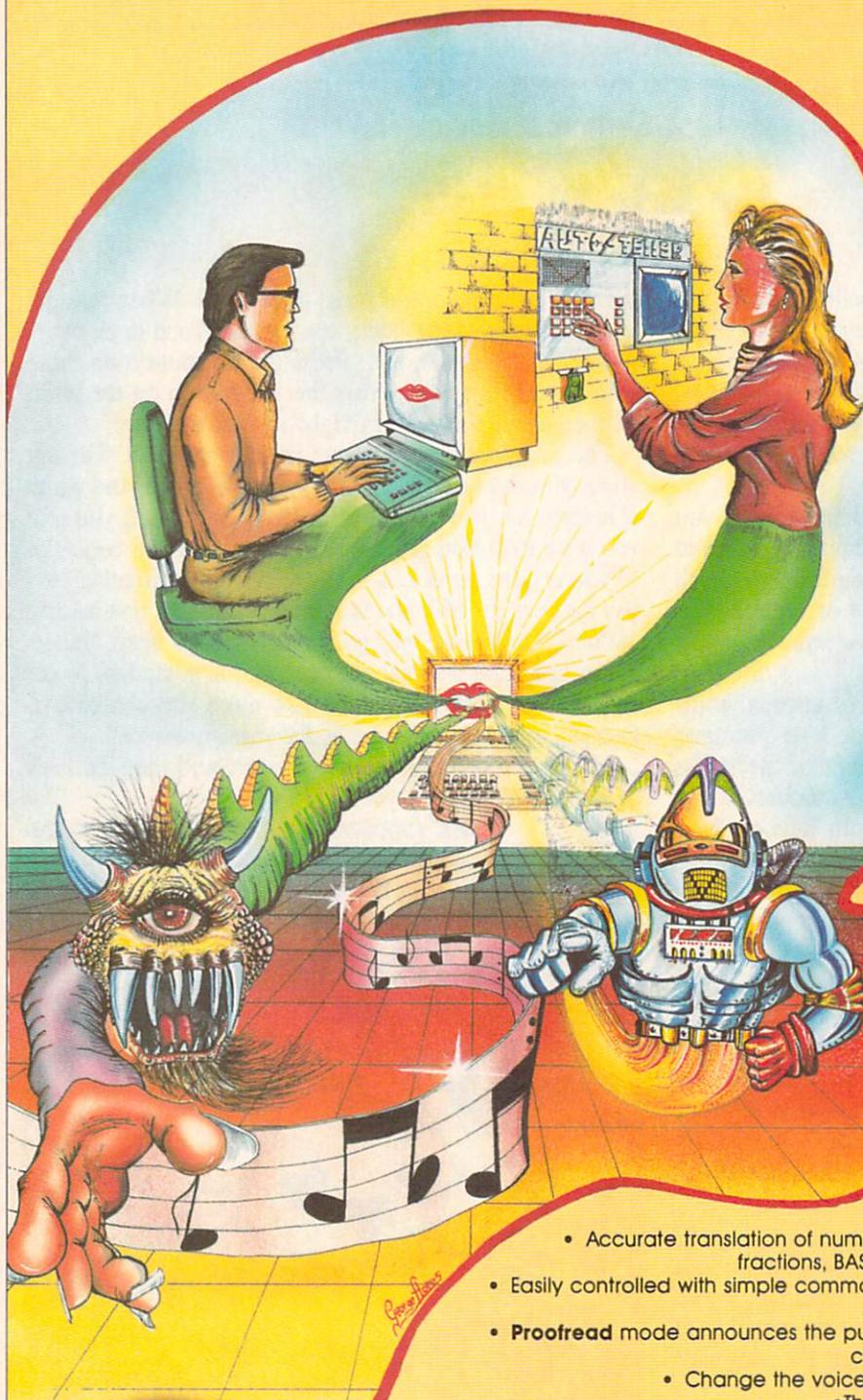
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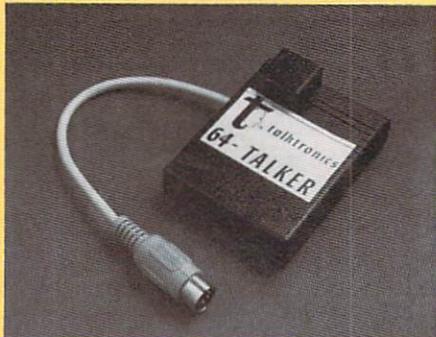
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MAESTRO

An Advanced Music Editor for the C-64

By William T. Eveleth

This extremely versatile music editor makes playing music on the Commodore 64 as easy as Do-Re-Mi. If you think word processors make writing easy, wait till you try your hand at *Maestro*. You can create original music for up to three independently controlled voices with no more trouble than typing a letter. And that's not all. *Maestro* lets you make changes as you go. Change a wrong note. Change the rhythm—or, if you like, change the tempo. Type in your favorite song from the sheet music. Or, create your own melodies. You be the composer—with an electronic orchestra at your fingertips! And once you've completed your masterpiece, you can save it on disk for a future premiere concert.

Maestro is organized into 10 operating modes as follows:

MODE 0: MUSICAL KEYBOARD

In this mode your keyboard becomes the musical instrument of your choice. Every key produces a sound (except RESTORE, SPACE, CONTROL, and the COMMODORE key). The corresponding notes on the piano are shown in the illustration on page 40. The same notes are shown in the staves above each keyboard section. To switch instruments, type SHIFT to return to the menu, select MODE 5, make your choice, and return to MODE 0. (Note: not all 10 instruments can be played from the keyboard in this mode.)

MODE 1: PLAY IT AGAIN!

This mode is similar to MODE 0, but with one major difference: *Maestro* remembers what you played! Type SHIFT after playing a few notes, and *Maestro* will play it back. Exactly the way you played it—the same notes, rhythm, and tempo.

To leave this mode before the playback cycle is completed, press the COMMODORE key.

MODE 2: COMPOSE A TUNE

Use this mode to create an original composition or to enter notes from sheet music. First indicate the number of voices. Think of a voice as one musical instrument. With only one voice, we are limited to the melody. If we wish to add harmony, additional voices are required. Most music is written for several voices, and the SID chip can handle up to three. With a little experimentation, you will find that the more voices, the fuller the music sounds. If you're trying to input notes from sheet music, you will probably find that more than three voices

are needed. For example, five voices would be required to play a five-note chord. However, if three notes are carefully chosen from such a chord, the same effect can usually be achieved.

Once you've indicated how many voices will be needed (and it's always possible to add or delete voices later), you will start to input the notes to be played by each voice. Using Figure 1 or 2 as a guide, type the notes in the correct order. Be sure to include rests (pauses) by typing SPACES. If you forget a rest, the rhythm will probably be incorrect.

After you have input a series of notes, type SHIFT, and you will be prompted for the corresponding rhythm for each note. For each note, you must indicate the note's duration.

The letters of the alphabet are used to represent rhythms. The letter "A" represents the smallest unit of time in a piece of music, usually a sixteenth note. The letter "B" makes a note play twice as long as "A", "C" three times as long, and so on.

If "A" is used for a series of notes, they will slur, with no distinct separations in between. If this effect is not desired, use "B" for the shortest notes. Two typical rhythm assignments are shown here.

Typical Rhythm Assignments

| RHYTHM | OPTION 1 | OPTION 2 |
|----------------|----------|----------|
| Sixteenth | A | B |
| Eighth | B | D |
| Dotted Eighth | C | F |
| Quarter | D | H |
| Dotted Quarter | F | L |
| Half | H | P |
| Dotted Half | L | X |
| Whole | P | ... |

If you accidentally type a wrong note or rhythm, simply press CURSOR LEFT while holding down the COMMODORE key. The note or rhythm will be cancelled, and you can then input the correct one. The CURSOR LEFT key cannot be used to correct notes after you have typed SHIFT and are prompted to input the rhythms. Furthermore, the CURSOR LEFT key cannot be used to correct the last rhythm entered. Once the last rhythm is typed, *Maestro* immediately begins to compile the music. But have no fear. From that point on, corrections can be made using the Music Editor (MODE 4).

The image displays four keyboard diagrams arranged in a 2x2 grid, each with musical notation above it. The top-left diagram shows keys 7, 9, +, CLR (♥), HM, (S) F1, INST (♠), and DEL. The top-right diagram shows keys RUN STP (π), S, F, J, L, (=) F5, and W, with sub-keys F7, A, D, G, H, K, :, ;, RTN, Q, and E. The bottom-left diagram shows keys T, U, P, #, (/) F3, 2, and 4, with sub-keys R, Y, I, O, @, ↑, ←, 1, 3, and 5. The bottom-right diagram shows keys X, V, N, ., and a key with a down arrow and CSR, with sub-keys Z, C, B, M, , /, and another key with a right arrow and CSR.

Piano equivalents of notes played by C-64 keys under Maestro control (also shown on staves above each keyboard section).

(Note: when MODE 2 is selected, any notes and rhythms previously entered will be erased unless you *immediately* exit the mode by typing SHIFT when prompted for the desired number of voices.)

MODE 3: LOOK AT MUSIC

This mode permits you to examine the notes and corresponding rhythms of any voice. Type SHIFT to return to the menu.

MODE 4: MUSIC EDITOR

The Music Editor permits four operations:

1. Add additional notes to any voice.
2. Change the notes and/or rhythm of an existing voice by retyping (from the beginning) the correct notes and/or rhythms.
3. Eliminate a voice.
4. Add an additional voice to a piece of music presently consisting of fewer than three voices.

For example, if you have composed a single-voice melody (using MODE 2) and wish to add a second voice for harmony, use the Music Editor to EDIT Voice 2. The Editor will allow you to input notes and rhythms for that new voice. Similarly, to eliminate an undesired voice, EDIT the voice: type "B" to edit from the beginning, and type SHIFT when prompted to enter notes and rhythms. Naturally, to eliminate all voices, it is easiest to start from scratch by using MODE 2.

MODE 5: SELECT INSTRUMENT

Select the desired instrument for each voice by typing

a number key. 10 instrument sounds are available. For greater musical color, try using a different instrument for each voice.

MODE 6: LISTEN TO MUSIC

In this mode, select the desired tempo (0 being the fastest), and indicate which voice you wish to hear. In this way it is possible to listen to each voice separately. To hear all voices simultaneously, type "4".

To stop music that is being played, simply type SHIFT.

MODE 7: SAVE MUSIC ON DISK

Reserve a spare formatted disk for saving music. Use this mode to name and save music on that disk.

MODE 8: GET MUSIC FROM DISK

Load music you have saved on disks. Other sequential files may be confused with music files, so do not attempt to load them.

MODE 9: LOOK AT DISK INDEX

Examine the titles of music you have saved on disk.

MAESTRO SUMMARY

| | |
|---------------|---------------------------------|
| SHIFT | Return to menu |
| | Start playback (PLAY IT AGAIN!) |
| | Stop playback |
| | Ready to input rhythms |
| COMMODORE KEY | Stop playback (PLAY IT AGAIN!) |

WHAT IS THIS GIRL DOING?

THE GIRL IS-
 TH AX PAS GG3 ER2 LL PAS IH SS
 29 15 04 34 52 45 04 12 55
 FEEDING
 PAS FF IY PA3 002 IH NG PAS BB1
 04 40 19 02 33 12 44 04 28
 BREAD TO-
 RR1 EH EH PA1 001 PAS TT2 UW2
 14 07 07 00 21 04 13 31
 A DUCK
 PAS EY PAS 002 AA KK2 PAS
 04 20 04 33 24 41 04



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COMMODORE KEY/

CSR RT

SPACE

INSTRUMENTS:

- 0 Accordion
- 1 Organ
- 2 Clarinet
- 3 Synthesizer
- 4 Kazoo

Erase note or rhythm
Rest (silence)

- 5 Drum
- 6 Guitar
- 7 Xylophone
- 8 Banjo
- 9 Piano

HELPFUL HINTS

When inputting notes, keep in mind that *no SHIFTed characters are used to represent notes* (for obvious reasons!).

After using MODE 4 to add a voice, be sure to assign it an instrument using MODE 5.

Do not use rhythm "A" when the same note is to be sounded twice in a row.

If no sound is heard when playing notes in MODE 0, 1, or 2, try changing instruments.

EXAMPLE MUSIC

From the menu, select MODE 2 (COMPOSE A TUNE). Then type 2 to indicate that two voices will be used, and input the following notes:

oI↑I←I←315*5↑I↑I←I←31↑o○515↑1I@↑363←3@←Y@I@151↑1@3←@→I↑↑@Y←1

(From Figure 1 or 2 we know that 0 = SPACE)

Now type SHIFT, and enter the following rhythms:

BBBBBBBBDDDDBBBBBBBBDDHBBBBBBBBDDDFBBBBB
BBDDDFBBBBDFBBBBDFBBDDH

In a moment, you will be prompted to indicate a tempo for the immediate playback of Voice 1. Type any number and playback will begin. (To halt playback type SHIFT).

Now you are prompted to input the notes and rhythms for Voice 2. As before, type the following:

DQ&Q:QRE:EYRQ&:Q:QRE:EYRQRQYQ;QK;DHGK♣E♣
:♣H:AGDHK;GKAGH:DH#/A♣;♣H

(Here again, ♣ = RTN, & = f5, and # = f7.)

Type SHIFT and input these rhythms:

DHBBBBBBBBDDDDBBBBBBBBDDDDBBBBBBBBDDDFB
BBBBBDDBBBBDDBBBBDDBBBBH

And that's all there is to it. You will be prompted to indicate a tempo for the immediate playback of Voice 2. Select any tempo, then type SHIFT to halt playback and move on.

Now, assign instruments using MODE 5. For this piece you might like 2-Clarinet for Voice 1 and 1-Organ for Voice 2.

Ready? You should see the menu once again. To hear all those notes and rhythms you have just provided, type 6 (LISTEN TO MUSIC), then 4 (both voices at once) and then whatever tempo you prefer (2 is good for this piece). Sit back and enjoy! □

SEE PROGRAM LISTING ON PAGE 134



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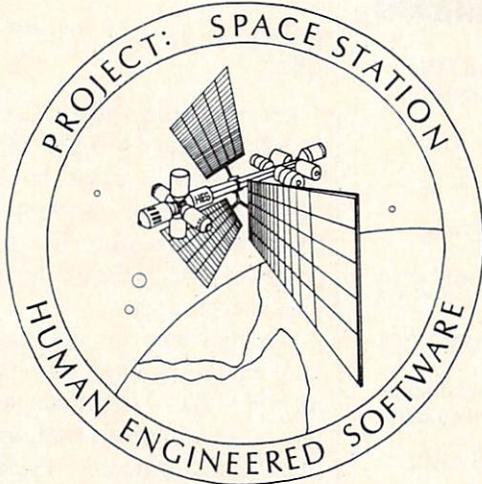
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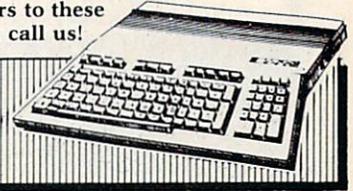
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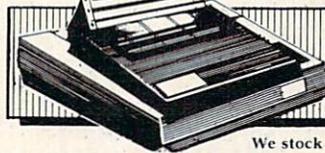
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- C - Print features currently being used
- D - Filename of text
- E - Percentage of RAM (memory) used
- F - Ruler (also message line)
- G - Word wrap/justification flag
- H - 'Block marked' flag
- I - Insert mode flag
- J - Characters per inch
- K - Number of the current font
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FERRATA

Line 685 of *Formatter* (August) was omitted during printing. It should read

```
685 GET D$: IF D$="" THEN
685
```

Users of some newer C-64's will find that *Gators N Snakes* (August) will occasionally cause the screen to flash, then blank out with unusual characters appearing. To correct the problem, turn off the machine and reload the program.

We apologize for any inconvenience caused by these problems. Remember that corrections to *Ahoy!* programs and articles are listed on the *Ahoy!* Bulletin Board (718-383-8909 — modem required) as soon as they are spotted.

SMALL THINGS CONSIDERED

Ahoy! is pleased to congratulate

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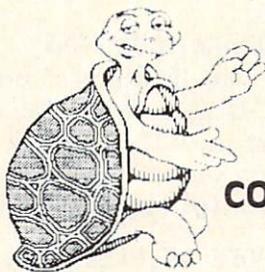
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TIPS AHOY!

We kept our part of the bargain—we came up with the title for *Ahoy!*'s programming tips column. And many of you readers have kept your part of the bargain, by supplying us with useful hints, tips, and programming routines for the Commodore computers—many more than we can fit into the limited space available in this issue. But *Tips Ahoy!* will be expanding in future issues, and we hope to receive input from a great many more of you. We'll pay top industry rates for accepted submissions. Send your best to *Tips Ahoy!*, Ion International Inc., 45 West 34th Street—Suite 407, New York, NY 10001.

LIFESAVERS TO SCOTCH TAPE TO YOUR COMMODORE

Many readers have called up or written regarding problems entering the BUG REPELLENT program. The most typical error is an:

?ILLEGAL QUANTITY ERROR
IN 5000

Until now there was no way to know where the bad data statement was, but with one simple command typed in immediate mode you can tell what line number the bad data element is in. Simply use the following line:

PRINT PEEK(63) + PEEK(64)*
256 [RETURN]

The computer will return the line containing the error.

If you have ever inadvertently typed NEW, the following line will restore your program:

POKE2050,1:SYS42291:POKE45
,PEEK(34):POKE46,PEEK(35):
CLR [RETURN]

Your program will be restored back into memory.

—H. Roth
Los Angeles, CA

HIDING YOUR PROGRAMS

If you wish to make a program "unlistable" enter the following line into your program:

1 REM (SHIFT L)

When someone types LIST the computer will show

1 REM

? SYNTAX ERROR

If people wise up to this trick, you may wish to be a bit more devious. Put the REM statement with the (SHIFT L) in the same line as an important statement, such as

100 V=53248:REM [SHIFT L]

If this line is deleted in order to view the program, the variable will not be defined and the program will not run.

To make your program unstoppable once running, use POKE 788,52. This will disable the RUN/STOP key.

—Craig Buchaman
Huntsville, AL

AUTO RUNNER

Instead of having to LOAD and RUN a program in separate steps, typing

LOAD"(FILENAME)",8,1(SHIFT
) (RUN/STOP)

will LOAD and RUN a program automatically.

—Barry Allyn
Arlington, VA

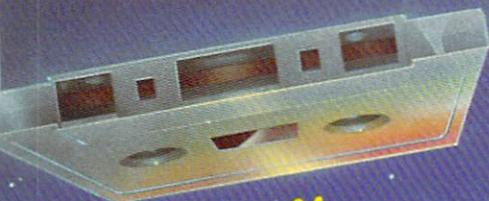
UNDIM YOUR DIMS

One limitation of BASIC on the C-64 is the inability to redimension an array. The following line will allow you to undimension an array so that you may redimension it.

POKE 49,PEEK (47):POKE 50,
PEEK (48)

—Jerry Jarvis
Spokane, WA

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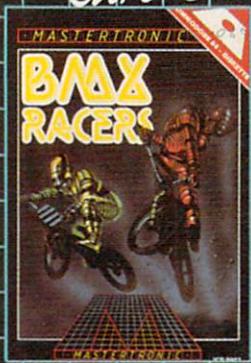
Sure Chart Winners



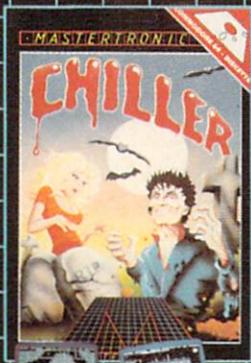
One of the most faithful computer simulations ever produced of a fruit machine. It incorporates the hold, nudge, gamble and shuffle features found in the real thing.



A satellite retrieval game that includes 16 levels of "low pressure" death awaiting the unskilled astronaut.



A sure chart winner. You will need skill and fast reflexes to beat this one! You can take on 5 different courses, each course ranges from 8 to 25 different scrolling screens.



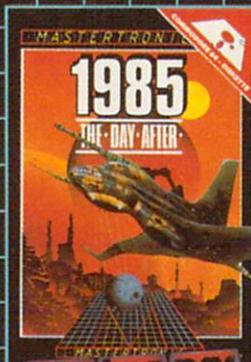
Opehed to Five Star Reviews in Europe recently this is surely one of the most challenging and unusual games available for the C64. Written by Commodore Programmers of the year Richard and David Darling, the game has five different spectacular screens with hidden twists - if you get this far you have to retrace your steps through another five of increasing difficulty.



Another unusual arcade + strategy game in which the players strive by weird and wonderful techniques to achieve a state of miniaturisation and hence enter Zycos brain and the game continues in another dimension.



An imaginative three screen multi level arcade adventure that uses very high resolution graphics and will test the abilities of the most experienced games players.



A scrolling multi screen game that takes Commodore graphics to a new state of the art level previously seen only in a handful of other games. Playability is a keyword on this 'five star game'!



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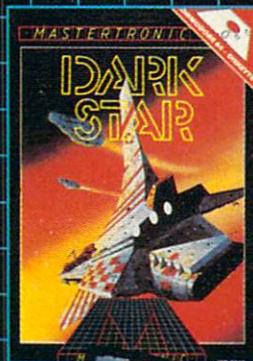
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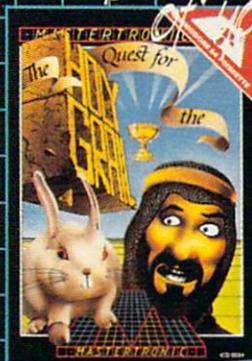
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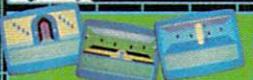
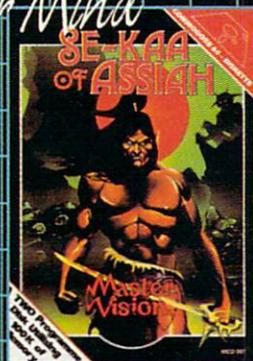
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An amazing two program adventure using over 100K of memory that will challenge the most experienced adventure games players. Myriad locations graphically illustrated with thousands of alternative moves will probe the limits of your mind.

EDUCATIONAL

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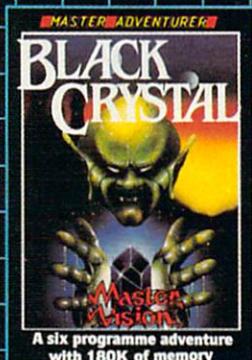
A two program disc aimed at 4-7 year old children that introduces the basics of counting and simple addition and subtraction. At the same time the child is both amused and entertained by the fun aspects of the programs.



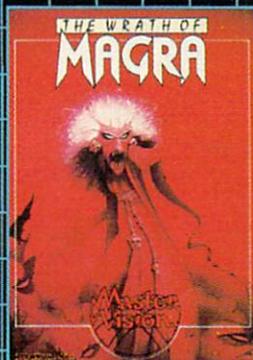
These two testing programs were written by college principal Gordon Askew and help to sharpen observational skills and visual memory. Each of the two programs contains three games and are aimed at 4-7 year olds and then from 7 years upwards. The screen graphics and entertainment value guarantee a child's interest and pleasure.



Star Wars' 1983 style with a very fast moving five screen arcade action game with multi skill levels.



A six programme adventure in the Third Continent magical fantasy series using over 180K memory could absorb and expand your imagination for months.



Truly 'State of Art' programming in this latest Third Continent adventure. Launched to rave reviews in England. This is a 120K adventure in three programs that comes with a beautifully illustrated 150 page descriptive 'book of shadows' set not to be missed by serious games players.



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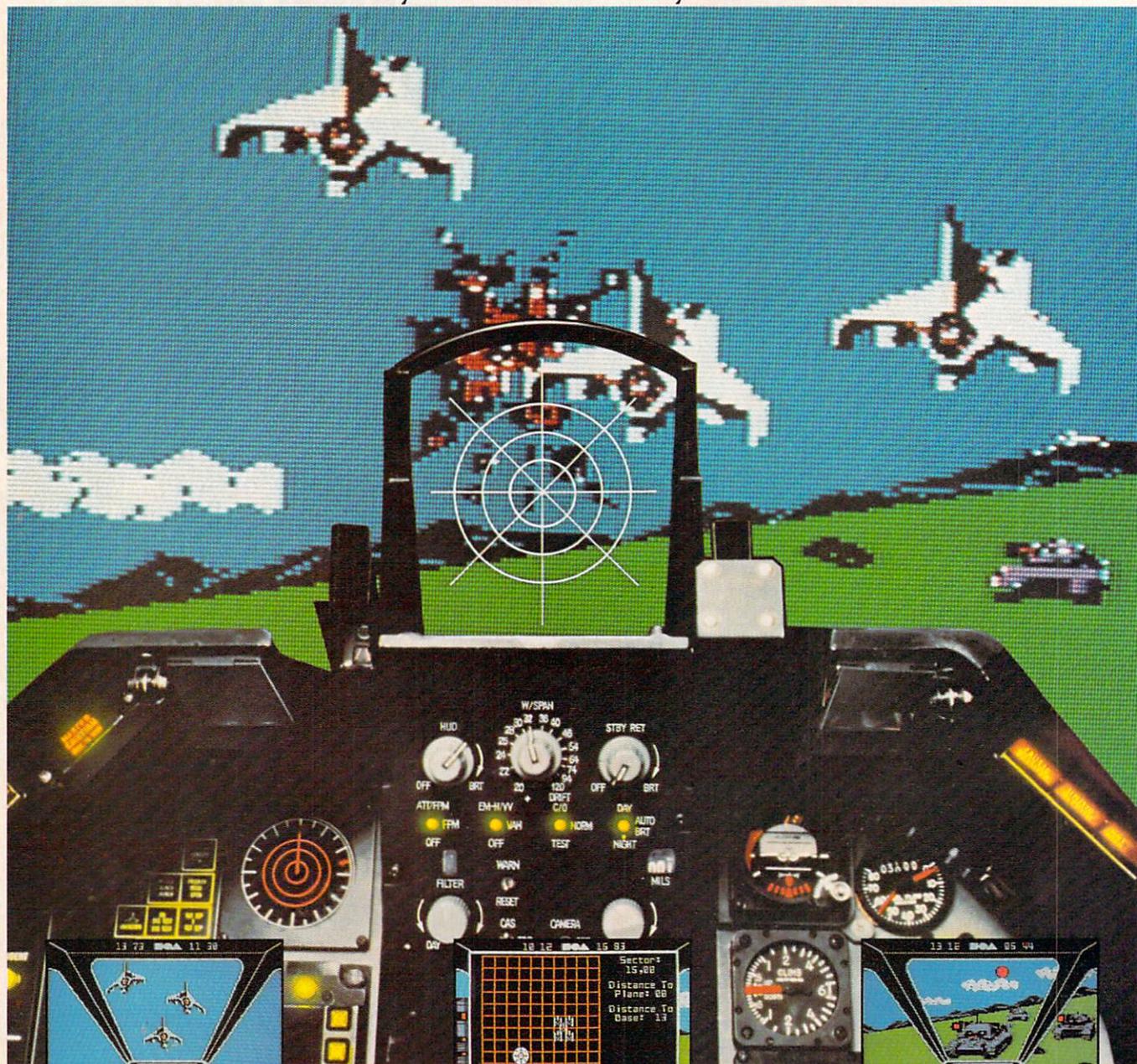
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RUPERT REPORT



TOM CUSHWA

Infinitesimal Intrigue

By Dale Rupert

Computer Explorations of Sub-microscopic Activity

How often do you get the chance to watch molecules in motion, or to monitor short-lived radioactive isotopes? This month you can add those two activities to your list for the skeptic who asks, "What can you do with a personal computer, anyway?"

We will continue exploring ways to simulate the real world with the microcomputer. These investigations may not uncover any revolutionary, fundamental truths (although they may). Our goal is simply to gain some insight into the behavior of objects beyond the realm of our normal senses.

Suppose you could see the molecules of air in a room. Undoubtedly they would be scattered randomly and rather uniformly. Now imagine that as you watch, all the molecules gradually migrate to the left half of the room, leaving a vacuum in the right half.

Is there any reason this couldn't happen? In fact, from a physical standpoint, it certainly *could* happen. Each molecule has a certain velocity. If the velocities of all molecules just happened to be in the same direction at the same time, theoretically all the air could travel to one side of the room.

From a statistical standpoint it's a different story. The

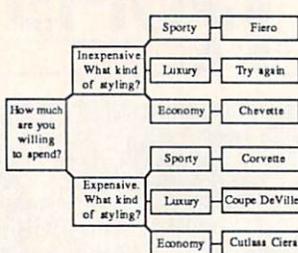
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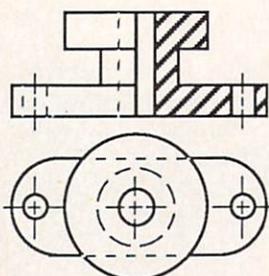
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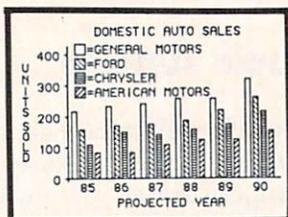
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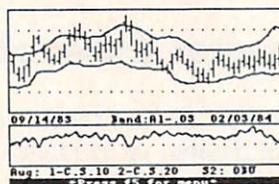
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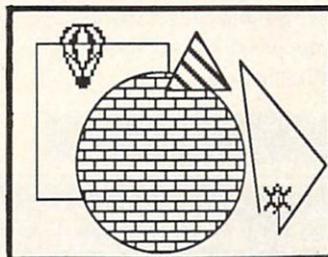
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| |
|-----------------------------------|
| SCR # 20 |
| C P (RANDOM NUMBER TESTER 7RND) |
| 1 P FORTH DEFINITIONS DECIMAL |
| 2 P : 7RND |
| 3 P (INITIALIZE FIRST SCREEN) |
| 4 P 1024 1000 ASCII 0 FILL |
| 5 P BEGIN |
| 6 P 1000 RND (RANDOM 0.999) |
| 7 P 40 /MOD (COLUMN, LINE) |
| 8 P SWAP (EXCHANGE) |
| 9 P 2DUP SE (CHARACTER) |
| 10 P 1+ -ROT (ADD 1) |
| 11 P SI (SAVE) |
| 12 P TERMINAL UNTIL |
| 13 P |

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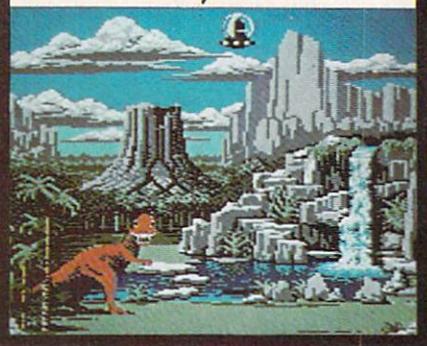
We are a small software company operating in California's San Bernardino Mountains. This is a rural area, so all businesses must have P.O. boxes. Our local post office is very efficient, however, and if your request for SAUCER ATTACK is sent with a money order, the package will be sent out the same day, reaching most states within three days.

SAUCER ATTACK is our first product, and has enjoyed considerable favor with the magazines. (See the reviews in RUN magazine, JAN. '85, and Commodore's POWER PLAY, MAY '85.) To answer the most asked question: YES, the screen photos are real! They were taken from a normal (in fact, well-used) Commodore monitor with an ordinary 35 mm camera. We have had orders for the game from every state in the union, and 21 other countries.

Thanks to the kind public support for SAUCER ATTACK, we will be introducing our second product, hopefully this coming January. 16 months in the making, TIME CRYSTAL will offer even more spectacular graphics than SAUCER ATTACK, as well as the depth of game play offered by adventure games. We hope to push the state-of-the-art ahead a couple of years with this program. The screen photo below is from the Prehistoric Age in TIME CRYSTAL. Watch for our next ad in the Dec. AHoy! for more info on TIME CRYSTAL.

Thanks again for your support and see you in two months.

Jim Sachs



likelihood of all air molecules in a room spontaneously having velocities in the same direction at the same time is negligibly small. The situation (on a smaller scale) is analogous to flipping a million coins and having them all come up tails. Possible? Yes. Probable? Don't bet on it.

TOWARD INCREASING DISORDER

If you watched a movie of thousands of identical molecules moving around in a container, would you be able to tell if the movie was going forward or backward? If the molecules were uniformly distributed and remained so throughout the movie, you certainly could not tell.

(You might prefer a simpler and more familiar example if you find it difficult to picture molecules moving around. Consider the wind-filled box containing Ping-Pong balls that is used for drawing lottery numbers or for choosing bingo values. The balls continuously float around, bouncing off the sides of the container and each other. This is not really an isolated system because of the external fan, but it gives you the idea of the random motion with which we will be dealing.)

Suppose that the molecules gradually began congregating in the left half of the container, until the final scene showed no molecules at all in the right half. Assuming the molecules have no attraction for each other, it doesn't require a course in statistical mechanics to realize that the movie was probably running backward.

We would conclude that the film started with all molecules on the left and that they migrated in all directions until they "filled" the container. The concept that things in the universe tend to become more disorganized or more randomized is perhaps common sense. The physicist says in the Second Law of Thermodynamics that the natural tendency is for the entropy of a system to increase. This is another way of expressing our notion that the amount of disorganization of the molecules in the container should be increasing. If we see the molecules organize themselves in one half of a container, it seems somewhat mysterious, or downright unnatural!

The program *Molecular Motion* on page 120 simulates the random movement of molecules within a container. (The program is only for the Commodore 64.) The table on this page lists the variables and their uses. The molecules all begin on the left side of the screen. A random number is chosen to decide if the next molecule to trade sides comes from the left or from the right side of the screen.

The probability that a molecule moves to the other side of the screen depends upon how many molecules are currently on its side of the screen. If all molecules are on the left, then obviously the next movement must be from the left side to the right side. If the molecules are evenly distributed, the next molecule to move to the other side is just as likely to be on the right side as on the left.

The relative number on the left (RL) is calculated in line 80 from the total number on the left (NL) divided by the total number (TTL) of molecules. Since all molecules start on the left side, this ratio is initially one. Line 90 picks a random number between zero and one. If the

VARIABLES FOR MOLECULAR ACTION

| | |
|--|------------------------------------|
| A\$ keyboard input | MR memory to POKE on right |
| KK direction: 1=normal; 0=reversed | NL number on left |
| K1 start of screen memory | PL POKE character for left |
| K2 width of screen | PN random number |
| K3 blank character | PR POKE character for right |
| K4 molecule character | RL relative number on left |
| L\$ format character | T time counter |
| L1\$ cursor left | TTL total # of molecules |
| ML memory to POKE on left | X screen column (0-39) |
| | Y screen row (0-24) |

random number is less than the relative number on the left side, it is assumed that one of the molecules migrates from the left to the right.

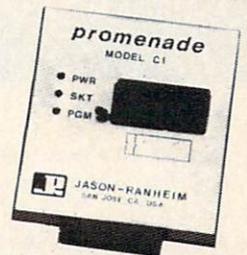
As more molecules move to the right, the relative number on the left decreases. Consequently it becomes less probable that a molecule will move from left to right. For example, when half are on each side, the relative number on the left is one half. If the random number is less than one half, one moves from left to right. It is just as likely in this case that the random number will be greater than one half, meaning that one moves instead from right to left.

After the program has run for awhile, you should notice that the numbers on the left and right sides are nearly equal. They vary some as would be expected. Hopefully

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you agree that it is most unlikely for the original distribution to occur again with all molecules on the left. Chances are equally remote that all of the molecules would ever end up on the right side of the screen at once.

THE ARROW OF TIME

Robert Eisberg describes this problem as a calculator simulation in his book *Applied Mathematical Physics with Programmable Pocket Calculators* (McGraw-Hill, 1976). He refers to "the arrow of time" as the natural direction for the system to progress.

We can easily simulate reversing the arrow of time. That way we will be able to make our "computer movie" run backward. Normally K3 represents the empty space character (ASCII value 32), and K4 represents the molecule (ASCII value 81). If any key is pressed while the program is running, the values of K3 and K4 are swapped in line 270.

Now when the test in line 110 says to move a molecule from left to right, the opposite will occur. A molecule will be put on the left and a blank will be put on the right. Now it is more likely for a molecule to go from right to left whenever there are already more molecules on the left. Let the program run for a while with the arrow of time reversed. All of the molecules regathering on one side of the screen seems unnatural. Pressing an-

other key reswaps the values of K3 and K4 and sets the arrow of time straight again.

The numbers at the top of the screen tell the numbers of molecules on each side and the number of time intervals that have elapsed since the last key was pressed. Time is displayed as a negative value when the arrow of time has been reversed.

This concept of the increasing entropy or disorder of an isolated system relates only to systems containing reasonably large numbers of objects. If there were only two molecules in the container, it wouldn't seem unusual for both of them to be on the same side at one time. It would be impossible to know whether the movie is going forward or backward if it showed just two molecules. With 480 molecules, it should be readily apparent when things are behaving naturally and when they aren't.

RADIOISOTOPE ACTIVITY

Radioactive nuclei decay at random. A nucleus of Uranium 234 (U-234) splits into a Helium nucleus and a nucleus of Thorium 230. U-234 has a half-life of a quarter of a million years. This means that after that amount of time, half of the nuclei in the original sample of U-234 will have decayed.

Just as with the probabilities of coin flipping, you can't predict what any one nucleus will do at any given time. You can only come up with averages for many nuclei or many time intervals. A particular U-234 nucleus might decay today or it might wait several million years before decaying.

Thorium 230 is called a "daughter product" of U-234. Thorium 230 itself is radioactive. It breaks down into other products which eventually decay to become Lead 206 nuclei.

The program *Radioactive Decay* on page 120 simulates the decay of a sample of a radioactive substance. (This program is written for the Commodore 64. The first part of this program also runs on the VIC 20 if lines 240 and 250 are deleted. The Plot Routine works only on the Commodore 64.) The initial substance decays to one radioactive daughter product which itself decays to a stable second daughter product.

Common sense tells us that as the amount of the original substance decreases, the amount of the first daughter product should increase. Furthermore the amount of the stable second product should gradually increase as some of the first product decays. Eventually only the stable nucleus, the second daughter product, remains.

The relative amounts of each substance at any time depend upon the relative half-lives of each substance. If the initial substance decays rapidly and the first daughter product decays much more slowly, we would expect the amount of the first daughter product to increase rapidly. Its concentration should remain fairly high for quite a while as it slowly decays into the second daughter product.

The first time you run *Radioactive Decay*, line 170 calls the subroutine at line 400 to print the quantities of each type of nucleus. You may add an appropriate OPEN statement and change lines 400 and 420 to PRINT# state-

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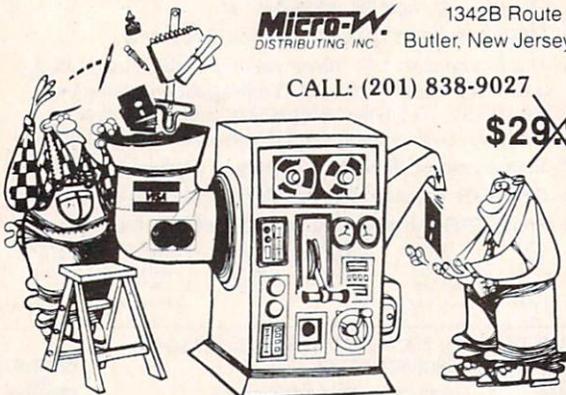
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ments if you want the output to go to your printer instead of to the screen.

If you are using the Commodore 64, you may change line 170 to GOSUB 500. This calls the Plot Routine which creates a graph of the quantities of the three substances as a function of time. Pressing any key after the first screen is completed will continue the graph onto the next screen.

This program is easy to modify. First of all, the decay constants in lines 110 through 130 may be changed. A value of one means that the substance decays instantly. A value of zero means that the substance is stable. The closer the decay constant is to one, the shorter its half-life is. See how changing the decay constants changes the relative numbers of each type of isotope.

For the technically oriented readers, the relations between the decay constant (DC) and the half-life (t) are as follows:

$$DC = 1 - \text{EXP}(-0.693/t)$$
$$t = -0.693/\text{LOG}(1 - DC)$$

The number -0.693 is the natural log of one half.

Initially there are 100 type 0 nuclei. The computer selects a random number for each nucleus. If that number is less than the decay constant for a given nucleus, then that nucleus decays. A type 0 nucleus becomes a type 1 nucleus when it decays. A type 1 nucleus decays into

a type 2 nucleus. Since the type 2 nucleus has a decay constant of zero, it will never decay.

The array NUC() keeps track of each nucleus' type. For example, if the tenth nucleus has decayed twice, it is a type 2 nucleus, and NUC(10) equals two. The array M() keeps track of the total numbers of each type of nucleus. Initially M(0) is 100 while M(1) are each zero, since all 100 nuclei are type 0. When a type 1 nucleus decays, there is one less type 1 and one more type 2. Line 210 does the accounting.

It is not difficult to change the initial number of nuclei or the number of different daughter products. Line 10 defines the total number and line 30 gives the number of daughter products. If you change the number of daughters, you should change the numbers of decay products beginning at line 110. There should be a decay constant for each type of nucleus.

John R. Merrill provides a more technical discussion of radioactivity simulations and many other topics in his extensive book *Using Computers in Physics* (Houghton Mifflin, 1976). You could certainly learn a lot of physics by running the programs in his outstanding book.

As usual, the programs this month are merely a starting place for your investigations. Simulations on your microcomputer provide a window into the workings of the universe. Enjoy your explorations and your discoveries. □

SEE PROGRAM LISTING ON PAGE 120

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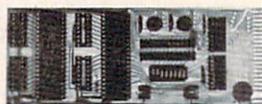
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COPY PROTECTION:

THE GUARDED SECRETS

Including

**Disk Error Checker,
a Utility for the C-64**

By George Trepal

It seems that every other ad in computer magazines is for programs that copy other programs (but not themselves). What's going on? Why should a program be hard to copy, anyway? Shouldn't a simple LOAD then SAVE to another disk make a copy?

Imagine being given the job of designing a book that anyone could read but no one could copy. Making software copyproof is a lot like this. The computer must read the information from the disk in order to run the program, yet the information must somehow be protected from being copied. When the program is in the computer it can alter the computer's SAVE and BREAK instructions and protect itself. When it's on the disk it has no such protection and can be copied a block at a time. Yet there are programs that can't be copied.

To understand what's happening we have to start with the disk drive. It's not simply a box. Inside is a full computer with ROM and RAM and a dull little filing program that runs constantly.

In addition to the computer circuitry is the disk turning motor and a system to move the magnetic head over the disk. The head is responsible for reading or writing information to the disk. The head moves in steps across the disk with each step representing a track. The steps are referenced to solid objects called stops. When you format a disk the drive starts the process with internal banging. Each bang is the head whacking against a stop to make sure it's gone as far as it can. When it is satisfied about its position it starts laying down tracks.

If you're thinking that this is a pretty sloppy way to run things you're right. If the head can't position itself over the tracks it's said to be out of alignment. Since the alignment for each drive is slightly different, a disk that works on one drive may not be readable by another.

If you'll look at a disk you'll see a little round hole near the hub. Some drives have a light beam-photocell combination to look for the hole. When the hole shows up, the computer has a reference point to work from. This is called hard sectoring a disk. Commodore computers use soft sectoring, which means the hole isn't used and the drive has no idea where it is on the disk. It gets around this problem by putting a marker called a sync character at the start of things. Each track is divided into sectors with the outer tracks having more sectors than the inner tracks. The sectors of a track take up equal room, and a space between the last and first sectors is provided as a safety margin. If

the space weren't there and the drive's timing were off, the last sector could overwrite the first sector.

The computer and drive are both dedicated to 100.000% accuracy. A program that takes up 100 blocks on the disk represents about 25,000 bits of program information and 9,000 bits of error detection information. If even one is wrong, the program won't run right!

One way to detect errors is to add the values of all the bytes stored in a sector and store this checksum separately. When the information is read off the sector the addition is done again and compared with the checksum. If the two don't match, the information is read again, since an error has been detected. After a number of tries and failures, an error is declared and the red drive light starts to flash.

Each sector has the disk ID written into it. If the ID doesn't match the ID the computer found when it checked the directory, an error is declared.

Synch characters tell the drive where it is on the disk. If a synch character is missing you'll get an error.

Virtually all copy protection takes advantage of the fact that the drive and computer hate anything abnormal. Normal copy programs won't copy errors because—well, because they're errors and are therefore WRONG!

This is easier to understand if we humanize the machines. The scene: a program has been loaded into the computer and it has started to run.

Computer: Hmm! The first thing the program tells me to do is check to see if this disk is original or a copy. If it's a copy, I won't run the program. Hey! Drive, get me the data in sector one of track one.

Drive: OK, sector one of track one. Coming right up.

Unbeknownst to Drive, the entire track is empty and has been reformatted, thus providing it with an ID different from the rest of the disk.

Drive: Here it is. Better check to see if the ID matches. Oh, oh! it doesn't. My head is probably put out of alignment, so I'll whack it against the stop to align it. BANG! Nope, the error is still there so I'll whack my head again to align it. BANG!...

Drive whacks his head for some time. You hear it as about a second of machine gun fire. Eventually Drive gives up and an error is declared.

Drive: Yo, Computer! I can't give you the information. I tried hard to get it, but the ID doesn't match.

Computer: The program says that if Drive tells me there's an ID error, the disk is the original and it's okay to run

the program.

The thing that confuses some people is that the error is not part of the program. If the error were part of the program, the program couldn't be loaded, since it would have an error in it. The error is always confined to a portion of the disk not used to hold program information.

There are two ways to read errors and both are (poorly) covered in the Commodore drive instruction manual. One way is the block read just described. It involves a great deal of head banging, which can indeed cause head misalignment. All programs copy protected with block reads work to send your drive to the repair shop. The other method is called memory reading. A memory read actually looks inside the drive's buffers to extract information. There is no banging. The program that accompanies this article uses memory reads to check a disk for errors.

Simple errors were adequate protection two years ago, but now there are dozens of copy programs on the market that copy them. A war is on between those who want to protect software and those who want to copy it. Needless to say, almost no one wants to tell how they protect their software. The following information is probably right, but as I've said, people are reluctant to talk.

A disk normally has 35 tracks on it, but the head can be told to make extra tracks. Track 36 is the easiest to work with and track 40 is the hardest. Since a normal disk copy program only copies 35 tracks, vital program information stored on track 36 is lost. The error checking program I've included will check to track 40. If the tracks don't exist, the program will give error #21. If the tracks beyond 35 get a format command that tells the computer to lay down more blocks than there is room, the last blocks overwrite the first. This sort of "dirty format" will hang up my reader (and most copy programs).

There is room between the tracks for information, and this half-track space can be used to store critical data. I think true half-tracking is impossible with the 1541 drive since the head alignment isn't good enough for it. The half-traced track tends to destroy one of the tracks it's between. But that's taken into account. When a half-tracked program is copied, if the head alignment is very good the half-track is missed entirely. If it's normal, the head wiggles and picks up some information from the normal track and some from the half track, not getting clear information from either.

Similar to half-tracking is renumbering tracks, two tracks 34's for example. This can be terribly worrisome to copy programs.

Remember that the sync character lets the drive know where the information on the disk is. If a track sync character is removed, a normal copy program can never find where it is and hangs up. Of course, the track has no information on it.

Extra sectors can be put after the last sector of a track and information can be hidden in them.

The spacing of bits stored in the outer tracks differs from that of the inner tracks. By altering the bit density of a track it can be made unreadable.

There are a few other tricks (including the one my company uses) that I've promised not to write about.

A technique that has been proposed is to write a sector

with a magnetic strength halfway between a 1 and a 0. When the computer reads this track it will read garbage which will vary with drive vibration, disk flexing, heat, and other factors. The sector will be read several times and if the result is different each time, the disk is assumed to be the original. If the disk were copied, the garbage read from the original would always be the same.

Another technique which is almost impossible to use with soft sectored disks is laser protection. A tiny hole representing one bit of a byte is burned in the disk. The byte is written with the last bit being 1. If it is read back as being 0 (i.e., hole) the disk is an original. This is really a technique for hard sectored disks.

There are two general classes of copy programs sold. The first sort reads information from a disk a block at a time and makes a copy of it. The second sort is called a nibble copier and is the meaner of the two. The destination disk is put in the drive and the drive rotation is timed. The source disk is then put in and a whole track (rather than block at a time) is read and stored to be fed to the destination disk later. Since the nibble copier doesn't have to worry about such things as synch characters, it's harder to protect against. Interestingly enough, most copiers tend to randomly introduce errors to the destination disk. Since most disks that are copy protected have lots of extra room on them, the introduced errors hardly ever hit a vital spot.

Why should errors be created? For one thing, the programs bypass the normal error traps to be able to write errors. Also, they bypass (usually) vital routines to gain speed. A normal copier written in BASIC takes about 25 minutes to copy a disk. By using machine language and bypassing things, a nibble copy of a disk (including half-tracks) takes about 8 minutes. Fast copy routines can do the job in about 3 minutes. Spoolers can do the job in about half a minute!

Spooling means to get peripheral devices talking to each other. A copy spooler uses two disk drives and has them sending information directly to each other. Once the process is underway, the computer can be turned off. Non-spooling copiers have to read the information into the computer, then out onto the destination disk.

Now to my error checking program. It only finds errors rather than writes them. What use could this be in making copies? Answer: Well, uh... You may get a certain thrill in using it to find how commercial disks are protected. You can also use it to see if a disk, copy or not, has errors. If it is a copy, you can see if they are in the right places. You can use it to check formatted disks for bad spots. If you have critical information to save, it pays to check the disk first. The program doesn't hurt any information on the disk.

Copyright law allows you to make a copy of your copy protected disks for archival purposes.

You may want to format a disk and see how many errors you can create with a magnet. Be careful not to get it near the middle track since you may make the whole disk unreadable. You can also put blank formatted disks in different places to see if they are safe. Does it hurt to leave a disk on top of the monitor? How about under a ringing telephone? Are errors caused by freezing? What happens if a disk gets too hot? □ **SEE PROGRAM LISTING ON PAGE 134**

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REVIEWS

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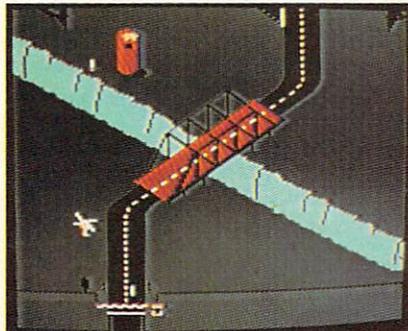
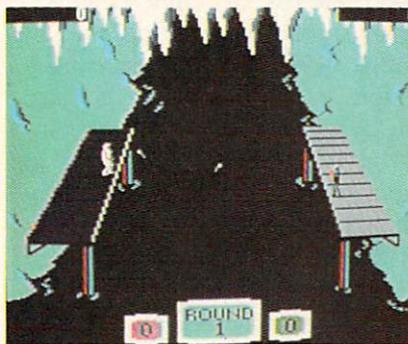
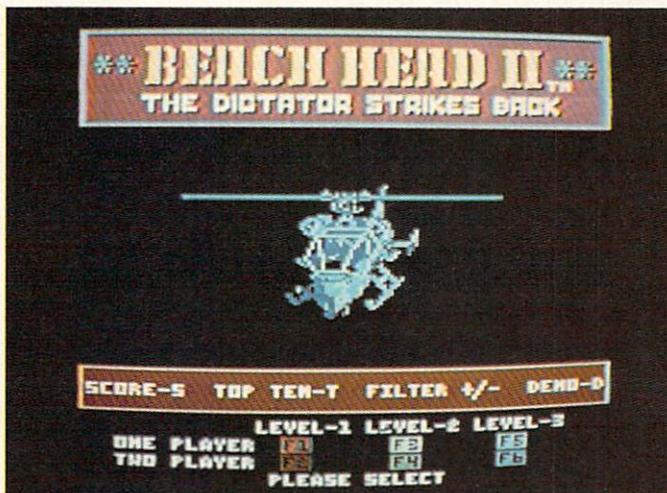
As any fan of movie serials knows, defeating a villain is one thing, keeping him down is quite another. *Beach-Head II* proves the same is true in the world of computer entertainment.

The Dictator Strikes Back is the ominous subtitle of this action strategy simulation of small-unit combat at the end of World War II. The implacable enemy, whom many computerists defeated in 1984's *Beach-Head*, has survived the destruction of his fortress. Now "The Dragon" is spoiling for revenge.

One major difference between *Beach-Head II* and its predecessor is that it can be played head-to-head as well as solitaire. In the solo mode, the gamer can control either the Allies or the Dictator in the program's four linked scenarios.

The only exception, a slap in the face to logic, is "Escape." The human player always controls the rescue helicopters against computer-directed ground forces. Even if the computerist takes the Dictator's side in the other scenarios, he or she must control the chopper in "Escape." There is no sensible explanation for the Dictator's sudden desire to ferry hostages to safety. The instruction booklet doesn't even try to offer a rationale. Possibly "The Dragon" intends to ransom his prisoners back to the Allies at a later date.

No one can accuse designers Roger and Bruce Carver of leading with anything less than their best. "Attack," the initial assault on the Dictator's sanctuary, is the most satisfying part of the game from several standpoints. It depicts an intriguing situation, has superlative audiovisual effects, and



You can't keep a good bad man down.
READER SERVICE NO. 165

features the most original play-mechanic in the whole program.

"Attack" begins with a paratroop drop from the Allied helicopter in the background. The Dictator's machine gun at the bottom-center of the display tries to shoot as many soldiers as possible before they overrun the gun emplacement. There are two rows of brick walls which provide cover between death-defying

dashes across open terrain, but this is fundamentally a war of attrition. In other words, the Allied commander must expect to lose some men in order to achieve his goal.

The Allies earn one reinforcement for each trooper who reaches either of the two walls closest to the machine gun. The attackers need every man, because the only way to get to the second scenario, "Rescue," is to charge into the teeth of the gun and blow the door behind it. The soldiers can toss grenades at the machine gun nest, but avoiding bullets is the main tactical concern.

After the assault group successfully storms the gun position, the display switches to the "Rescue" phase. The Dictator's arsenal is depleted, so he must prevent the 20 hostages from crossing the courtyard to the waiting helicopters with four oddly assorted weapons: a man on the roof who drops stones on the prisoners, a non-firing tank which runs them down, a truck which shoots at them with a small-caliber machine gun, and a guy who pops out of a trap door and sets landmines. The Allies' machine gun at the bottom of the screen can shoot the various obstacles out of the path of the hostages.

"Escape," the third scenario, is as prosaic as "Rescue" is wacky. It resembles *Choplifter* viewed from an

overhead perspective. The Allies must airlift hostages to freedom in three pairs of choppers despite tenacious defenders on the ground.

"Battle" pits the commander of the Allies against the Dictator in personal combat. The large body of water at the center of the screen separates the rivals, who throw heavy sharpened sticks called pountas at each other.

Each man can move back and forth along his pier, duck or jump to avoid blows, and toss pountas at his foe. A fighter can throw straight by hitting the action button or try a curving toss by moving the joystick at the instant the onscreen figure releases the stick.

This is a fitting climax to this installment of the *Beach-Head* saga, but not half as entertaining as "Attack" or "Rescue." A combatant who scores four hits wins a round and sends the loser into the drink. It's fun once or twice, but players may feel that nine rounds, the length of a complete engagement, is too much.

It's hard to fault either the sound or the graphics. Speech Systems of Berkeley, the folks who did the voice for Activision's *Ghostbusters*, has clearly surpassed itself. The pathetic cries of wounded soldiers in "Attack" are almost too heart-tuggingly realistic. The squeamish can shut off the voice prior to the start of the game.

The visuals are generally outstanding, though "Escape" looks bland next to the other three scenarios. The animation is particularly fine in the opening and closing sequences, and it's hard not to smile at the antics of the little man who pops out of the trap door with the mines in "Rescue."

The four parts of *Beach-Head II* combine into an enjoyable play-experience, even though none is really strong enough to stand alone. It's one of the best head-to-head games for the Commodore, and the computer makes a powerful solitaire opponent.

Who knows? Maybe the Dictator swam away after losing in "Battle" to plague the Allies anew in *Beach-Head III*. Fans of the Carvers' inimitable design style can only hope so.

Access Software, 925 East 900 South, Salt Lake City, UT 84105.

—Arnie Katz

QUESTRON

Strategic Simulations, Inc.

Commodore 64

Disk; \$39.95

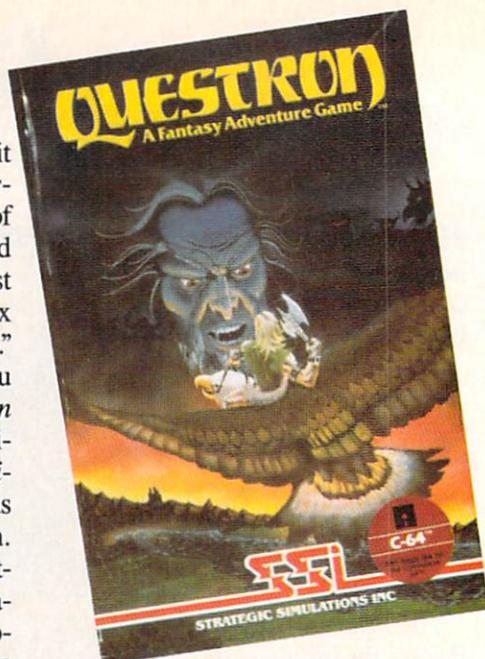
You can't imagine how difficult it was to drag myself away from *Questron* to write this review. It's one of those games that you start playing and suddenly realize it's three hours past bedtime. SSI should label the box "potentially hazardous to your sleep."

If you've ever played *Ultima II*, you have some idea of how *Questron* works. In fact, the game style is licensed under Richard Garriott, *Ultima's* author. You begin the game as a poor peasant kid, fresh off the farm. From there, it's a straight uphill battle to become a knight. Every creature you meet along the way is a potential enemy. Most will attack on sight. But among them there may lurk a few friends. Only an adventurous spirit will ever find out.

You'll have some important considerations to make along the journey, like "Where is your next meal coming from?" It doesn't take long to starve to death out in the wild. Distributed around the countryside are small towns whose businessmen will be happy to take your hard-won gold in exchange for weapons, armor, food, or advice. Of course, this means you've got to get some gold. If you approach the right salesman, you might cut a deal on a horse, whama lama, or raft.

In some of the towns, you can even do a little gambling. I admit to spending a great deal of time in front of the blackjack tables (in real life, one of my few vices). There are also roulette tables and a game called double or nothing. Sorry folks, no ponies or dogs. The closest they get to a greyhound is a Blind Blood Dog that can rip your throat out if you aren't careful.

Hit points is a rather nebulous term for your good health. The more points you have, the more damage you can take in a fight. When the points are gone, so is your life. The people and monsters of *Questron* are not equally dangerous. Some can only inflict minor damage, while others can end your life in a few strokes. The guards that populate the



Warning! Can put bags under your eyes.
READER SERVICE NO. 166

towns and the castle are quite strong. And if you ever make it to the Land of Evil, you'll find out just how tough beasties can be.

What's the point, you ask? The Evil Magician Mantor is threatening to destroy all of *Questron* and you've got to stop him. With the help of the princess, the king, the doctor and the Wizard Mesron, you might be able to defeat Mantor. But first you have to prove yourself by attaining the rank of knight.

There are a number of puzzles to overcome in order to do well in *Questron*. My only hint would be to talk with as many people (things) as possible. You could pick up something that will be useful down the road.

I can't tell you a couple of the really neat features of the game without giving away some of the puzzles. I will say that *Questron* has incorporated an arcade game and a puzzle that make it more interesting than your average strategy/adventure game. The arcade game tests your dexterity; the puzzle tests your intelligence.

Questron has great graphics and the sound is marvelous. I especially liked the opening theme, despite its lengthening the load time. Be warned, *Questron* takes a long time to load. Also, as you have gathered from my earlier statements, it takes a long time

to play. Even a seasoned adventurer will spend a few days working his way through it. A save feature is included. Four characters can be stored on the disk at one time, so more than one person can be using the same disk.

Whew! Now that this is out of the way, I can get back to that dungeon in the Land of Evil and see what awaits me. The outline effect used to portray the limited visibility in the dungeons is perfect. You really feel like you have to crawl along and watch out for the traps. Ooops! Another trip wire.

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

—Cheryl Peterson

THE MUSIC SHOP

Broderbund Software

Commodore 64

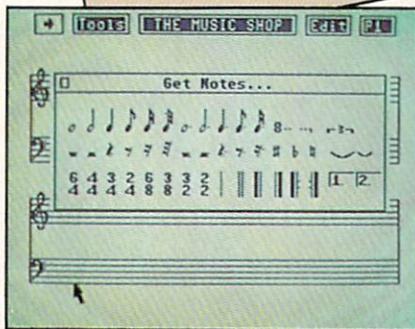
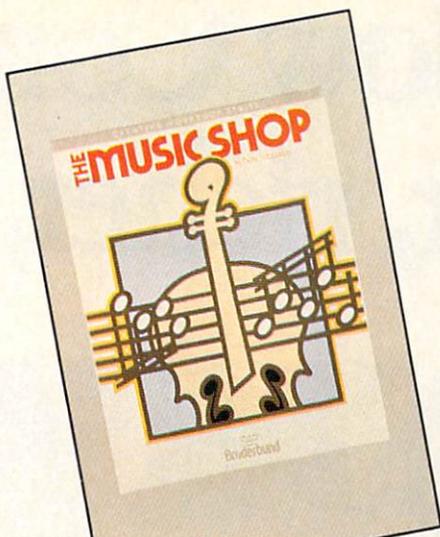
Disk; \$44.95

After doing a comparison of a dozen music packages for *Ahoy!* (Nov. '84), I thought I'd seen every configuration imaginable. So when a favorite editor asked me to look at *The Music Shop*, I was prepared to be disappointed. What a pleasant surprise awaited me. Not only does *The Music Shop* have all the great features needed to make it a useful music processor, it emulates the user interface of the Apple Macintosh, almost legendary for its icons, pulldown menus, and dialog boxes.

The Music Shop single-handedly proves my contention that the Commodore's limitations are perpetuated by the programmers who don't make the most of it. In operation, *The Music Shop* functions much as any good Macintosh program. Substitute a joystick for a mouse and off you go.

Any chores that need to be performed are identified by icons at the top of the screen. Pointing to them brings down a menu with highlightable options. The fire button activates the option. What could be simpler?

Even so, I must compliment the documentation. It is attractive, informative, and logically laid out, with sufficient illustrations and tutorial



Emulates the Macintosh user interface.
READER SERVICE NO. 167

material. In addition, short sections explain a little music theory and how the SID chip works. A handy reference card is included, making it easy to use and learn the keyboard commands available (if you choose to use them instead of the joystick).

One of last year's better music programs, *Music Construction Set*, used a hand icon—controlled by a joystick—to point at musical symbols that were put onto a staff to create sheet music. Though it functions much the same way, *The Music Shop* uses the pulldown menus to provide a greater variety of options. "Get notes," for instance, brings up a dialog box with notes and rests (whole to 32nd duration), time signatures, bars, repeat symbols, and other musical notations. Another choice in the "Tools" menu allows you to set up the staff groupings, color combinations, and key signatures. One option even allows you to verify the timing of each bar.

Although *The Music Shop* appears to require more steps to operate than *Music Construction Set* or other on-

screen music editors, I felt more comfortable with it because the screen didn't look so cluttered. Two double (or four single) staves can be on the screen simultaneously, allowing room for at least four bars of music. Since dialog boxes only appear when they are needed, there is nothing between you and your music.

The editing commands include cut and paste, copy, delete, clear, home, and the most important safety feature, UNDO. While the commands can be entered using the Edit menu, there are two-key combinations that also can be used. When the menu is pulled down, each option is followed by its keyboard command—sort of a subliminal learning experience.

At almost any point in editing, you can play the entire piece to see how you're doing. Though each note is played as it is entered on the staves, it doesn't hurt to occasionally hear the whole thing from the beginning. Pressing the joystick button will stop the playback.

If you aren't happy with the instruments that are playing the music, another menu will allow you to change the three voices. There are eight pre-programmed instruments; or you can design your own by modifying wave forms and envelope data. When you save your song, the instruments are saved as well. Although there are only three voices, you can change each song's instruments up to eight times for each voice.

Though this is enough to make the program functional, *The Music Shop* goes one step further. You can play the music while making the adjustments, so it is easy to judge how effective your modifications are. There are coarse, medium, and fine controls, giving maximum flexibility.

If that's not enough, the program will print out sheet music for you; the whole song in one pass or a page at a time. My only gripe is that it doesn't work with the Cardco printer interface, but if the sheet music meant that much to me, I'd go buy one of the other three interfaces that do work.

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

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DISK MAINTENANCE

Reflexive Software

Commodore 64

Disk; \$29.95

Disk Maintenance is a group of three utility programs designed to help you get the most out of your Commodore 1541 disk drive. The main program offers the user the ability to change and edit any disk directory at will. The list of commands available with this program is both lengthy and impressive. With a single keystroke users will be able to perform the following functions:

Find the starting and ending address of any file.

View/edit Block Availability Map.

Disassemble any ML file.

Exchange the position of any two files in the directory.

Kill any disk file permanently.

List any file as a BASIC program.

Create a disk menu.

Rename a disk.

Append two BASIC files.

Rename a file.

Scratch a file.

Compare any two BASIC programs.

Validate the disk.

Read a sequential file.

Unscratch a file.

Change a file type.

Protect a file from being scratched.

While I could spend the next 20 pages describing each of these functions, my esteemed editor would, no doubt, frown on my doing so. I will therefore restrain myself and concentrate on but two.

The KILL function listed above is similar to the scratch command that all disk users are familiar with. Unlike a scratched file, however, a killed file can never be recovered. This would be useful if you wanted to give a copy of a terminal disk to a friend, but wanted to be sure that your password file could never be unscratched and used by someone else.

The second function I'll elaborate on is MENU. By using this little gem of a command, it is possible to create a menu of all the programs on your disk that will also load and run each of them. Any program, BASIC or machine language, can be included. With such a menu listed as the

first file on each of your disks, loading a program and running it becomes a simple matter of loading the menu with the command LOAD"*",8 and then pressing the key that is indicated next to the program you wish to run. You'll never again have to remember the proper spelling of a filename or the correct SYS to use with a machine language program!

ABLE, the second program in this package, is an Advanced Block Editor that will allow the user to view and/or alter the contents of any block on the disk. Included in *ABLE* are functions for working with sprites directly on the disk, numerous help screens, and the ability to enter information as decimal numbers, hex numbers, ML instructions, and BASIC tokens. *ABLE* also supports the use of undocumented opcodes which makes machine code editing a breeze.

Compactor/Uncompactor, the final program, performs two functions. The first is compacting a BASIC program. This is equivalent to shortening the program because each line will be filled to its maximum of 250 bytes. The compactor will also remove all REMs and any leading colons it encounters. The second function will take any BASIC program and expand it by putting each individual command on its own line. This makes debugging much easier since a line can be changed without worrying about affecting other commands on the same line.

Disk Maintenance is, quite simply, one of those programs that no serious Commodore user should be without. Its speed, versatility, and friendliness have earned this program a permanent spot, not on my shelf, but alongside my computer where it will always be within easy reach.

Reflexive Software, 6507 39th Ave N.E., Seattle, WA 98155 (phone: 206-525-6873). —B.W. Behling

CARTRIDGE EXPANDER

Navarone Industries, Inc.

C-64, C-128

\$24.95

The Cartridge Expander from Navarone Industries is a handy gad-

get that allows you to have up to three ROM cartridges plugged into your C-64 or C-128 at once. Through the use of a three-position slide switch, you can change from one cartridge to another without the hassle of turning off the computer and removing the present cartridge and replacing it with another. This not only saves you time by keeping your most used cartridge in one place, but also reduces the amount of wear and tear your cartridge port would normally receive. Being able to rapidly switch from one ROM cartridge to another might not seem like a big deal to many people but those of us who have paid \$60.00 to \$70.00 repair charge for a new cartridge port connector can readily appreciate the advantage of owning this particular piece of equipment!

Another nice feature of this device is its push-button reset switch that allows you to return your computer to its power-up state without any loss of memory. By combining the use of this switch with a program to recover accidentally newed programs, you need never fear losing a program by the inadvertent use of the "NEW" command. This tiny switch is also great for breaking out of an ML program that has "crashed" or otherwise "locked up" your computer.

Although there are similar devices on the market for Commodore computers, the \$24.95 price tag of this model places it easily within the reach of most users.

Navarone Industries, Inc., 19968 El Ray Lane, Sonoma, CA 95370 (phone: 209-533-8349).

—B. W. Behling

FOREWORD

Experienced users are well aware of the need to maintain backup copies of important disk files. It only takes a single incident of "diskus destructus" to turn the most complacent operator into a dedicated archivist. Even software purveyors with the most complex of copy protection schemes stress the importance of maintaining backup copies of all disk files. The reasons are simple. It takes very little effort to permanently damage the mylar film (only 3/1000 of an inch thick) and its microscopic magnetic coating on which digital data is stored. The typical computer's environment is teeming with forces hostile

REVIEWS

to the well-being of the floppy disk, the most common of which are dust, smoke, magnetic fields, and temperature extremes; not to mention the ever-present possibility of physical damage due to improper handling.

In spite of this universal need for backup copies, early 1540/1541 disk drive users were severely handicapped when it came to backing up disk files. Although the Commodore DOS has a built in COPY command, it is of very little value for a single drive system. Having multiple copies of a file on single disk does very little to enhance data security. The only backup utility on the Test/Demo disk supplied with the disk drive (Jim Butterfield's *Copy/All*) required two disk drives for its use. Even then it took half an hour to back up a single disk.

It wasn't until the coming of the *Commodore 64 Disk Bonus Pack* that single drive users obtained some relief. The *1541 Backup* program on that disk allowed for a full disk backup with a single drive. Of course it did require six pairs of disk swaps and about 40 minutes to copy a full disk.

Nevertheless, we old-timers persevered. We gritted our teeth and hung in there, meanwhile inventing ingenious ways to keep ourselves amused while waiting for a disk to be copied. Of course, the 1541 wasn't too happy with this state of affairs. It frequently made its displeasure well known by demanding periodic alignment of its read/write head, as well as other chronic complaints. Ultimately our patience was rewarded. Third party software vendors strived to fill the gap which Commodore has left open to this very day. Both commercial and public domain copy programs have been developed which greatly reduced the time required for the copy process. The very latest of these offerings, which we will look at, gives very impressive performance.

An inevitable side effect of creating a high speed copy utility for the 1541 is the ability to reproduce many of the existing copy protection schemes. Although it would be feasible to omit these features from a copy utility, the publishers rarely do so. It has been found to make good economic sense to promote a copy program with these capabilities included.

Copy protection, piracy, and the software buyer's rights are regular topics in the editorial pages of every computer publication. The discussions appearing in both national publications and local newsletters have ranged hot and heavy under, over, and all around the fence. In the midst of all the controversy one thing remains abundantly clear. The advertising for products designed to assist the user in backing up his software continues unabated. Furthermore, in what seems to be an otherwise depressed market, these products continue to command premium prices. This is in spite of the fact that many of these products are rapidly obsoleted as software producers improve their copy protection schemes.



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COMPUTER

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At the risk of being outdated before these reviews are published, we present two products which as of this writing represent the state of the art in their respective fields for the C-64. We feel that both of these utilities have sufficient legitimate purpose to remain of value for some time to come. This is in spite of the rather colorful names under which they are being marketed.

FASTHACK'EM
Basement Boys Software
Commodore 64
Disk; \$29.95

Based on physical appearances, *FASTHACK'EM* certainly lives up to its company's name. Packaging and documentation is minimal, consisting of a custom printed cardboard disk mailer and a single sheet of instructions. The brief documentation is further emphasized by the warranty and copyright notices which make up more than 60% of it. Fortunately, the program is menu driven and easy to use. Most users will require a minimum of experimentation to discover the program's capabilities. In addition, better documentation has been promised for the final release.

FASTHACK'EM is the product of Mike J. Henry. For newcomers in the audience, Mr. Henry was one of the people behind *Disector*, one of last year's most successful copy programs, as well as a powerful and still pertinent disk utility. Apparently Mr. Henry has decided to take his disk drive expertise and branch out on his own. The results are quite impressive. *FASTHACK'EM* is probably the fastest way to copy an entire 1541 formatted disk at the present time.

Actual performance depends on your system configuration. With a single 1541 disk drive, copying time for an unprotected disk is on the order of two minutes. Actual results will depend on the manual dexterity of the user, as three pairs of disk swaps are required. With two disk drives, a 35-second unverified and 56-second verified copy is possible: a truly impressive performance. Users of a single 1541 also have the option of copying many forms of protected software with a nibble copy utility.

If this is not enough, *FASTHACK'EM* provides an auto backup feature. In this mode, two 1541 disk

drives are set up to talk to each other all on their own. You can even pull the disk drive serial port cable and turn off the computer once the process has begun. What's more, multiple copies are possible. The drives will sense the removal and insertion of the source and destination diskettes. Some manual dexterity is required, as copying automatically starts three seconds after the destination diskette is inserted into the drive. It is of course up to the user to maintain the proper sequence of disk removals and insertions. To further speed things up, the auto backup utility also lets you select a range of tracks (from 1 to 40) for copying.

Owners of the MSD SD-2 will be immensely pleased with *FASTHACK'EM*. Two full disk backup versions are provided for this drive. These result in a 60-second and 68-second backup of an entire disk, nearly twice as fast as the MSD SD-2 can do on its own. In addition, these utilities allow the SD-2 to copy many types of protected software. The SD-2 copy routines also allow the setting of a range of tracks from a minimum of track 1 to a maximum of track 40.

Copy protection schemes have matured considerably since the introduction of the 1541. Current methods no longer bump the disk head mechanism against the track one stop, a contributing cause to 1541 alignment problems. Many of these schemes are rather sophisticated, employing such esoteric procedures as variable density recording on a single track, half tracking, and recording on normally unused tracks beyond track 35. As a result, it is very difficult if not impossible to design a general purpose copy utility for these schemes. A number of programs have attempted to handle this problem with limited success. These generally have required the user to provide several disk parameters which describe the protection to be duplicated. The problem with this approach is the difficulty involved in discovering the proper parameters.

The *FASTHACK'EM* nibble utility has some limited parameter input capabilities. However, the user is left

totally on his own as to their proper application. Instead, taking the bull by the horns, a parameter copier is included which lists 17 specific programs and a single major publisher by name. Actually the copy utility sometimes cheats. No attempt is made to duplicate the original protection scheme of all of these programs. Instead an unprotected copy is created by modifying the original program code right on the disk. The programs represented are all currently popular titles. We expect the exact roster to vary as time goes on. We leave you to your own means in finding out if your favorite program is represented.

A high speed utility loader is part of the *FASTHACK'EM* program. This seven-block routine may be easily copied for your own use. Installation in the C-64's \$C000 block is simple. The result is a better than six to one improvement in the LOADING times of program files. Other disk operating times are not affected.

FASTHACK'EM is a much-needed utility for Commodore disk users. As of this writing it is the fastest whole disk backup utility we know of. Two single 1541 disk drives can now back up a disk in less time than was formerly possible with a dual disk drive. Even the performance of the MSD SD-2, the mainstay of the cottage industry Commodore publisher, has been improved by nearly 100%. User groups across the country have already recognized *FASTHACK'EM*'s capabilities in making real-time copies of public domain libraries during club meetings.

Of course there are some disadvantages. The demands on the user are now greater than ever before. Very little time remains between disk swaps for writing disk labels or other mundane activities. Gone are the leisurely coffee breaks or refrigerator raids while waiting for a 1541 to do its stuff. Instead the user is tied down to the machine, feeding it disks at an ever increasing rate. Most users will gladly make the sacrifice.

Basement Boys Software, P.O. Box 30901, Portland, OR 97230-0901 (phone: 503-256-5506).

—Morton Kvelson

ISEPIC

Starpoint Software

Commodore 64

\$64.95

In a related but independent event, Chip Gracey in conjunction with *Starpoint Software* (publishers of *Director*, mentioned above) have released *Isepic* (pronounced ice pick) for the Commodore 64. *Isepic* is a plug-in cartridge which at the flick of a switch replaces the Kernal ROM with its own operating system. This has the effect of literally stopping the microprocessor in its tracks and removing control from whatever program is running at the time. *Isepic* then lets you save the entire contents of memory to disk. This includes the full contents of the 64 kilobytes of RAM as well as the status of the microprocessor registers and the computer's I/O registers. The resultant "snapshot" is in a form suitable for reLOADing by *Isepic*, at which time the originally executing program picks up at the precise moment at which it left off.

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The *Isepic* cartridge contains two kilobytes of static RAM, several digital logic chips, and a single switch. Before booting the source program, the cartridge RAM is LOADED with the *Isepic* operating system. A flick of the cartridge switch then hides the *Isepic* cartridge by electronically disconnecting it from the expansion port. The computer is then reset to the power up state, at which time the subject software is booted up in the appropriate fashion.

The *Isepic* operating system lets you do several things before you relinquish control back to the C-64. You can view the disk directory, format a disk, and create a special *Isepic* disk for use during the snapshot process. For advanced users a memory editor and mini disassembler are included. At the time of flicking the switch, *Isepic* also fills all of memory with a predetermined pattern of its own choosing. The purpose of this will be seen shortly.

The ramifications of all this activ-

ity are startling, to say the least. Most significant is the fact that this treatment will bypass any disk copy protection schemes which may have been used by the original software boot routines. Backup copies can thus be made of the resulting snapshot files. However, in the original snapshot form, the *Isepic* cartridge and software is required to reboot the original program. To get around this, *Isepic* lets you "break" the program.

For those unfamiliar with this term, breaking a program refers to the process whereby the true hacker disassembles a copy protected program and removes the original protective code. The origin of the term probably lies in the activity burglars perform in the still of the night. A properly broken software package can be easily archived. Very often, operating convenience in the form of short loads is enhanced as well.

Although we have no definitive proof, it is generally believed that true hackers have no real interest in the programs they are breaking. Their primary concern lies in what is perceived as the challenge of discovering the secrets of the code placed into the program by the original authors. Some original software authors even encourage this behavior by placing hidden messages on the disk or in the code. Very often these are phrased as a dare to the hacker, in effect challenging him to do his worst.

Of course, most major software publishers take a very dim view of these activities and generally wish it would all just go away. As we mentioned above, there are many aspects to this situation. We can only encourage our readers to let their consciences guide them along the proper path.

As applied to *Isepic*, breaking the program is a compacting process which results in a stand alone LOADable file which can RUN without the additional benefit of the *Isepic* package. To accomplish this, *Isepic* makes use of the pattern previously placed in RAM as mentioned above. This allows unused parts of the snapshot to be eliminated from the final disk files. Also, *Isepic* looks for any re-

petitive patterns in the program code for possible additional compaction.

Not all snapshots can be broken by *Isepic*. A small amount of memory has to be made available for the stand alone boot routines which are included with the broken program. These routines reconstruct a RUNable image after the program is LOADED. In the tradition of the true hacker, these routines also display the *Isepic* logo while booting the program.

Isepic will convert many copy protected programs to easily archivable form. Many broken programs will LOAD faster due to the elimination of the initial opening screens and menus associated with most commercial software. Of course, some protected programs have their own built-in speedup routines which will be negated by the *Isepic* treatment. *Isepic* supplies its own boot utility which is incorporated in every broken program. A typical *Isepic'd* program is on the order of 35 kilobytes. These LOAD in less than 30 seconds with the *Isepic* speedup routines.

Isepic will not remove the protection from software which relies on security keys or dongles for copy protection. Of course, such programs do not require the attention of *Isepic* in the first place. *Isepic* will not successfully remove the protection from programs which check the disk at regular intervals during normal operation. These programs will still require the original protected disk for proper operation.

The *Isepic* process is fairly lengthy. It takes about five minutes to create the initial snapshot. A similar interval is needed to perform the break operation. Additional overhead is consumed by disk formatting and LOADING the original program. It should take about 30 minutes for a complete *Isepic* procedure.

Once again we caution our readers that *Isepic'd* programs are still copyrighted by the original authors and publishers. In addition, there is the matter of the copyright on the *Isepic* code itself. Illicit distribution of copies of *Isepic'd* programs may bring down the wrath of the original publishers, as well as Starpoint Software

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EASY GUITAR

DJ Software

Commodore 64/128

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In 1955, the image of Elvis rocking and reeling on TV provoked thousands of teenage boys to learn to play guitar. You probably saw more than a few of those boys—grownup now—at the recent Live Aid extravaganza. This “Electronic Woodstock” may inspire the next generation of guitar players the same way Elvis did the last. In 1985, however, we’ve got something Townsend, Clapton, McCartney and the rest never had—a Commodore 64/128 and a program called *Easy Guitar*.

There are dozens of software packages that teach us how to read music, write music, and create music. Oddly, there are only a few that actually teach us how to play a musical instrument. And *Easy Guitar* may be the only one that teaches the instrument most people want to learn to play. It was conceived and programmed by David Perry, a Seattle-based musician and record producer.

The program follows a very simple step-by-step method. Beginning players are shown a graphic labeling the parts of a guitar, and the computer generates the six tones needed to tune the strings. (Unlike most of us, the C-64/128 has perfect pitch.) A short lesson in music theory follows, but you don’t need it to learn how to play beautiful music. The Beatles, among others, proved that.

The computer is a good guitar teacher because it can do more than books or audio tapes. A book can show you where to place your fingers on the frets. A tape can let you hear what it should sound like. But the computer can do both—and at the same time. In demonstrating how to play scales, for instance, you see the correct fingering and hear the scale being correctly played. A guitar teacher can do this too, but try to find a human who will teach you how to

play guitar for a flat fee of \$39.95.

The program contains diagrams of the 50 most common chords you’ll run into, which can be practiced in over a dozen different progressions. During practice sessions the computer plays the chord changes with you, backed by a bass and drum simulation called “The Commodore 64 Back-Up Band.” You can set the band to play as fast or slow as you’d like with a built-in metronome that clicks on each beat.

Easy Guitar claims to be for both beginners and advanced players, but it’s really only a tool for the complete novice guitar player. There’s no mention of fingerpicking at all, and hardly any guidance on strumming or what to do with the hand that strikes the strings. This doesn’t mean it’s bad, just that people who already play well won’t get much out of it.

Only one chord diagram fits on the screen at once, and the program suggests buying a regular chart illustrating the common chords. I thought the designers could have easily included one in the package. The program could also have been improved by including some synthesized pop tunes for users to play along with the computer. The designers chose to include a multiple-choice test and a “Catch a Chord” video game instead, both of which seem like filler.

Still, as a guitar player myself, I found *Easy Guitar* to be the perfect way for people who have never played a note to get their feet wet. The lessons are clear, simple, and take advantage of the computer’s interactive capabilities. You can learn at your own pace. You don’t have to plow through a thick instruction manual—in fact, instructions aren’t even included in the program. Everything you need to know is right up there on the screen.

For the kids who caught the guitar bug watching Live Aid, enjoy your guitar. It’s an easy instrument to learn, but a hard one to master. You probably won’t see this program in your local store, but you can make an order or get more info by writing DJ Software, 10636 Main St., Suite 414, Bellevue, WA 98004.

—Dan Gutman

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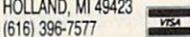
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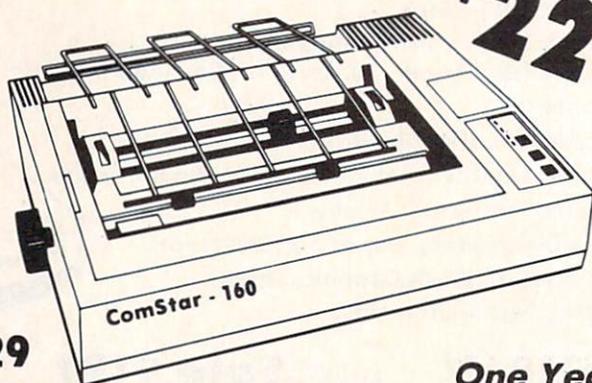
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GIANT PRINTER SALE

10"/15½" COMSTAR 160 150-170 CPS COMSTAR 160 + High Speed (Tractor-Friction Printer)

- Tractor Friction Printer
- Dot Matrix, Impact, Prints Single Sheets or Continuous Feed Paper, 10" or 15½" Carriage
- Print buffer
- 9 x 9 Dot Matrix, Double Strike
- Near Letter Quality, High Resolution, Dot Bit Image
- Underlining, Backspacing, Left-Right Margin
- True Low Descenders, Super and Subscript
- Prints Standard, Block Graphics
- Better than Gemini 10X
- Centronics Parallel Interface



\$229⁰⁰

10" COMSTAR 160 List \$499 **Sale \$229**

15½" COMSTAR 160 List \$699 **Sale \$299**

One Year Free Replacement Warranty

PRINTER

Impact Dot Matrix

PRINT HEAD

9 Wire (User Replaceable)

PRINT SPEED — Bi-directional Logic Seeking

10" ComStar 160: 150-170 CPS; 15½" ComStar 160: 150-170 CPS

PAPER SLEW SPEED

10 LPS at 1/6" Spacing

PRINT BUFFER

2K

PRINT SIZE

10, 12, 17, 5, 6, 8.5 CPI

NUMBER OF COLUMNS

10" ComStar 160: 80, 96, 136 (40, 48, 68 Double Width)
15½" ComStar 160: 136, 164, 232 (68, 82, 116 Double Width)

CHARACTER MATRIX

9 x 9 Standard, with True Descenders
18 x 9 Emphasized
18 x 18 Double Strike
6 x 6 Block Graphics
60 x 72 Low Resolution, Bit Image Graphics
120 x 144 Hi Resolution, Bit Image Graphics
240 x 144 Ultra Hi Resolution, Bit Image Graphics

CHARACTER SETS

96 Standard ASCII, 64 Special, 32 Block Graphic, 96 Downloadable, 88 International Characters

CHARACTER FONTS

| | |
|--------------------------|----------------------|
| Normal (10 CPI) | Emphasized |
| Elite (12 CPI) | Double Strike |
| Condensed (17 CPI) | Super and Sub Script |
| Enlarged (5, 6, 8.5 CPI) | |

SPECIAL FEATURES

| | |
|--------------------------------|--|
| Self-Test | 15.5" Carriage (15½" ComStar 160 Only) |
| Macro Instruction | |
| Continuous Underline | |
| 8 Bit Selectable Interface | |
| Column Scan Bit Image Graphics | |
| Vertical and Horizontal Tabs | |
| Skip Over Perforation | |

LINE SPACING

1/6", 1/8" Plus Programmable by n/144" or n/72"

PAPER HANDLING

| | | |
|-------------|---------------------|---------------------|
| | 10" COMSTAR 160 | 15½" COMSTAR 160 |
| Roll Paper: | 8.5" to 10" Wide | 8.5" to 15" Wide |
| Cut Sheet: | 8" to 10" Wide | 8" to 15" Wide |
| Sprocket: | 3" to 10" Wide | 5" to 15.5" Wide |
| Copies: | 3 Carbonless Sheets | 3 Carbonless Sheets |

RIBBON

10" ComStar 160 Cartridge \$9.95, 15½" Comstar 160 Ribbon \$14.95

INTERFACE

Standard Parallel (Centronics Compatible)

DIMENSIONS — in inches

| | |
|---------------------|----------------------|
| 10" COMSTAR 160 | 15½" COMSTAR 160 |
| 15.36W X 12.6D x 5H | 23.4W x 14.3D x 5.2H |

WEIGHT — in pounds

| | |
|--------------------------|-----------------------------|
| 10" COMSTAR 160: 11 lbs. | 15½" COMSTAR 160: 18.7 lbs. |
|--------------------------|-----------------------------|

All product data subject to change without notice.

Parallel Interfaces:

Commodore 64 — \$39.00

Apple II, IIe, II+ — \$59.00

Atari — \$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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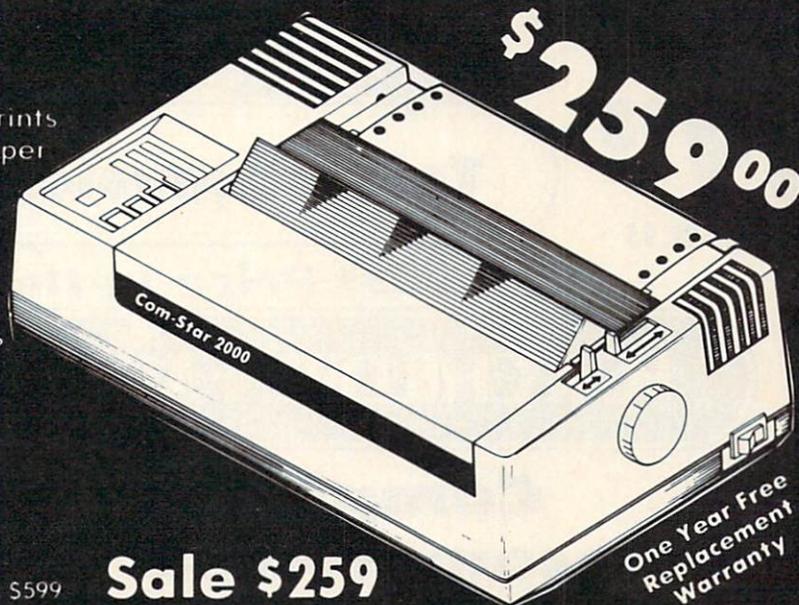
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10" ComStar 2000 165-185 CPS

Super Letter Quality 10" ComStar 2000 Plus Super High Speed
Lifetime Warranty*

- Tractor Friction Printer
- 165 - 185 CPS Dot Matrix Impact, prints single sheet or continuous form paper
- Letter Quality Mode 40 CPS
- 9x9 or 17x17 dot matrix
- 256 user definable characters
- Super script, subscript
- Pica, elite, proportional and italics
- Super bit image graphics
- 1920 byte print buffer
- Lifetime printhead warranty*
- Better than Epson FX80
- Automatic dark mode



10" ComStar 2000

List \$599

Sale \$259

PRINTING METHOD

Impact dot matrix system

PRINT SPEED

160-180 cps PICA; 40 cps FINE MODE (Letter Quality)

PAPER FEED SPEED

100 msec/line (in case of 1/6 inch line feed)

CHARACTER FONT

9x9 matrix (pica, elite, condensed), 9xn matrix (proportional), 17x17 matrix (fine mode) 2 pass

BIT IMAGE GRAPHICS

480, 640, 960, 1280, 1920 dots/line

PRINT DIRECTION

Bi-directional in text mode with logic seeking Uni-directional in bit image graphic mode

CHARACTER PITCH

1/10" (pica), 1/12" (elite), 7/120" (condensed), 2/10" (double width pica), 2/12" (double width elite), 14/120" (double width condensed)

CHARACTERS PER LINE

137 characters (condensed)
96 characters (elite)
80 characters (pica)
68 characters (double width condensed)
48 characters (double width elite)
40 characters (double width pica)

HORIZONTAL TAB

Programmable positions & manual selection by control panel switches

VERTICAL TAB

Programmable

LINE FEED PITCH

1/6", 1/8", 7/72" (programmable pitch), 1/72" (programmable pitch), n/72" (programmable pitch), n/216" (programmable pitch)

CHARACTER SET

Full ASCII 96 characters with descenders. International characters: USA, Germany, Italy, U.K., France, Denmark, Sweden, Spain

PAPER FEED SYSTEM

Adjustable sprocket feed, friction feed

FORM HANDLING, FANFOLD PAPER

Width: 4-10"; number of copies, original & 2 copies without carbon

RIBBON

Cartridge ribbon

PAPER END SENSOR

Mechanical switch (printer stops printing 0.6 inches from end of paper)

INTERFACE

Parallel (Centronics compatible) Buffer memory size: 1920 byte

RELIABILITIES: PRINTER LIFE

MTBF: 5,000,000 lines; ribbon life, 3,000,000 chars.

DIMENSIONS & WEIGHT

Width 16.0"; depth 11.8"; height 4.72"; weight 14 lbs.

All product data subject to change without notice.

Parallel Interfaces:

Commodore 64 — \$39.00

Apple II, IIe, II+ — \$59.00

Atari — \$59.00

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Commodore 64

MODEM

Commodore 64



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- 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

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We are so sure this is the only telecommunications package you will need we will give you 15 days Free Trial.

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Sale

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COLORS

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- For Video Recorders
- For Small Business Computers
- Apple - Commodore - Atari - Franklin - etc.



(Premium Quality)

- Beautiful Color Contrast
- High Resolution
- Separated Video
- Sharp Clear Text
- Anti-Glare Screen
- 40 Columns x 24 Lines
- Supports 80 Columns

List \$329⁰⁰

13" Color Computer Monitor

*Connecting cable \$9.95

Sale \$169.95*

Add \$14.50 shipping, handling and insurance. Illinois residents please add 6% tax. We do not ship to foreign countries (including Canada), Alaska, Puerto Rico, APO-FPO. Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail!

13" RGB & COMPOSITE MONITOR List \$399.00

Must be used to get 80 columns in color with 80 column computers (C128 & Atari ST). (add \$14.50 shipping)

Sale \$279⁰⁰*

14" COMMODORE 1702 COLOR MONITOR List \$299.00

(add \$14.50 shipping)

Sale \$179⁰⁰*

15 Day Free Trial - 90 Day Immediate Replacement Warranty

12" XTRON SUPER HI-RESOLUTION MONITOR

80 Columns x 24 Lines, Super Hi-Resolution 1000 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" MONITOR GREEN OR AMBER TEXT List \$159.00

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

Sale \$69.95*

* Connecting cable \$9.95

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Commodore - 64

☆☆ NEW ☆☆

WORD PROCESSING BREAKTHROUGH!

SALE

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.
- **Lines Centered, Justified Or Aligned** At The Right Side.
- **Variable Page Lengths And Line Spacing.**
- **Borders** At Top Or Bottom With Optional Title Lines And Page Numbers.
- **Linked Files** To Print Extra-long Documents In Sequence.
- **Flexible Printer Set-up** To Allow Use With Any Printer.
- **Find And Replace** Text Functions That Can Be Automatic.
- 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

\$29.95
COUPON

Sale Price \$39.95

☆☆☆ 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.

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.

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

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FLOPPY DISKS SALE *69¢ ea. Economy Model or Cadillac Quality We have the lowest prices!

*ECONOMY DISKS

Good quality 5¼" single sided single density with hub rings.

Bulk Pac

100 Qty.

69¢ ea.

Summer Sale Prices Only

10 Qty.

89¢ ea.

Total Price

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Total Price

8.90

CADILLAC QUALITY (double density)

• Each disk certified

• Free replacement lifetime warranty

• Automatic dust remover

For those who want cadillac quality we have the Loran Floppy Disk. Used by professionals because they can rely on Loran Disks to store important data and programs without fear of loss! Each Loran disk is 100% certified (an exclusive process) plus each disk carries an exclusive FREE REPLACEMENT LIFETIME WARRANTY. With Loran disks you can have the peace of mind without the frustration of program loss after hours spent in program development.

100% CERTIFICATION TEST

Some floppy disk manufactures only sample test on a batch basis the disks they sell, and then claim they are certified. Each Loran disk is individually checked so you will never experience data or program loss during your lifetime!

FREE REPLACEMENT LIFETIME WARRANTY

We are so sure of Loran Disks that we give you a free replacement warranty against failure to perform due to faulty materials or workmanship for as long as you own your Loran disk.

AUTOMATIC DUST REMOVER

Just like a record needle, disk drive heads must travel hundreds of miles over disk surfaces. Unlike other floppy disks the Loran smooth surface finish saves disk drive head wear during the life of the disk. (A rough surface will grind your disk drive head like sandpaper). The lint free automatic CLEANING LINER makes sure the disk-killers (dust & dirt) are being constantly cleaned while the disk is being operated. PLUS the Loran Disk has the highest probability rate of any other disk in the industry for storing and retaining data without loss for the life of the disk.

Loran is definitely the Cadillac disk in the world

Just to prove it even further, we are offering these super LOW INTRODUCTORY PRICES

List \$4.99 ea. INTRODUCTORY SALE PRICE \$2.49 ea. (Box of 10 only) Total price \$24.90

\$3.33 ea. (3 quantity) Total price \$9.99

All LORAN disks come with hub rings and sleeves in an attractive package.

DISK DRIVE CLEANER \$19.95

Everyone Needs A Disk Drive Doctor

FACTS

- 60% of all drive downtime is directly related to poorly maintained drives.
- Drives should be cleaned each week regardless of use.
- Drives are sensitive to smoke, dust and all micro particles.
- Systematic operator performed maintenance is the best way of ensuring error free use of your computer system.

The Verifin disk drive cleaner can be used with single or double sided 5¼" disk drives. The Verifin is an easy to use fast method of maintaining efficient floppy diskette drive operation. The Verifin cleaner comes with 2 disks and is packed in a protective plastic folder to prevent contamination. List \$29.95. **Sale \$19.95.** * Coupon \$14.95.

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Fulfill All Your Personal & Business Needs "NOW"**S'MORE Cartridge Sale \$49.95****57% More Memory For BASIC****C128 Programming on your Commodore 64**

For the first time, the Commodore 64 computer owners can make use of the full memory that came inside their Commodore 64 without having to learn sophisticated assembly or machine language programming. The new S'MORE BASIC Cartridge allows BASIC programmers to use over 60K of RAM for BASIC programs. This 57% gain in available memory is not restricted in any way, it can be used for arrays, variables and BASIC programs which would over-load the capacity of an un-expanded Commodore 64. List \$69.95 **Sale \$49.95**

S'MORE (for Super Memory Optimized RAM/ROM Expansion) is a powerful cartridge-based program which provides...

- * 61,183 bytes of C-64 RAM memory freed for BASIC programming (57% more than the 38,911 now free). This gain is not restricted in any way, and can be used for arrays, variables, and BASIC programs which would overload the un-expanded C-64's capacity
- * Over 60 new and enhanced BASIC commands & functions
- * Full error trapping, and an automatic error help which lists the error line and places a flashing cursor at the beginning of the program statement containing the error
- * No peeks or pokes because S'MORE provides direct access to normally peeked/poked items
- * Full up-down scrolling through program listings for easier program editing

Relative File Commands: DOPEN# & RECORD#. **Print Using And Other Formatting Tools:** PRINT USING, PUDEF (define format for the PRINT USING function), & PRINT AT (row, col.). **Full Error Trapping:** TRAP, EL (returns error line #), ER (returns error #), ERR\$ (returns error description), RESUME, & RESUME NEXT. **Structured Programming Commands:** DO, LOOP, EXIT, UNTIL, & WHILE. **Formatted Input Commands:** GETKEY, INLINE, INPUT (improved), INPUT AT (row, col.), INFORM (limits allowed response keys and length of response). **Peeks & Pokes Not Needed:** Direct access to normally peeked/poked items is provided with commands like BORDER, PAPER, INK, VID(x) (x—screen memory location), COL(x) (x—color memory location), VIC(x), SID(x), CIA(x), NORM, UPPER, & LOWER.

A BRIDGE TO THE C-128: Commodore 64 owners get immediate memory expansion from S'MORE. S'MORE's command structure is similar to the C-128, allowing programmers to make use of advanced programming techniques available on the C-128's new BASIC 7.0 so that programs written on S'MORE BASIC may be more easily converted to run on the C-128.

Write Now! — Word Processor Sale \$34.95**Easy To Use Cartridge Based Word Processor for the C-64, With Full 80 Column On-Screen In Color View Mode**

The WRITE NOW! word processor provides you with the easiest to use, fastest to learn format available for your Commodore 64 computer. It will give you all the fetures you would expect in a professional word processor and some features not found in any other Commodore 64 word processor.

(Cartridge) List \$49.95. **Sale \$34.95. Coupon \$29.95.**

- Program is on cartridge and loads instantly so there is no waste of time loading from unreliable tapes or disks.
- Built in 80 column display allows you to see exactly what you will print including headers, footers, justification, page numbers and page breaks.
- Can send all special codes to any printer, even in the middle of a line without losing proper justification.
- Page numbering in standard numbers or upper or lower case Roman numerals.
- Full string search and search/replace functions.
- Direct unlimited use of previously stored text from tape or disk called from within text during the print out so it uses no memory space and allows creation of unlimited length documents.
- Full scrolling up and down through text.
- No complicated editing modes or commands.
- Multiple line headers and footers.
- Justification and text centering.
- Block copy and delete commands.
- Save text to tape or disk.
- Easy full screen editing.
- Works with any printer.
- Easy to understand instruction booklet.
- 4 help screens included.

Spell Now — Spell Checker Sale \$19.95

"Spell Now" is a disk based professional spelling checker that interfaces with the "Write Now" word processor for the C-64. Use "Spell Now" to check the spelling in your "Write Now" files. It includes all features of the most expensive spelling checkers on the market. (Disk) List \$39.95. **Sale \$19.95.**

Graph Now / Paint Now — Graphic/Logo Generator Sale \$19.95

A full graphics package capable of generating line, bar graphs and graphic art designs such as logos and pictures to be used with "Write Now" for the C-64. Save your graph or logo in a "Write Now" compatible file and print it out along with your "Write Now" text file. (Disk) List \$39.95. **Sale \$19.95.**

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Coin Controls
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Rated No. 1



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Allows keypad hook-up
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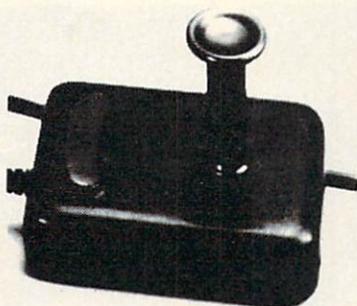
*"Three Way Firing"
Options*



*Single Button Economy Model

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\$8.95**



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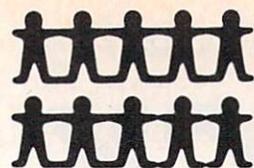
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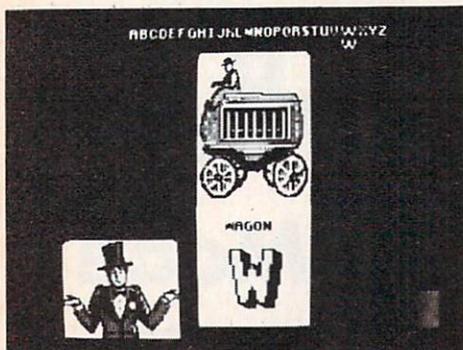
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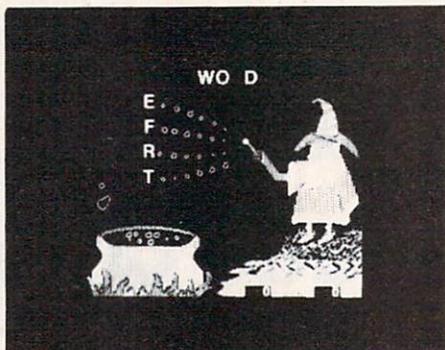
DLM



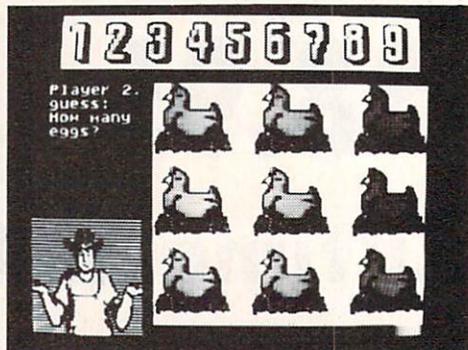
Makes your Computer into a Fun Classroom



Alphabet Circus. All the color and excitement of the big top are here, along with play-and-learn activities that enhance letter recognition, alphabet order, and text creation. The six games for one or two players are: Alphabet Circus, Meet the Circus, Alphabet Parade, Secret Letter, Juggler, and Marquee Maker. (Disk) List \$29.95. **Sale \$17.95.**



Spelling Wiz. A colorful wizard who uses his magic wand to zap missing letters into words, assists players in spelling more than 300 words commonly misspelled. (Disk) List \$34.00. **Sale \$19.95.**



Number Farm. Here's a bumper crop of activities design to develop recognition of numbers and number words and an understanding of the concept of numbers. The six games for one or two players are: Number Farm, Old McDonald, Hen House, Animal Quackers, Horseshoes, and Crop Count. (Disk) List \$29.95. **Sale \$17.95.**

Commodore 64 Sale

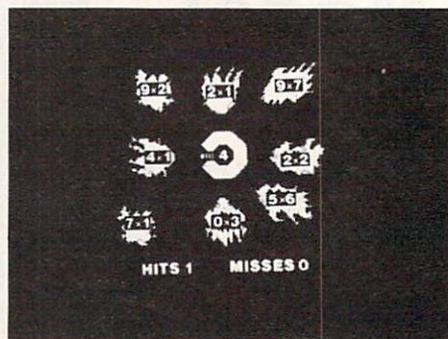
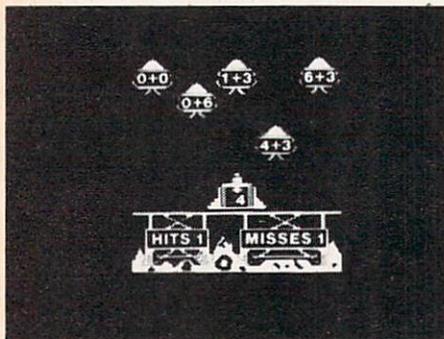
Alien Addition. The fast action and colorful graphics of arcade games motivate players of all ages to learn fundamental math skills. Alien addition provides practice in basic addition facts using an "Alien invasion" theme complete with spaceships and laser cannons. (Disk) List \$34.00. **Sale \$19.95.**

\$17⁹⁵ - \$19⁹⁵
Early Christmas Sale

Commodore 64 Sale

Alligator Mix. Players build skills in addition and subtraction as they feed hungry alligators. Very challenging, with great graphics. (Disk) List \$34.00. **Sale \$19.95.**

Meteor Multiplication. Have fun blasting meteors, while learning basic multiplication facts. Requires motivation as players practice and are drilled in multiplication skills. Fast action and colorful graphics keep interest of all ages. (Disk) List \$34.00. **Sale \$19.95.**



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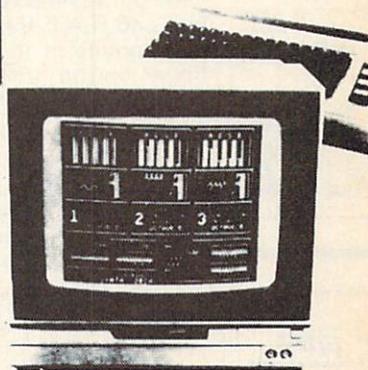
Also available is **Lite Sprite**, a light pen driven sprite builder (List \$39.95 **Sale \$29.95**).

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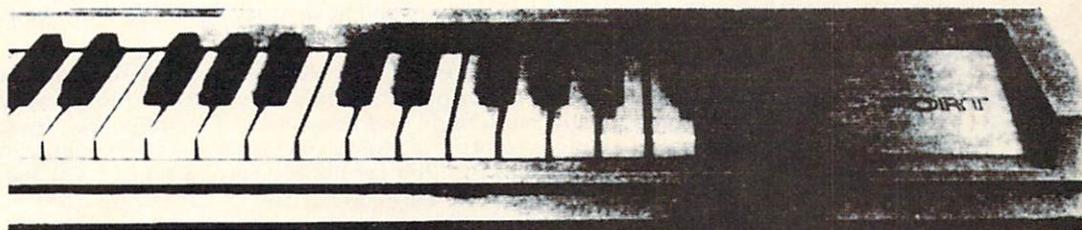
The ultimate music synthesizer and multi-track recording system for the Commodore 64. A **Full-sized REAL Keyboard** and all software including preprogrammed songs are included. (Disk) List \$149.95 **Sale \$99.00.**

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Winter Games — Experience the challenge of six winter sporting events. In the Bobsled, you're right in the tube careening along the walls. At the SkiJump, you control your form in take-off, flight and landing. In Figure Skating, timing counts for the transitions, the jumps and landings. Choreograph your own routine in Free Style Skating. Hot Dog Aerials push your agility to new heights. The Biathlon challenges your endurance in cross-country skiing. There's even an opening ceremony, complete with national anthems. One to Eight Players.
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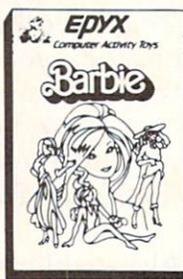


The World's Greatest Football Game — This one has it all — strategy, action, three views of the field. It's in a class all its own! Finally, a football game that not only puts you on the field, but also on the sidelines in the coach's shoes. Use the "Playbook" or design your own offensive and defensive plays. Then, grab the joystick and put your strategy to the test. You control key players to run a sweep, make a tackle, throw a pass and even kick a fieldgoal. All the action and all the strategy make this your favorite football game. (Disk) List \$39.95. **Sale \$22.95.**



Jet Combat Simulation. Flight simulation programs are the most requested in the country. The key to a good one is realism, the sensation of being in the cockpit — guiding the plane through take-offs, landings and air to air — air to ground combat. You are an Air Force pilot and your mission is critical. Your success in completing your orders depends on how quickly and accurately you react. Very Intense — Fantastic Graphics, animation and control elements. (Disk) List \$39.95. **Sale \$22.95.**

Barbie — The biggest name in dolls. Browse through Barbie's closet full of beautiful clothing and dress her for the party. You can cut her hair or make it longer and color it or change the style. Buy new clothing at the boutique or any of the six other specialty shops, or even go to the dress shop and create Barbie's designer clothes with the help of the computer. The combinations are endless and so is the fun. One or two players.
(Disk) List \$39.95. **Sale \$24.95.**



Ballblazer — Unique split-screen, 3-D graphics give you and your opponent a first person view of the field of play. You race across the playfield in your Rotofoil trying to capture the ball and fire it through the goal before your opponent. The winner is the player with the most points at the end of the timed competition. Hold onto your joystick and keep that finger on the fire button, this is the type of two player head-to-head action you've been waiting for. Two Players. (Disk) List \$29.95. **Sale \$24.95.**

Summer Games II — The original Summer Games was last Summer's No. 1 seller. Carry on the tradition with another chance to "Go for the Gold!" Introducing Summer Games II with 8 new Olympic events including Kayaking, cycling, fencing, diving, track & field, gymnastics and equestrian. The excitement of Olympic competition is present in this new version as it was in the original. Great graphics and sound effects. This one's a winner! (1 to 8 players). (Disk) List \$39.95. **Sale \$24.95.**



G.I. Joe — The best selling toy soldier is now available as an activity toy on the home computer. Select the battle situation then choose the equipment you think you will need to get the job done. Choose from a number of uniforms and weapons in your well stock arsenal and get ready for the action. Play alone or with a friend, if you plan the right strategy you will complete the mission if not you will have to try again. One or two players.
(Disk) List \$39.95. **Sale \$24.95.**

Rescue On Fractalus! — Your mission is to fly your Valkyrie Fighter through the Jaggi defenses and rescue the downed Ethernorps pilots. Sounds easy, but don't let it fool you. It's tough enough just to navigate the mountains and canyons of Fractalus, but try doing it while destroying enemy gun emplacements or dodging suicide saucers. We supply the Long Range Scanner, Dirac Mirror Shield and Anti-Matter Bubble Torpedoes ... YOU supply the skill and guts! One Player. (Disk) List \$29.95. **Sale \$24.95.**



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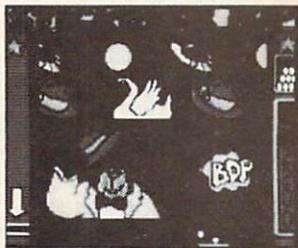
Weekly Reader

Commodore 64
SALE

XEROX Educational Programs

Stickybear Bop

Rack up points by bopping all kinds of objects — planets, stars, ducks, and more... First, you'll flip balls at an animated shooting gallery of whizzing targets that appear. Bop as many as you can. Bop more, score more!... To pile up points in succeeding rounds, you must bop the assorted objects Mr. and Mrs. Stickybear are juggling...don't get bopped by the sandbags Stickybear drops when he sails across the top of the screen in his balloon... and watch out for a pair of silly birds who will try to steal the little balls you need to play with. The game continues with more shooting galleries, sandbags, a bigger flock of silly birds, and more of everything to be bopped. (Disk) List \$34.95. **Sale \$24.95.**



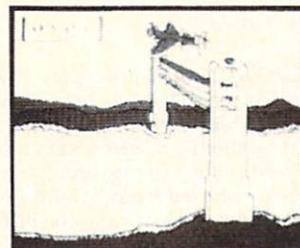
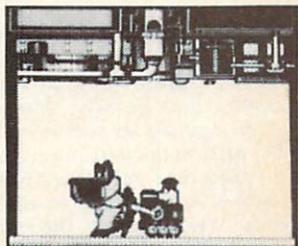
Stickybear Numbers

There are colorful groups of big moving objects, such as ducks, birds and bears, that reinforce numbers and counting skills. You can use the space bar to learn to count up and down. The many possible picture combinations work to captivate youngsters with an endless variety of picture shows and give them plenty of hands on computer experience. (32 page book, disk, colorful Stickybear poster, Stickybear stickers.) (Disk) List \$34.95. **Sale \$24.95.**

Stickybear Basketbounce

Your goal is to win as many points as you can by catching colorful, bouncing, falling objects — including bricks, donuts, and stars — before running out of baskets. While trying to accumulate points, Stickybear must duck falling objects and dodge moving ground obstacles that try to trip you. Keep score on the computer to see which player's on top.

New obstacles and falling objects in each successive round require more and more skill in order to score. The rounds increase in difficulty as you progress through each level, making Stickybear Basketbounce a game that is fun and challenging for all ages. (Disk) List \$34.95. **Sale \$24.95.**



Stickybear Opposites *Award Winner!*

Stickybear floats across the screen on unicycles, in cars, on hot air balloons and other delightful vehicles to teach beginners about opposites and build reasoning skills.

Such concepts as up/down, full/empty, in front/behind and more soon become crystal clear as Stickybear does his stuff with fun activities and eye-popping animation. A colorful book and a poster provide additional opposites for 3- to 6-year-olds to learn. (Disk) List \$34.95. **Sale \$24.95.**

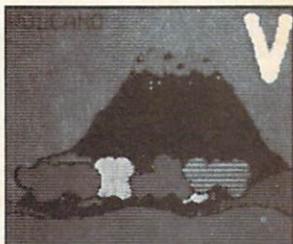
Outstanding Software Award — Preschool Education — Creative Computing.

Stickybear ABC *Award Winner!*

Beautifully animated pictures help children learn their ABC's and become familiar with computers. Two full-screen, full-color pictures with sound represent each letter in the alphabet.

Besides helping boys and girls become familiar with computers, Stickybear ABC teaches younger children to recognize and name the letters. Older children begin to recognize words on sight. (Disk) List \$34.95. **Sale \$24.95.**

Best Software of the Year — Learning Magazine Parents' Choice Award — Parents' Choice.



Stickybear Shapes

Three delightful, full-color games help 3- to 6-year-olds identify circles, squares, triangles, rectangles and diamonds. When the youngster makes a correct choice, a big, bright picture comes alive with colorful animation! Even older children who have already learned these shapes will enjoy experimenting with Stickybear Shapes!

A special book and poster that accompany the disk provide additional activities for building shapes recognition, an essential school skill. (Disk) List \$34.95. **Sale \$24.95.**

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ReportWriter — Lets you make 'data' into information that can be reorganized and presented to help you make decisions. You need invoices turned into commission reports, customer leads tuned into mailing labels, accounts receivable turned into letters to your customers. ReportWriter can handle all of these requests. You create your own report ideas with ReportWriter. A report can be simple columns of figures, a memo, a check, a label, whatever you need. You may create as many reports as you like from the same files; it will report to the computer screen or to your printer. (Disk) List \$39.95. **Sale \$29.95. Coupon \$24.95.**

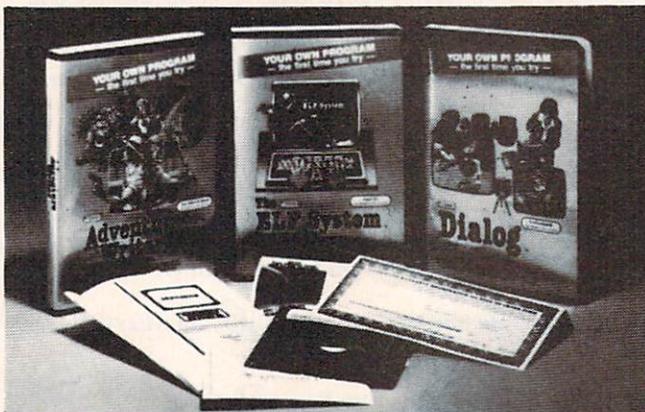


MenuWriter — MenuWriter links programs together so the user can select the program he needs by pressing just one key. Where good program design calls for several different files or reports to load smoothly and quickly, MenuWriter does the job. You set up screen after screen (up to 21) of simple clear menu formats to link your programs together. Menus can call programs to auto-load or simply call other menus. You control the whole process - from color selection to screen layout, to key choice. Whether you're working with CodeWriter programs or your own, MenuWriter will give you professional menu results the first time. (Disk) List \$39.95. **Sale \$29.95. Coupon \$24.95.**



SpeedWriter — What do you do with a BASIC program that you wrote (or bought, or typed) that is nice, does what you wanted it to do, but is just too slow to suit your needs? SpeedWriter makes BASIC FLY! A must for the sophisticated programmer, yet easy enough for the novice. Reduces program size up to 50%, in addition to speeding up your program to run 10-30 times faster. Couldn't be simpler! (Disk) List \$49.95. **Sale \$39.95. Coupon \$34.95.**

AdventureWriter — You think playing computer adventure games is exciting? How about the thrill of creating your own? It's all in this package. Your own heroes and villains, monsters and magicians, castles and coffins. You create complete adventure games without programming, which run on your disks. As many adventures as you can dream up - your treasures, your own fiendish riddles, and your treacherous plots for your friends to figure out! You control locations, treasures, hazards, characters, all descriptions and the plot. Computer adventures are one of the fastest growing hobbies around. Send them in for evaluation, we could market them for you. * graphics included in Commodore. **Com-64 Version** (Disk) List \$49.95. **Sale \$39.95. Coupon \$34.95. Atari Version** (Disk) List \$39.95. **Sale \$29.95.**



Dialog — You can create all the EDUCATIONAL programs you can imagine without programming with the DIALOG program. Dialog is a simple on-screen process which allows you to create the first time you try, programs to educate children, inform adults, or just to entertain. Everything from simple tests to training manuals to complete novels. You control all the text, questions and answers. Any presentation is made more alive with the human give and take of real questions and answers. The Dialog system writes all the computer code onto your disk -to distribute any way to like. Graphics included. (Disk) List \$49.95. **Sale \$39.95. Coupon \$34.95.**

ELF System — Finally, a simple way to create calculation/print programs. These are NON-FILE programs which let you: (A) Collect information; (B) Number crunch with all the conditional calculations you need; (C) Display the results to the screen or printer any way you'd like. It's like a spreadsheet without rows and columns an a super calculating word processor without the hassle. (Disk) List \$39.95. **Sale \$29.95. Coupon \$24.95.**

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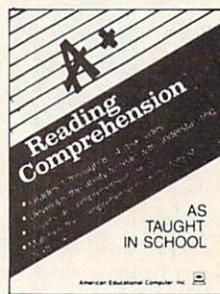
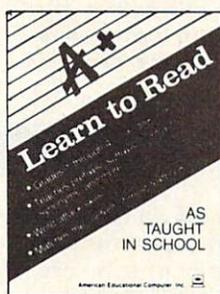
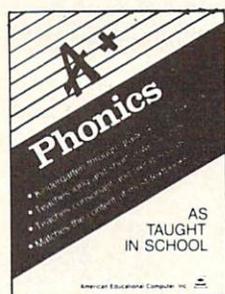
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All programs were written by teachers and have been classroom validated. These programs teach in a standard classroom format with rewards as the user gets through the various lessons.

Atari & Commodore 64

EasyReader Series

There are three programs in this series designed and tested by teachers from the appropriate grade levels for accurate content. Each disk keeps track of the students name, ensuring that the user completes one lesson before starting a new one. Animation, Graphics and sound are used in a successful way that keeps the child's interest as he learns each new skill. Correct answers are rewarded and wrong answers are corrected. Very easy to use, with most instructions appearing on the screen when needed.

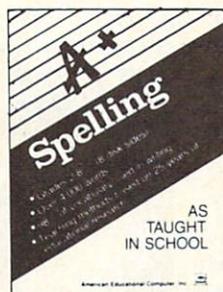


Phonics. A program designed to teach beginning phonics: the sound of vowels and consonants. Helps child to develop skills for successful reading. The material covered follows the same guidelines of most textbooks. 8 disk sides; for Kindergarten through grade 4. (Disk) List \$39.95. **Sale \$24.95.**

Learn To Read. Provides work with structural word skills — contractions, prefixes, suffixes, synonyms and more. Prepares child for material that will be covered in the classroom as well as building on traditional school curriculum. Grades 1-4. (Disk) List \$39.95. **Sale \$24.95.**

Reading Comprehension. Helps child to develop reading skills with an accent on understanding the material presented. Teaches cause and effect, similarities and differences, predicting outcomes, main ideas and more. Grades 1-8. (Disk) List \$39.95. **Sale \$24.95.**

Atari & Commodore 64



(Disk)

AEC Spelling — A series of seven educational software programs for grades 2 through 8. It teaches the spelling of 4,000 words most commonly used in writing (98% of most people's writing vocabulary). The word lists used are the result of over 25 years of research into the writing/spelling needs of children and adults. Each grade level consists of one two-sided disk with word lists on one side and study activities on the other. The activities are designed to develop mastery in spelling utilizing a Test/Teach/Test approach. A pre-test is used to find out which words a user cannot spell correctly. These are recorded on a "Words To Study" list. The activities for learning these words are provided. Finally, a post-test is taken by the learner to measure progress. The approach is simple and rewards are built in. (Grades 1-8) List \$39.95. **Special Sale — 8 programs/4 disks \$24.95.**



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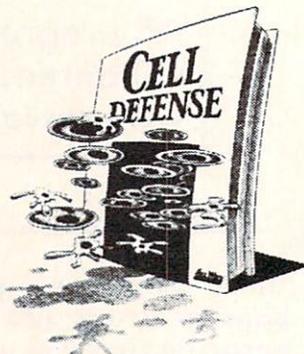
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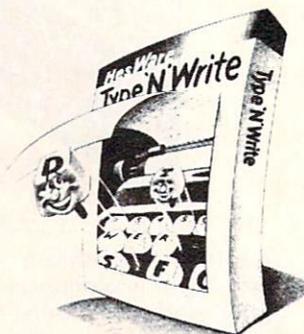


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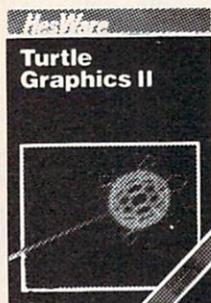
Super Zaxxon — Use the skills and tactics you learned in Zaxxon to master the new patterns and dangers in Super Zaxxon. Floating foretresses but with deadlier weapons and tighter passageways. 3-dimensional perspective but with even more realistic graphics. 3-dimensional flight but with a perilous tunnel requiring even more precise control. And a fire-breathing dragon that makes Zaxxon's robot look like a wimp. (Disk) List \$29.95. **Early Christmas Sale \$9.95.**

Early

Typing Tutor — Give your children an education they'll never get in school. Just think how much a child could learn if they had their very own private teacher at home. That kind of specialized help is now available through educational software programs from HesWare. There's Type 'N' Write, for the Commodore 64, that introduces your children to keyboard skills. Touch typing. And even word processing, for creating and editing up to eight pages. (Disk) List \$29.95. **Early Christmas Sale \$9.95.**



Christmas



Turtle Graphics II (LOGO) — An exciting and fun way to discover computer programming concepts. Turtle Graphics II is an easy-to-learn computer language that enables the beginning programmer to master the computer in just a few minutes. By telling an imaginary turtle how to roam about on the screen, the Turtle Graphics II programmer can create colorful and artistic pictures. As one becomes more and more adept at teaching the turtle to paint, he or she is painlessly learning all of the basics of computer programming. This not only develops computer awareness but enriches one's math, logic, communication and artistic skills as well. List \$29.95. **Early Christmas Sale \$9.95.**

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Now you can play pool on your Commodore-64. Sharpen your aiming accuracy and shooting finesse. Using only a joystick and a few keystrokes you choose where to aim and how much power to use. Fantastic action. (Cartridge). List \$29.95. **Early Christmas Sale \$9.95.**



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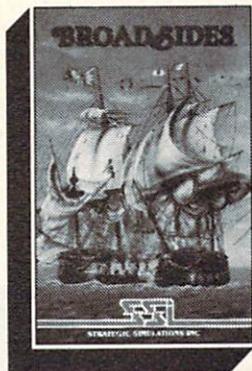
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Broadsides — A tactical simulation of ship-to-ship combat between sailing ships of the Napoleonic era. You will match yourself against another ship commanded by the computer or by a human opponent. To be victorious you may use various types of ammunition for your cannons, or you may attempt to board the other ship and engage in close combat using swords and muskets. (Disk)

List \$39.95. **Sale \$24.95.**



Computer Quarterback — This game offers true realism in a very playable format! Two players compete by selecting plays and then watching the animated action of their teams clash on the gridiron. The use of the game paddles allows each team to enter their plays in secret (as if in their respective huddles) until the offense "hikes" the ball. Fantastic Action. (Disk)

List \$39.95. **Sale \$24.95.**



Field of Fire — World War II combat that allows you to direct fire, order assault and movement of fireteams on a scrolling hi-res. screen. Lead Easy Company of the First Infantry Division through eight historical battles in North Africa and Europe. (Disk).

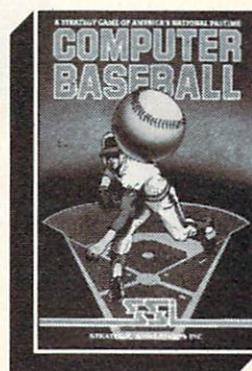
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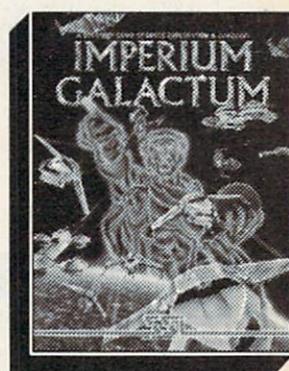
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SHADEYDUMP

for the C-64 and Gemini Printer

BY MICHAEL SCHELL

Some of the most popular software packages for the Commodore 64 are graphics programs. Using these, one can produce remarkable color pictures on the screen. Unfortunately, few screen dumps can account for color. By printing a different 4x4 dot pattern for each of the 16 colors, *ShadeyDump* produces a gray scale printout of any bitmapped hi-res (or multicolored) screen consisting of over a million dots.

Written in 100% machine language to be used with the Gemini 10X double-density, double-speed graphics mode, *ShadeyDump* can print either standard bit-mapped screens or multicolored bit-mapped screens. *ShadeyDump* can print a mirror image of the screen. *ShadeyDump* can be used with any hardware printer interface, or with a user port software driven interface. *ShadeyDump* even includes

built-in BLOCKLOAD and BLOCKSAVE commands to simplify loading of hi-res screens.

USING SHADEYDUMP

When loaded, *ShadeyDump* assumes several things. The first is that your picture is a standard hi-res image located at 24576 and the color information is stored at 23552. This format is compatible with pictures created with the *DOODLE!* graphics package. Second, *ShadeyDump* assumes that you are using a printer interface which responds to device number 4, and in transparent mode with secondary address 5. If either of these assumptions are wrong you will need to change some of *ShadeyDump's* pointers.

To *ShadeyDump* a *DOODLE!*-compatible picture, sim-

SHADEYDUMP SOURCE CODE LISTING

LOC LINE

```
0000 ;*****
0000 ;*
0000 ;*   SHADEYDUMP   *
0000 ;*   VERSION 2.0   *
0000 ;*
0000 ;* (A GRAY SCALE SCREEN DUMP) *
0000 ;*
0000 ;* (C) 1985 BY MICHAEL SCHELL *
0000 ;*
0000 ;*****
0000 ;*
0000 ;*   = SC000      *
0000 ;*****
0000 ;*
0000 ;*   EQUATES     *
0000 ;*
0000 ;*****
0000 ;*
0000 BASE = $57
0000 COLPTR = $59
0000 COLUMN = $5B
0000 DOTS = $5C
0000 COLHLF = $5D
0000 DBLSTR = $5E
0000 ROW = $5F
0000 CBYTE = $60
0000 FAC1 = $61
0000 FAC2 = $69
0000 COLOR = $FB
0000 ;*
0000 CIAIOR = $DD01
0000 CIADDR = $DD03
0000 CIAICR = $DD0D
0000 ;*
0000 ICHROT = $326
0000 SETLFS = $FFBA
0000 SETNAM = $FFBD
0000 OPEN = $FFC0
0000 KCLOSE = $FFC3
0000 CHKOUT = $FFC9
0000 CLRCHN = $FFCC
0000 CHROUT = $FFD2
0000 ;*****
0000 SCRNDP JSR CONECT
0003     LDX #0
0005 LOOP1 STX COLUMN
0007     LDX #1
0009 LOOP2 STX COLHLF
000B     JSR NXTCOL
000E     LDX #0
0010 LOOP3 STX DBLSTR
0012     JSR INTLIN
0015     LDA RVSPFLG
0018     BEQ RVS1
001A     LDX #24
001C     .BYTE $2C ;BIT
001D RVS1 LDX #0
001F LOOP4 STX ROW
0021     JSR SETCOL
0024     LDA RVSPFLG
0027     BEQ RVS2
0029     LDX #7
002B     .BYTE $2C ;BIT
002C RVS2 LDX #0
002E LOOP5 STX CBYTE
0030     JSR PRTCHR
0033     LDA RVSPFLG
0036     BEQ RVS3
0038     LDX CBYTE
003A     DEX
003B     BPL LOOP5
003D     LDX ROW
003F     DEX
0040     BPL LOOP4
0042     BMI SKIP1
0044 RVS3 LDX CBYTE
0046     INX
0047     CPX #8
0049     BNE LOOP5
004B     LDX ROW
004D     INX
004E     CPX #25
0050     BNE LOOP4
0052 SKIP1 LDX DBLSTR
0054     INX
0055     CPX #2
0057     BNE LOOP3
0059     LDX COLHLF
005B     DEX
005C     BPL LOOP2
005E     LDX COLUMN
0060     INX
0061     CPX #40
0063     BNE LOOP1
0065     JMP CLOSE
0068 ;*
0068 ;*****
0068 ;*
0068 ;*   PRINTER ROUTINES *
0068 ;*
0068 ;*****
0068 ;*
0068 CONECT LDA INTMOD
006B     BEQ SERIAL
006D     PARALL LDA #$FF
006F     STA CIADDR
0072     LDA ICHROT
0075     STA VECTOR
0078     LDA ICHROT+1
007B     STA VECTOR+1
007E     LDA #<PRTOUT
0080     STA ICHROT
0083     LDA #>PRTOUT
0085     STA ICHROT+1
0088     BNE SETLFS
008A ;*****
008A SERIAL LDA #4
008C     LDX DEVNUM
008F     LDY SECADD
0092     JSR SETLFS
0095     LDA #0
0097     JSR SETNAM
009A     JSR OPEN
009D     LDX #4
009F     JSR CHKOUT
00A2 ;* * * * *
00A2 SETLFS JSR ESCAPE
00A5     LDA #51
00A7     JSR CHROUT
00AA     LDA #1
00AC ;* * * * *
00AC CRRT1 JSR CHROUT
00AF ;* * * * *
00AF CRRT LDA #13
00B1     JSR CHROUT
00B4     LDA #10
00B6     JMP CHROUT
00B9 ;*****
00B9 ESCAPE LDA #27
00BB     JMP CHROUT
00BE ;*****
00BE PRTOUT PHA
00BF     STA CIAIOR
00C2     LDA #S10
00C4     ACKCHR BIT CIAICR
00C7     BEQ ACKCHR
00C9     PLA
00CA     RTS
00CB ;*****
00CB NXTCOL JSR ESCAPE
00CE     LDA #74
00D0     JSR CHROUT
00D3     LDA #13
00D5     JMP CRRT1
00D8 ;*****
00D8 INTLIN JSR CRRT
00DB     JSR ESCAPE
```

ply load the picture using:

```
LOAD "(NAME)",8,1
```

After loading your picture run *ShadeyDump* with:

```
SYS 49152
```

If you wish to print a hi-res image located somewhere else in memory you will have to change two pointers. You can POKE 49704 and 49705 with the proper address of the bit-map in standard low-byte/high-byte format and change the pointer to the video matrix at 49706 and 49707, but *ShadeyDump* can do this for you. Simply use the following *ShadeyDump* SYS command:

```
SYS 49936, (ADDRESS OF BIT MAP),(ADDRESS OF VIDEO MATRIX)
```

Example: to *ShadeyDump* a *DOODLE!* image enter this line:

```
SYS 49936,24576,23552
```

ShadeyDump will automatically POKE all the proper locations to print your picture.

Printing a multicolor picture requires changing four pointers, the pointer to the bit map at 49704, the pointer to the video matrix at 49706, the pointer to color memory at 49708, and the pointer to the screen color at 49710, and toggling setting one flag at 49703 to zero. You can

use POKES to set these pointers, or you can again use a *ShadeyDump* SYS command:

```
SYS 49960, (ADDRESS OF BIT MAP),(VIDEO MATRIX),(COLOR MEMORY),(SCREEN COLOR)
```

Example: to *ShadeyDump* a *Koala* image enter this line:

```
SYS 49960,24576,32576,33576,34576
```

Again *ShadeyDump* will automatically POKE all the proper locations.

Most users of *ShadeyDump* will use a serial port interface such as those made by Cardco. *ShadeyDump* defaults to this type of interface with a device number of 4 and secondary address of 5. To change the device number POKE 49716 with the proper number, and to change the secondary address POKE 49717 with the proper value.

Some users will prefer to use a parallel interface connected through the user port. *ShadeyDump* has a built-in driver routine to use this type of interface. To access this feature POKE 49713 with a one to toggle the interface flag.

ADVANCED SHADEYDUMP TOPICS

If the standard version of *ShadeyDump* defaults to values that are not optimal for your use, you can easily save a custom version of *ShadeyDump* using *ShadeyDump's* built-in BLOCKSAVE SYS command. After changing *ShadeyDump's* pointers and flags, save your new version of *ShadeyDump* with:

```
CODE      LDA #121          C130      CLC                C193      STA FAC2+1
COE0      JSR CHROUT       C131      ADC FAC2         C195      LDA BASE
COE3      LDA #32          C133      STA FAC2         C197      STA FAC2
COE5      JSR CHROUT       C135      BCC SKIP2        C199      LDX #03
COE8      LDA #3           C137      INC FAC2+1      C19B      LOOP8  ASL FAC2
COEA      JMP CHROUT       C139      LDA FAC2         C19D      ROL FAC2+1
COED      ;*****          C13B      STA BASE          C19F      DEX
COED      CLOSE LDA INTMOD C13D      LDA FAC2+1        C1A0      BNE LOOP8
COF0      BEQ SCLOSE       C13F      STA BASE+1        C1A2      LDA HIRES
COF2      PCLOSE LDA VECTOR C141      LDA SCREEN       C1A5      CLC
COF5      STA ICHROT       C144      CLC                C1A6      ADC FAC2
COF8      LDA VECTOR+1    C145      ADC FAC2         C1A8      STA FAC2
COFB      STA ICHROT+1    C147      STA FAC2         C1AA      LDA HIRES+1
COFE      RTS              C149      STA COLPTR       C1AD      ADC FAC2+1
COFF      SCLOSE JSR CLRCHN C14B      LDA SCREEN+1     C1AF      STA FAC2+1
C102      LDA #4           C14E      ADC FAC2+1        C1B1      RTS
C104      JMP KCLOSE       C150      STA FAC2+1        C1B2      ;*****
C107      ;*                C152      STA COLPTR+1     C1B2      PRTPCHR LDY CBYTE
C107      ;*****          C154      LDY #0           C1B4      LDA (FAC2),Y
C107      ;*                C156      LDA (COLPTR),Y   C1B6      STA FAC2+2
C107      ;*      MATH ROUTINES * C158      AND #15          C1B8      LDA COLHLF
C107      ;*                C15A      STA COLOR+1      C1BA      BNE SKIP4
C107      ;*****          C15C      LDA (COLPTR),Y   C1BC      LDX #4
C107      .MAC TIMES       C15E      LSR A            C1BE      LOOPA  ASL FAC2+2
C107      LDA #1           C15F      LSR A            C1C0      DEX
C107      STA FAC2+2       C160      LSR A            C1C1      BNE LOOPA
C107      LDA #?2         C161      LSR A            C1C3      SKIP4  LDY #3
C107      STA FAC2+3       C162      STA COLOR+2      C1C5      LOOPB  STY DOTS
C107      JSR MULTPY      C164      LDA BASE+1      C1C7      LDA MCMODE
C107      .MND             C166      STA FAC2+1      C1CA      BEQ MCDMP
C107      ;*****          C168      LDA BASE          C1CC      HIRDMP  LDY #4
C107      MULTPY LDA #0     C16A      STA FAC2         C1CE      LDA FAC2+2
C109      STA FAC2         C16C      CLC                C1D0      STA FAC2+3
C10B      STA FAC2+1       C16D      ADC COLMEM       C1D2      HLOOPC ASL FAC2+3
C10D      LDX #8           C170      STA FAC2         C1D4      LDA #00
C10F      SHIFT ASL A      C172      LDA BASE+1      C1D6      ROL A
C110      ROL FAC2+1      C174      ADC COLMEM+1    C1D7      TAX
C112      ASL FAC2+2       C177      STA FAC2+1      C1D8      INX
C114      BCC CHCNT       C179      LDY #00          C1D9      BNE SKIP12
C116      CLC              C17B      LDA (FAC2),Y     C1DB      MCDMP  LDY #2
C117      ADC FAC2+3       C17D      AND #15          C1DD      LDA FAC2+2
C119      BCC CHCNT       C17F      STA COLOR       C1DF      STA FAC2+3
C11B      INC FAC2+1      C181      LDA BCKGRN      C1E1      MLOOPC ASL FAC2+3
C11D      CHCNT  DEX       C184      STA FAC2         C1E3      LDA #00
C11E      BNE SHIFT       C186      LDA BCKGRN+1    C1E5      ROL A
C120      STA FAC2         C189      STA FAC2+1      C1E6      ASL FAC2+3
C122      RTS              C18B      LDA (FAC2),Y     C1E8      ROL A
C123      ;*****          C18D      AND #15          C1E9      EOR #3
C123      SETCOL TIMES ROW,40 C18F      STA COLOR+4      C1EB      TAX
C12E      LDA COLUMN      C191      LDA BASE+1        C1EC      SKIP12 LDA COLOR,X
```

SYS 49876,49152,50010,"(NAME)",(DEV. NO.)

Using this feature it is possible to have a different version of *ShadeDump* for every graphic package that you own.

The proper syntax for the BLOCKSAVE command is:

SYS 49876, (STARTING ADDRESS),(ENDING ADDRESS+1),"(FILE NAME)",(DEV. NO.)

ShadeDump also includes a BLOCKLOAD SYS command to allow you to load files to non-standard locations. The proper syntax is:

SYS 49909, (LOAD ADDRESS),"(NAME)",(DEV. NO.)

ShadeDump's dot matrix is stored in memory starting at 49734 and running to 49861. The dot matrix runs from lightest color to darkest. Each color is represented by eight bytes, four for the first strike and four for the second strike. *ShadeDump* only uses the two least significant bits of each byte in printing the dot pattern. Using a monitor or simply POKEing values (0-3) into these locations you can change, and improve, the dot patterns *ShadeDump* uses to print gray scales. You can save your new improved version of *ShadeDump* with the BLOCKSAVE command.

Finally, *ShadeDump* can produce mirror images of the pictures it dumps. To print a mirror image simply POKE 49712 with a zero. □

SEE PROGRAM LISTING ON PAGE 139

```

C1EE      TAX                      C23B      C26C
C1EF      LDA SHADE,X              C23C      C26D
C1F2      ASL A                    C23D      C26E      .BYTE 0,3,0,0,3,0,0,0
C1F3      CLC                      C23E      C26F
C1F4      ADC DBLSTR               C23F      C270
C1F6      ASL A                    C240      C271
C1F7      ASL A                    C241      C272
C1F8      ADC DOTS                 C242      C273
C1FA      TAX ;X=((SHADE*2)+DBLSTR)*4 C243      C274
C1FB      LDA MCMODE               C244      C275
C1FE      BNE SKIP13              C245      C276      .BYTE 3,0,0,0,0,3,0,0
C200      LDA MATRIX,X             C246      C277
C203      LSR A                    C246      MATRIX .BYTE 0,0,0,0,0,0,0,0
C204      ROL FAC2+4              C247
C206      LSR A                    C248
C207      ROL FAC2+4              C249
C209      SKIP13 LDA MATRIX,X      C24A
C20C      LSR A                    C24B
C20D      ROL FAC2+4              C24C
C20F      LSR A                    C24D
C210      ROL FAC2+4              C24E      .BYTE 0,0,1,0,0,2,0,0
C212      DEY                      C24F
C213      BEQ SKIP14              C250
C215      LDA MCMODE               C251
C218      BEQ MLOOPC              C252
C21A      BNE HLOOPC              C253
C21C      SKIP14 LDA FAC2+4        C254
C21E      JSR CHROUT              C255
C221      LDY DOTS                 C256      .BYTE 1,0,0,0,0,2,0,0
C223      DEY                      C257
C224      BPL LOOPB               C258
C226      RTS                      C259
C227      ;*****                  C25A
C227      MCMODE .BYTE 255          C25B
C228      SCREEN .WORD $5C00       C25C
C22A      HIRES .WORD $6000        C25D
C22C      COLMEM .WORD $8000       C25E      .BYTE 0,1,2,0,1,2,0,1
C22E      BCKGRN .WORD $D021       C25F
C230      RVSLFLG .BYTE 255        C260
C231      INTMOD .BYTE 0           C261
C232      VECTOR .BYTE 0,0         C262
C233      C263
C234      DEVNUM .BYTE 4            C264
C235      SECADD .BYTE 5           C265
C236      ;*****                  C266      .BYTE 2,1,0,2,0,2,1,0
C236      SHADE .BYTE 15,0,11,4,10,6,14,1 C267
C237      C268
C238      C269
C239      C26A
C23A      C26B

```

SHADEYDUMP MULTICOLOR FILE POINTERS By Morton Kevelson

ShadeDump can generate a gray scale printout for any multicolor image, not just *Koala* files. Here is a list of file parameters for some popular multicolor drawing packages for the C-64. The table lists the parameters in the proper format for the *ShadeDump* SYS command:

SYS 49960, BMP, VM, CM, SC

Where: BMP = bit map
VM = video matrix
CM = color memory
SC = screen color

| | NOTE | BMP | VM | CM | SC |
|--------------------------|------|-------|-------|-------|-------|
| Koala Printer | 1 | 24576 | 32576 | 33576 | 34576 |
| Peripheral Vision | 2 | 24576 | 23552 | 32768 | 24575 |
| Paint Magic | 3 | 16384 | 24576 | 25576 | 24384 |
| Flying Colors | | 8192 | 7168 | 6144 | 8191 |
| Blazing Paddles | 4 | 24576 | 32768 | 33792 | 32640 |
| Micro Illustrator | 5 | 8384 | 6384 | 7384 | 6383 |

Notes:

All files should be LOAded using a nonrelocating LOAD "filename",8,1 except as noted below.

1. The only thing unusual about *Koala* files is the structure of the file name. The first character is always shifted reverse "A" (CHR\$(129)). The file name is always exactly 15 characters long. If the text of the name is not long enough it is padded with spaces (CHR\$(32)). If you are having trouble LOAding a *Koala* file then try using the DOS wild card characters; for example, "?PIC A NAME*".

2. *Peripheral Vision* stores its multicolor images in two files, one for the bit map and video matrix and the other for color memory. The first character of the bit map file name is the British

Pound (£) symbol (CHR\$(92)). The last four characters are ".BMP". The rest of the file name can contain up to 11 user assigned characters. The last four characters of the color memory file are ".CMM". The remaining characters of the file name are the same 11 user assigned characters as above. The color memory file must not be LOAded using a nonrelocating LOAD. It normally occupies the same memory as *ShadeyDump*. Instead use *ShadeyDump*'s BLOCKLOAD SYS command to relocate the color memory to a safe location:

```
SYS 49909,32768,"FILENAME.CMM",8
```

Peripheral Vision does not save the screen background color byte. It is always assumed to be white. Before executing *ShadeyDump* you must POKE 24575,1 in order to assign the proper screen background color.

3. *Paint Magic* files can be LOAded in two ways. The first, as a BASIC LOAD, allows the *Paint Magic* file to be viewed by simply RUNning it. The other is a nonrelocating LOAD. Use only the nonrelocating LOAD "file name",8,1 for *Paint Magic* with *ShadeyDump*. *Paint Magic* saves only a single byte which is used to fill the entire 1000 bytes of color memory. The color value for color memory is stored in location 24387. Since *ShadeyDump* expects a complete 1,000 byte color memory for a multicolor file, you will have to provide it. After LOAding the paint magic file and before executing *ShadeyDump* simply RUN the following brief program.

```
10 A=PEEK(24387)
20 FOR I=25576 TO 26575
30 POKE I,A
40 NEXT I
```

This will set up the contents of color memory.

4. Most of the *Blazing Paddles* multicolor image file is located in the RAM hidden beneath the BASIC ROM. The video matrix and color memory information LOADs into the \$C000 block which is occupied by *ShadeyDump*. Use the *ShadeyDump* BLOCKLOAD SYS command to relocate the *Blazing Paddles* file to 24576 by entering

```
SYS 49909,24576,"FILE NAME",8
```

The original *Blazing Paddles* file parameters are:

```
40960-48959 Bit Map
49023 Border Color (low nybble)
49024 Background Color (low nybble)
49152-50151 Video Matrix
50176-51175 Color Memory
```

Suncom's Animation Station uses a customized version of the *Blazing Paddles* software. Multicolor image files created with the Animation Station should be treated exactly as *Blazing Paddles* files.

5. The *Micro-Illustrator* multicolor files are brought in with a nonrelocating LOAD. The screen background color is assumed to be white. You will have to POKE 6383,1 before executing *ShadeyDump*.

Although both *Peripheral Vision* and *Blazing Paddles* have built-in gray scale printer dumps, you will still find *ShadeyDump* useful. As a stand-alone routine it may be readily incorporated into your own programs. Having access to the source code will allow you to customize *ShadeyDump* to your own needs. Most notably the gray scale can be adjusted to accommodate varying image densities. *ShadeyDump* images are proportioned very close to the original screen dimensions and slightly different from those produced by *Blazing Paddles*. This could be desirable in many situations. □

```
C29E      .BYTE 3,0,0,0,0,0,3,0
C29F
C2A0
C2A1
C2A2
C2A3
C2A4
C2A5
C2A6      .BYTE 0,3,0,0,0,0,0,3
C2A7
C2A8
C2A9
C2AA
C2AB
C2AC
C2AD
C2AE      .BYTE 2,1,2,1,0,0,0,0
C2AF
C2B0
C2B1
C2B2
C2B3
C2B4
C2B5
C2B6      .BYTE 3,3,3,3,0,0,0,0
C2B7
C2B8
C2B9
C2BA
C2BB
C2BC
C2BD
C2BE      .BYTE 3,3,3,3,3,3,3,3
C2BF
C2C0
C2C1
C2C2
C2C3
C2C4
C2C5
C2C6 ;*****
C2C6 ;*
C2C6 ;*****
C2C6 ;*          BSAVE & BLOAD          *
C2C6 ;*
C2C6 ;*****
C2C6 ;** BSAVE EQUATES **
C2C6 ;*
C2C6 FRMNUM = $AD8A
C2C6 GETADR = $B7F7
C2C6 CHKCOM = $AEFD
C2C6 BSSAVE = $E15F
C2C6 SETPAR = $E1D4
C2C6 BSLOAD = $E175
C2C6 ;*
C2C6 LINNUM = $14
C2C6 ;*
C2C6 GETPAR JSR CHKCOM
C2C9 JSR FRMNUM
C2CC JSR GETADR
C2CF LDA LINNUM
C2D1 LDX LINNUM+1
C2D3 RTS
C2D4 ;*
C2D4 BSAVE JSR GETPAR
C2D7 PHA
C2D8 TXA
C2D9 PHA
C2DA JSR GETPAR
C2DD PHA
C2DE TXA
C2DF PHA
C2E0 JSR CHKCOM
C2E3 JSR SETPAR
C2E6 PLA
C2E7 TAY
C2E8 PLA
C2E9 TAX
C2EA PLA
C2EB STA LINNUM+1
C2ED PLA
C2EE STA LINNUM
C2F0 LDA #LINNUM
C2F2 JMP BSSAVE
C2F5 ;*
C2F5 BLOAD JSR GETPAR
C2F8 PHA
C2F9 TXA
C2FA PHA
C2FB JSR CHKCOM
C2FE JSR SETPAR
C301 PLA
C302 TAY
C303 PLA
C304 TAX
C305 LDA #0
C307 STA $A
C309 JMP BSLOAD
0000 ;*****
0000 ;*
0000 ;*          ADDENDUM: SHADEYDUMP          *
0000 ;*          VERSION 2.0                  *
0000 ;*
0000 ;* (C) 1985 MICHAEL SCHELL             *
0000 ;*
0000 ;*****
0000 ;*
0000 *          = $C310
C310 ;*
C310 GETPAR = $C2C6
C310 MCMODE = $C227
C310 SCREEN = $C228
C310 HIRES = $C22A
C310 COLMEM = $C22C
C310 BCKGRN = $C22E
C310 RVSLG = $C230
C310 INTMOD = $C231
C310 DEVNUM = $C234
C310 SECADD = $C235
C310 ;*
C310 STROUT = $AB1E
C310 ;*
C310 SETHRS JSR GETPAR
C313 STA HIRES
C316 STX HIRES+1
C319 JSR GETPAR
C31C STA SCREEN
C31F STX SCREEN+1
C322 LDA #255
C324 STA MCMODE
C327 RTS
C328 ;*
C328 SETMC JSR GETPAR
C32B STA HIRES
C32E STX HIRES+1
C331 JSR GETPAR
C334 STA SCREEN
C337 STX SCREEN+1
C33A JSR GETPAR
C33D STA COLMEM
C340 STX COLMEM+1
C343 JSR GETPAR
C346 STA BCKGRN
C349 STX BCKGRN+1
C34C LDA #00
C34E STA MCMODE
C351 RTS
C352 ;*
```

SHOTGUN

A Rapid-Fire Diskkeeping Utility for the 64

By R. Harold Droid

Disk housekeeping is a chore best reserved for rainy days when the basement floods, giving you an excuse to get out of mopping. It's not that a clean, neat, orderly file box repulses me; it's the aggravation it takes to get there. You've probably amassed a collection of neat little programs that do tidy little organizing jobs on disks, like copying files, printing out master directories, renaming and locking files. But many neat and tidy little programs don't make file box rejuvenation a neat and tidy little job. I don't really need any more practice typing "LOAD" and "RUN."

Obviously what I need is a user-definable, menu-driven, auto-loading and running, multi-BASIC program-booting piece of weaponry which is always available so I can get a new program into memory with a flick of my itchy trigger finger. I call it *Shotgun*. Although it is designed with diskkeeping in mind, it's going to be useful any time you have a collection of programs with complementary functions that you have to continually interchange to get your job done.

Using *Shotgun* is as easy as LOADING it with an "8,1" appended and typing NEW and SYS51200. Press the SHIFT and RESTORE keys simultaneously to see your menu. From the menu, you can load and run one of up to 26 files, or press the space bar to run the currently resident BASIC program. There are two other functions available. Space/RESTORE instantly reruns the BASIC program in memory (even while it's still running) and Commodore/RESTORE does a BASIC warm start which leaves *Shotgun* available. RUN-STOP/RESTORE disables *Shotgun*. You can get it back with SYS51200.

Shotgun is a customized menu program which you create by specifying which files you wish to include. To get a *Shotgun* for a particular disk, use the program *Shotgun Shell* and *Shotgun Loader*. The loader program loads the shell into memory and reads a disk directory. Simply press 'Y' or 'N' when a file name is displayed. At the end of the directory, you are prompted for a file name for your new rapid-repeating, auto-load/run menu program, with the default name *Shotgun*. The loader program then saves it for you.

Shotgun runs off of the NMI interrupt of the 64. This interrupt is generated whenever the RESTORE key is pressed. When you SYS51200, the vector which points to the NMI interrupt routine is changed to point to *Shotgun*. Then every time you hit RESTORE, the SHIFT, Commodore, and space bar keys are checked. If one of these isn't

pressed, control reverts to the normal NMI interrupt routine. At this point, if the RUN/STOP key isn't pressed, or if you don't have a cartridge plugged in, nothing happens and the computer continues on its merry way.

If one of the programs you load messes with the NMI vector, you're in for some strange results. None of the programs I'm using do. Note also that *Shotgun* sits in an area of memory that's heavily trafficked when BASIC needs machine language support. Most of the time programmers put such routines at 49152, which leaves eight free blocks before they overwrite *Shotgun*. Four blocks above are also open, so if you use the DOS wedge for doing disk chores, *Shotgun* is compatible. If you're as tired of practicing your spelling on "LOAD" and "RUN" as I am, this program should be compatible with you, too. □

SEE PROGRAM LISTING ON PAGE 132

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The publisher cannot assume responsibility for errors in the above listing.

SCUTTLEBUTT

Continued from page 16
view of the non-MIDI version of *The Music Shop* on page 65.)

Passport Designs, Inc., 625 Miramontes St. Half Moon Bay, CA 94019 (phone: 415-726-0280).

Two new C-64-compatible programs from Dr. T Music Software:

The *Echo Plus* MIDI delay program, in addition to performing the standard digital-delay functions, will make the C-64 "listen" to one MIDI keyboard and send MIDI commands on up to four channels to any keyboards connected to the computer's MIDI output. Effects that can be created include keyboard splitting, doubling, echoing, one-finger and arpeggiated chords, and infinite loops. The \$90 program runs with a Sequential, Passport, Korg, Yamaha, or Music-Data MIDI interface.

The *CZ Patch Librarian* is for use in creating, editing, and storing patches on the Casio CZ-101, CZ-10000, and CZ-5000 synthesizers.

Dr. T Music Software, 190 Washington Ave., Brooklyn, NY 11205 (phone: 718-625-7283).

RolandCorp US has released the *MUSE* (MIDI Users Sequencer/Editor) software system for the C-64, requiring RolandCorp's MPU-401 MIDI Processing Unit and a MIDI instrument. It allows the C-64 to perform 8-track recording and overdubbing, time correction of any tracks, full editing by measure, and more.

RolandCorp US, 7200 Dominion Circle, Los Angeles, CA 90040-3647 (phone: 213-685-5141).

COMPUSERVE CHANGES

The financial, demographic, and editorial subject areas of the CompuServe Information Service, previously available only to Executive Information Service subscribers, are now accessible to all 225,000 subscribers through an Executive Service Option. Price of a CIS subscription kit will remain \$39.95; a onetime fee of \$10 (\$5 for new customers) will be charged for the Executive Service Option (there will be a \$10 monthly usage minimum).

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The CompuServe Information Service has been further restructured to include "tour" and "find" options, article paging (fits articles to user's screen size), a more detailed, easier to use top menu, and a list of quick reference words.

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

PRICE REDUCTIONS

The price of the *Deluxe COMAL 2.0 Cartridge Pak* has been reduced almost \$40 to \$89.95. Included is the cartridge, a 320-page tutorial guide, and five demo disks.

COMAL Users Group, USA, Ltd., 6041 Monona Dr., Madison, WI 53716 (phone: 608-222-4432).

The price of the *Printmaster/+G* interface has been reduced to \$99.95.

Omnitronix Incorporated, P.O. Box 434, Mercer Island, WA 98040 (phone: 206-236-2983).

As this is being written, I am in New York State for a brief visit. I picked up a copy of *Ahoy!* today to pass the evenings. I use a Commodore 64 at home in Sacramento.

I am writing to counter the view expressed by one John W. Carino in the July issue. There is nothing offensive or dangerous to children in the advertisements of CVC Online.

On the other hand, there is a great deal of danger in the idea that a magazine should limit its advertisements to suit prudes, moralists, and others who believe children should be raised in barrels and fed through the bungalow until they are old enough to have the Real World sprung on them in all its glory and anti-glory.

Mr. Carino claims he is not a prude or a moralist. Well, if it walks like a duck, quacks like a duck, and deposits fertilizer like a duck, then one is safe in assuming the creature is a duck. Only a prude, moralist, or —worse—would request you to remove an ad as inoffensive as CVC Online's ad. I say to Mr. Carino: Sex is here to stay. Do you want your children prepared to deal with the real world, or do you want them prepared to live in a fantasy world? If you answer is the latter, then growing up is going to be a very painful process when they get out from under your thumb.

—Donald L. Cline
Sacramento, CA

P.S.: If you *do not* cancel CVC's ad, i.e., if you do not knuckle under to prudes and moralists, my subscription order will be in the mail when I return home.

Let me begin by saying that I, too, have been an enthusiastic reader of your magazine from the beginning.

However, I must raise a serious objection to the opinion expressed by John W. Carino in his letter published in issue #19. He complained about the ad from CVC Online, calling it an "advertisement of that type," warning of decreased circulation, expressing concern for the effect on children, etc. Although Mr. Carino says he is "not a prude or moralist," I searched his letter in vain for any *other* grounds for his complaint.

Please don't misunderstand me. I do think an editor has an obligation to his readers concerning his advertisers. If, for example, you receive complaints regarding one of your accounts (that they misrepresent their product or service, that they overcharge, etc.), then by all means drop them. But to drop an advertisement simply because one reader finds it offensive is to set a dangerous precedent.

Although I have never personally used CVC Online, they seem to be a reputable company offering a legitimate service at a reasonable cost. Nor do I find the ad offensive. What I *do* find offensive is the concept of censorship, that someone I don't even know would presume to influence what ad I may see.

I sincerely hope that it will not be the editorial policy of *Ahoy!* to cave in to this kind of pressure. So far, you have an excellent publication. Keep it that way.

—Mike Nichols
Kansas City, MO

Thank you very much for your excellent article in the May '85 issue, *Install a Reset Switch on Your VIC/64* by Tom Benford. I followed the well-written instructions and the set-up works fine.

I would like to offer a couple of suggestions, however. First, the sug-

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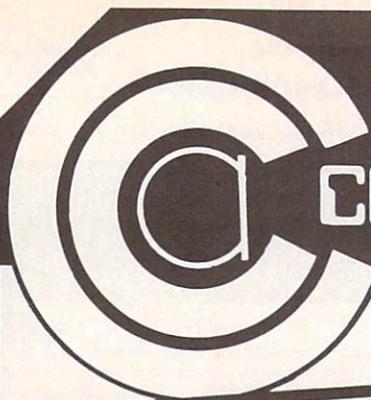
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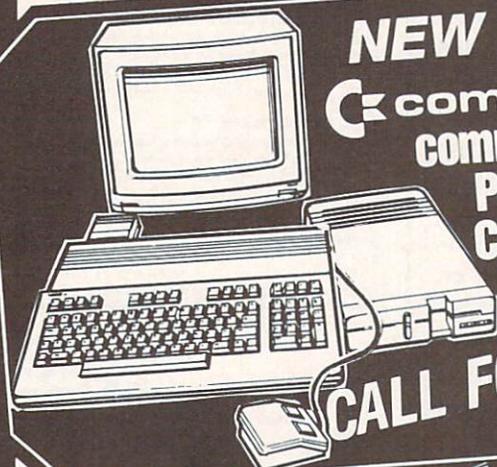


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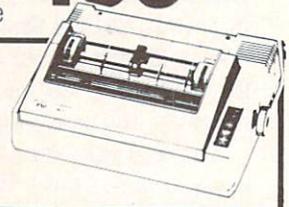
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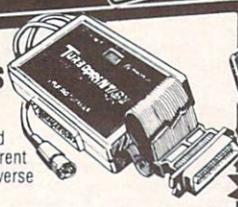


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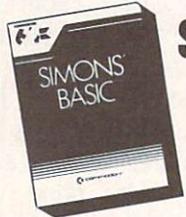


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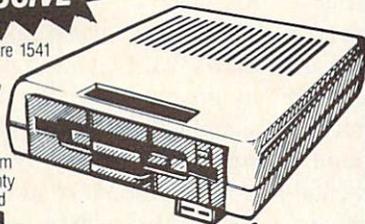
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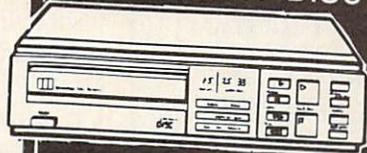
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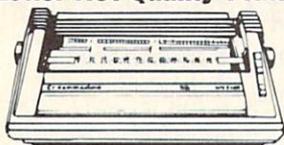


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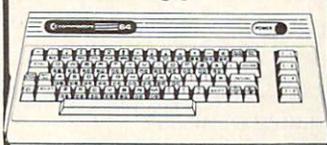
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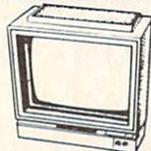
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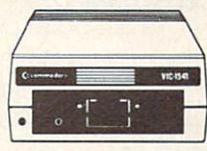
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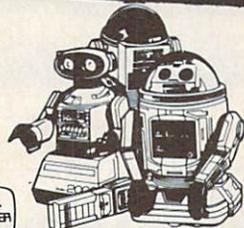
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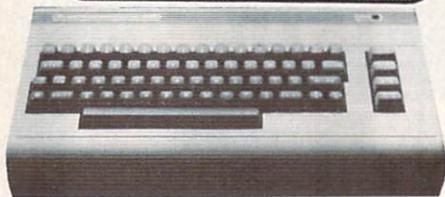
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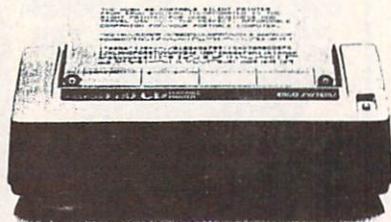
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gested location of the switch on top of the computer to the right of the power LED is somewhat vulnerable to inadvertent contact during operation. Given the purpose of the switch to erase all memory, it would be disastrous for it to be pushed while the memory was full of important data. I have placed my button on the right side of the computer just above the main power switch. Second, while shopping for the switches recommended by the article, I found a smaller, less likely to be accidentally tripped switch which comes two to a package at \$1.59 (Radio Shack #275-1571).

Thanks again for this excellent article and magazine! Keep up the good work.

—Joseph Bradley
Ossipee, NH

In the August issue of *Ahoy!* there were two items that raised my interest enough to write to you.

The first had to do with Dale Rupert's article on calculating pi by using the random number generator. His method is an interesting one, but there is an even simpler way. Many years ago, when I was learning FORTRAN, I wrote a program to calculate pi which is rewritten below in BASIC:

```
10 FOR I=1 TO N
20 X=RND(1):Y=RND(1)
30 IF X2 + Y2 >1 THEN 50
40 CC=CC + 1
50 NEXT I
60 PRINT 4*CC/I
```

The x and y represent coordinates of a point within a rectangular area 1 unit x 1 unit. In line 30 we check to see if the point lies within a quadrant of a circle with a radius of 1. The ratio of the area of the quadrant to the area of the square is pi/4, and, therefore, the ratio of randomly generated points within the quadrant to the points within the square should also be pi/4. Running the program above with the N=231,878 that Mr. Rupert mentions, produced pi=3.12792448 on my machine, which does indicate a certain lack of true randomness. Perhaps it might be of

interest to the readers for you to publish an article on the workings of the random number generator. I know that I would be interested.

The second item I noticed was the reply to Sean Flynn in the *S.O.S.* column concerning improving the performance of a monitor. I also use a TV/monitor (Panasonic CT-1112) and found that I could improve the clarity greatly by mixing the luminance signal with the video signal before it enters the monitor. In order to control the amount of luminance signal being mixed with the video, I first ran the luminance through a potentiometer and then, by means of a Y-connector, merged the two signals into the video input of my monitor. This has worked wonders, as the quality rivals that of the 1702 monitors I have seen. I can even read the 80-column output *PaperClip* produces! Since it is so easy and cheap to do, I would highly recommend it to anyone.

I hope this is of use.

—Theodore V. Brown
Hyde Park, NY

For Christmas I received a computer with a datasette. This computer happens to be a Commodore 16. You know the one I'm talking about, it's the one with the number 16 on it.

The Commodore 128 is also new, and merited a big feature in the August issue. What about the 16? Haven't your programmers heard of it? I think there are enough programs for the VIC and 64. What about the Commodore 16 owners of the free world?

—Larry Wedekind
Nashville, TN

It's true that we've neglected the C-16, and must regretfully report that the situation is not likely to improve. Running one C-16 program means running one less C-64, C-128, or VIC 20 program—and it's the C-64, C-128, and VIC 20 owners that make up the vast majority of our readership and potential readership. We hope you and the other "Commodore 16 owners of the free world" understand. Fortunately, there probably aren't enough of you to beat us up.

COMMODORE ROOTS

PROGRAMMING BIT BY BIT

Performing Single Bit Manipulations on Binary Numbers

BY MARK ANDREWS

Why is assembly language different from all other programming languages? There are many answers to that question. Readers of this column know by now that assembly language is the fastest-running and most memory-efficient of all programming languages. But it has another feature that we haven't examined yet. More than any other language, it gives the programmer direct and complete control over every individual bit in a computer's memory. That may not mean much to you now, but by the end of this column it will mean quite a bit. Before we begin, I'd like to throw some figures around.

There are 65,536 bytes of memory in a Commodore 64, and 131,072 in a Commodore 128. Since there are eight bits in a byte, this means that there are 524,288 bits in a 64, and up to 1,048,576 bits in a 128. And if you can control each of those bits individually—as easily as programmers in most other languages can handle bytes—you can wield a tremendous amount of power over your computer.

PROGRAMMING AN 8-BIT COMPUTER

Both the C-64 and the C-128 are 8-bit computers, so-called because each is built around an 8-bit microprocessor chip. The 64's main microprocessor is an 8-bit 6510 chip, and the 128's is an 8-bit chip called the 8502.

These are called 8-bit chips because the largest number they can process in one operation is 255—written 11111111 in binary notation, and therefore called an 8-bit number. To perform operations on a number larger than 255, an 8-bit computer must split the number up into 8-bit chunks, then perform the requested operation on each piece. Then, if the result of the calculation is larger than 255, it must be reassembled into a complete number.

Assembly language programmers use many tools to help them out with all this electronic cutting and pasting. And one of their most important tools is the carry bit, or carry flag, of the processor status register.

SHIFTING AND ROTATING INSTRUCTIONS

The processor status register (or P register) is one of several internal registers in the 6510/8502 microprocessor. The P register consists of eight bits, and seven of them are used as flags in various kinds of 6510/8502 operations. (The eighth bit is not used.)

The carry flag, or C flag, is one of the busiest flags in the P register. When the 6510/8502 performs arithmetic op-

erations on numbers larger than 255, the carry flag is the flag used to keep track of carrying and borrowing operations. Also, the C flag is often used with four specialized assembly language instructions called shifting and rotating operations: ASL (arithmetic shift left), LSR (logical shift right), ROL (rotate left), and ROR (rotate right).

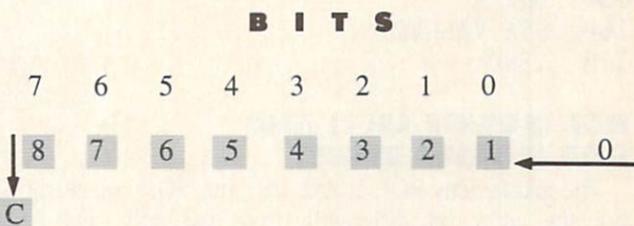
ASL (ARITHMETIC SHIFT LEFT) AND LSR (LOGICAL SHIFT RIGHT)

The instructions ASL, LSR, ROL, and ROR are often used in multiplication and division operations. With the help of these registers, it's easy to perform certain simple arithmetic operations, such as multiplying a number by 2. To double a binary number, you simply shift every bit to the left by one space, and fill in the vacated space with a zero. Take the binary number 0001, move every bit one space to the left, and you have 0010, or 2. Shift each bit to the left again, and you have 0100, or 4.

To divide a binary number by 2, shift bits in the other direction. Take the binary number 10000000 (\$80), move each bit to the right, and you have 01000000 (\$40). Shift right again, and you get 00100000 (\$20).

Now let's take a closer look at how the ASL and LSR instructions work. We'll begin with ASL:

Processor Status Register



The instruction ASL moves each bit in an 8-bit number one space to the left. If there is a remainder, it drops into the carry bit of the P register.

Following is an example of how an ASL instruction can be used to multiply a number by 2 in an assembly language program. (All the routines in this column were written using a *Commodore 64 Macro Assembler*.)

```
10 ;  
20 *=$8000  
30 ;
```

```

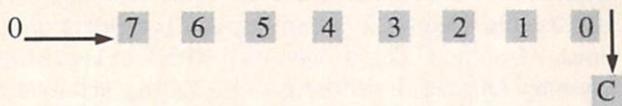
40 LDA #$40 ;REM 0100 0000
50 ASL A ;SHIFT VALUE IN ACCUMULATOR TO
LEFT
60 STA $FB
70 .END

```

The LSR instruction is the exact opposite of the ASL instruction, as you can see from this illustration:

Processor Status Register

B I T S



As you can see, LSR can shift each bit in a number one position to the right. Bit 7, left empty by the LSR instruction, will be filled in with a zero. But Bit 0, the rightmost bit, will drop into the carry bit of the P register.

Here is an example of how the LSR instruction can be used to halve an 8-bit binary number:

```

10 ;
20 ;DIVIDING BY 2 USING LSR
30 ;
40 VALUE1=$FB
50 VALUE2=$FC
60 ;
70 *=$8000
80 ;
90 LDA #6 ;OR ANY OTHER 8-BIT NUMBER
100 STA VALUE1
110 ;
120 ;NOW WE'LL DIVIDE BY 2
130 ;
140 LDA VALUE1
150 LSR A
160 STA VALUE2
170 .END

```

ROL (ROTATE LEFT) AND ROR (ROTATE RIGHT)

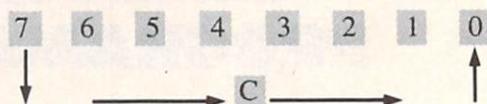
The instructions ROL (rotate left) and ROR (rotate right) use the carry bit differently from the ASL and LSR instructions.

ROL, like ASL, can shift the contents of the accumulator or a memory register one place to the left. But ROL does not place a zero in the Bit 0 position of the number being shifted. Instead, it rotates the carry bit into Bit 0, then moves every other bit one place to the left, finally dropping Bit 7 back into the carry bit. If the carry bit is set when the rotation takes place, a 1 is placed in the Bit 0 position. If the carry bit is clear, a zero goes into the Bit 0 position.

Here is an illustration of how the ROL instruction works:

The ROL ("Rotate Left") Instruction

Processor Status Register

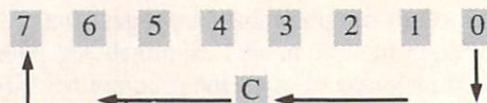


ROR works just like ROL, but in the opposite direction. It moves each bit one position to the right, rotates the carry bit into Bit 7, and moves Bit 0 into the carry bit.

Here is an illustration of the ROR instruction:

The ROR ("Rotate Right") Instruction

Processor Status Register



ROL and ROR are often used in multiplication and division routines involving numbers more than 8 bits long. For example, a 16-bit number can be doubled by combining an ASL instruction with an ROL instruction. First, an ASL instruction can be used to double the low-order byte of the number. Then an ROL instruction can be used to double the number's high byte. When the ASL instruction is used on the low byte, it will drop the leftmost bit (Bit 7) of the low byte into the C flag of the P register. Then the ROL instruction will pick up that bit and rotate it into the rightmost bit (Bit 0) of the high byte. The result of this operation will be a 16-bit multiplication!

FOUR MORE SINGLE-BIT INSTRUCTIONS

Three other instructions often used in single-bit operations are AND ("and"), OR ("or"), and EOR ("exclusive or"). These are often referred to as *logical operators* because (logically enough) they're used in logical operations.

In 6510/8502 assembly language, the logical operator AND has the same meaning that the word "and" has in English. If one bit and another bit both have a value of one, the AND operator also yields a value of 1. But if any other condition exists—if one bit is true and the other is false, or if both bits are false—the AND operator returns a result of 0.

The results of logical operators are often illustrated with diagrams called truth tables. Here's a truth table for the AND operator:

TRUTH TABLE FOR "AND"

| | | | | |
|-------|---|---|---|---|
| | 0 | 0 | 1 | 1 |
| AND 0 | 0 | 0 | 0 | 0 |
| AND 1 | 0 | 0 | 1 | 1 |

In 6510/8502 assembly language, the AND instruction

is often used in an operation called **bit masking**, the purpose of which is to clear or set specific bits of a number. The AND operator can be used, for example, to clear any number of bits by placing a zero in each bit that is to be cleared.

This is how that kind of bit-masking operation could work:

```
100 LDA #AA ;BINARY 1010 1010
110 AND #F0 ;BINARY 1111 0000
```

If your computer encountered this routine in a program, the following AND operation would take place:

```
    1010 1010 (CONTENTS OF ACCUMULATOR)
AND 1111 0000
-----
    1010 0000 (NEW VALUE IN ACCUMULATOR)
```

As you can see, this operation would clear the low nibble of \$AA to \$00 (with a result of \$A0). The same technique would work with any other 8-bit number. Whatever the number being passed through the mask 1111 0000, its lower nibble would always be cleared to \$00—and its upper nibble would always emerge from the AND operation unchanged.

THE "ORA" OPERATOR

When the instruction ORA ("or") is used to compare a pair of bits, the result of the comparison is 1 (true) if the value of either bit is 1. This is the truth table for ORA:

TRUTH TABLE FOR "ORA"

| | | | |
|-------|-------|-------|-------|
| 0 | 0 | 1 | 1 |
| ORA 0 | ORA 1 | ORA 0 | ORA 1 |
| 0 | 1 | 1 | 1 |

ORA is also used in bit-masking operations. Here is an example of a masking routine using ORA:

```
LDA VALUE
ORA #$0F
STA DEST
```

Suppose that the number in VALUE were \$22 (binary 0010 0010). This is the masking operation that would then take place:

```
    0010 0010 (IN ACCUMULATOR)
ORA 0000 1111 ($0F)
-----
    0010 1111 (NEW VALUE IN ACCUMULATOR)
```

THE "EOR" OPERATOR

The instruction EOR ("exclusive or") will return a true value (1) if one—and *only* one—of the bits in the pair being tested is a 1.

This is the truth table for the EOR operator:

TRUTH TABLE FOR "EOR"

| | | | |
|-------|-------|-------|-------|
| 0 | 0 | 1 | 1 |
| EOR 0 | EOR 1 | EOR 0 | EOR 1 |
| 0 | 1 | 1 | 0 |

The EOR instruction is often used for comparing bytes to determine if they are identical, since if any bit in two bytes is different, the result of a comparison will be non-zero. Here is an illustration:

```
EXAMPLE 1                                EXAMPLE 2
    1011 0110                                1011 0110
EOR 1011 0110                                BUT:  EOR 1011 0111
-----                                -----
    0000 0000                                0000 0000
```

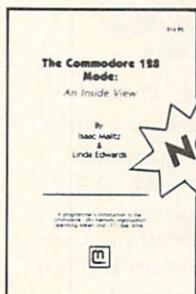
In Example 1, the bytes being compared are identical, so the result of the comparison is zero. In Example 2, one bit is different, so the result of the comparison is non-zero.

The EOR operator is also used to *complement* values. If an 8-bit value is EOR'd with \$FF, every bit in it that's a 1 will be complemented to a 0, and every bit that's a 0 will be complemented to a 1—like this:

```
    1110 0101 (IN ACCUMULATOR)
EOR 1111 1111
-----
    0001 1010 (NEW VALUE IN ACCUMULATOR)
```

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Still another useful characteristic of the EOR instruction is that when it is performed twice on a number using the same operand, the number will first be changed to another number, then restored to its original value. For example:

```

      1110 0101 (IN ACCUMULATOR)
EOR  0101 0011
-----
      1011 0110 (NEW VALUE IN ACCUMULATOR)
EOR  0101 0011 (SAME OPERAND AS ABOVE)
-----
      1110 0101 (ORIGINAL VALUE RESTORED)

```

This capability of the EOR instruction is often used in high-resolution graphics to put one image over another without destroying the one underneath. (Yes, that's how it's done!)

THE NAME GAME

Now we're ready to take a look at a program I promised you last month: *The Name Game*. You can find it in the program listings section of this issue. It was created using a *Merlin 64* assembler, but with modifications of a few directives, it can also be typed and run on a *Commodore 64* assembler. If you own a *Commodore 64* assembler, change the ORG \$8000 directive in Line 4 to `"*=$8000,"` and change the EQU directives in Lines 6 through 12 to `"="` signs. For the `"TXTBUF DS 40"` statement in Line 16, substitute the statements `"TXTBUF`

`=*" AND "*"=*+40"`. Use the `.BYTE` directive instead of the `ASC` and `HEX` directives in Lines 18 through 31. And, instead of using asterisks to identify comments, use semicolons. The program should then work fine.

I'll wait while you type *The Name Game*, assemble it, and run it. Then come back, and I'll explain how it works.

Finished? As you've seen, *The Name Game* makes use of two operating system (or "kernel") subroutines that are built into the Commodore 64 and 128. One of these, `CHROUT`, is often used in C-64 programs to print characters on a computer screen. The other routine, called `CHRIN`, can read characters that are typed in on a computer keyboard. The call address of `CHROUT` is `$FFD2`, and the call address of `CHRIN` is `$FFCF`. In the *Name Game* program, the `CHROUT` routine is used in a loop that extends from Line 42 to Line 55, and the `CHRIN` routine is used in a loop that extends from Line 90 to Line 97.

Before the *Name Game* program begins, some space is set aside for a text buffer (in Line 16), and the lines of the text that will be used in *The Name Game* are listed as strings of data in Lines 18 through 31. Next there are two subroutines that will be used later on in the program. One, labeled `FILL`, will clear the text buffer whenever it's called. The other subroutine, called `PRINT`, uses the Commodore 64 `CHROUT` routine to print messages on the screen.

As you type, assemble, and run *The Name Game*, you may notice that it uses its text buffer for lines that are typed in at the keyboard, not for lines that are called from RAM. Some kind of buffer is obviously needed for typed-in lines, since the computer must hold them in its memory long enough to do some comparison and printing operations. Another text buffer could have been set up for the lines stored in RAM, but it would have accomplished no real purpose except consume more memory and take up more processing time.

RUNNING THE PROGRAM

The main section of the *Name Game* program starts at Line 57 with a routine that prints the program's title on the screen. The next two routines print the line "Hello, what is your name?"

After this question is asked, the program clears the text buffer and waits for the player to type in a response. As he does, each character is placed in the text buffer. That's all that happens until the player stops typing characters and hits a carriage return.

Once a carriage return is typed, the program examines the characters that have been stored in the text buffer to see whether they spell the name `GEORGE`. If the player has not typed in the name `GEORGE`, the computer prints `"GO AWAY, [NAME], BRING ME GEORGE!"` Then the game starts again. Computers are very patient, so this process will continue until the player weakens and types the name `GEORGE`. Then the computer will print `"HI, GEORGE,"` and the game will end.

That's all there is to *The Name Game*. 'Bye, George!

SEE PROGRAM LISTING ON PAGE 137

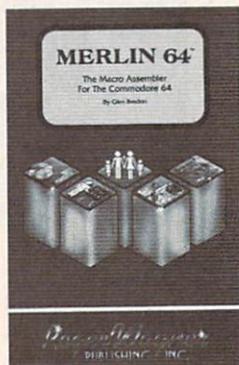
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Reader Service No. 221

THE 1541 DISK DRIVE CLEANING UTILITY

By John DeRosa

When was the last time I cleaned my disk drive? How many times have I used my cleaning disk? Is it time to throw out that disk and buy a new one? How do I spin the cleaning disk without causing an error that results in chattering my drive? This utility program will answer these questions, as well as help you keep your 1541 drive head clean. The program is for use with any cleaning kit that requires spinning a special cleaning disk.

The program begins by inputting the date (variable DT\$), the amount of time the disk is to spin while cleaning (SC), the number of times the cleaning disk was used (NC), and the maximum time the disk can be used (NM). This information comes with the cleaning disk instructions. The input can be from either a data file stored on the program disk, or the program will assume values. You can change the input data and save it on a disk prior to cleaning. If the number of times the cleaning disk was used exceeds the maximum, a warning is displayed and you are asked to buy a new cleaning disk.

After the input is read, the drive head will be moved to a different track from the last cleaning to assure that the same part of the cleaning disk is not used over and

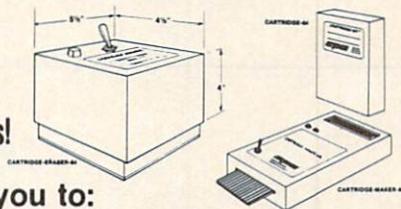
over. You are then prompted to insert the cleaning disk. The disk will spin for the desired amount of time, and a tone is played while it is spinning. The drive motor is turned on by setting the third bit of location \$1C00 (hexadecimal) in the disk drive memory using the Memory-Write command. (See lines 1800 to 1840 of the program listing.) The motor is turned off by resetting this bit. Since the disk operating system is not accessed to turn the drive on and off, the drive will not chatter. When cleaning is complete the drive stops spinning and the program ends by asking you to insert a data disk if you want to update the input information (new date, increment number of times cleaning disk was used, etc.) and store it on the disk so it can be accessed the next time you clean your drive.

To answer the question of how often you should clean your drive, some cleaning kit manufacturers recommend once a week with heavy use. I think this is excessive, and it may even be harmful to expose the drive head to the abrasive cleaning disk this often. I average two hours a day on my C-64 and have been cleaning my 1541 disk drive once every two months without any problems. □

SEE PROGRAM LISTING ON PAGE 140

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CADET'S COLUMN

For Beginning Users of the Commodore Computers

BY CHERYL PETERSON

Last month's column covered disk drives, and I'm going to continue the subject for a while. Those of you who didn't have one went out and bought one, didn't you?

If you did, you may have run into the 1541's spurious error messages, such as "File not found" (when you know it's there!) or other general read or write errors. The reason they're spurious messages is that they only occur after the drive has been on for about fifteen minutes.

The disk seems to be fine if you use it when you first power up the system. Unfortunately, by the time the drive starts messing up, you've got 15 or 20 minutes' worth of work done and are trying to perform a SAVE.

Most folks figure there's something wrong with the disk and run to the phone to call the manufacturer and complain. The manufacturer offers to send another disk, and when it arrives it has the same problem! We're talking maximum frustration here. Especially for new owners, who frequently assume they did something wrong.

Not knowing what to try next, you usually give up and take the thing off to the repair shop, where it's impossible to duplicate the problem. Why? Once you power down and wait 15 minutes, everything appears to be fine again. The service technician gives it back, along with a bill for who knows how much. When you get it home, the same thing happens again. Sound familiar? For most people using 1541's, it already does or soon will.

KEEPING THINGS COOL

The problem is caused by overheating. Some of the chips in the 1541 are particularly heat sensitive and drop dead when they get hot. Since the damage isn't permanent, once they cool down the chips work fine once again.

There are two ways to deal with the problem: take the drive apart and replace the chips with heat resistant ones (very expensive) or buy a fan to keep the drive cool. I have a little experience with two of the several different companies that sell cooling fans. (See accompanying list.)

Uni-Kool makes a nice little fan that sits on top of the 1541 and blows the cool air directly into the drive. Though it's a little more expensive than some of the others, it has one serious advantage: a replaceable filter. If you use your drive in a room with lots of cigarette smoke or dust particles, a fan blows all those contaminants right on your disks. As far as I know, the Surgeon General hasn't re-

quired cigarette pack warnings that say "Smoking may be hazardous to computer disks!", but contaminants can mess up both drive and disks. So the changeable filters in the Uni-Kool are a wise precaution.

Innovative Organizers, Inc. markets plastic stands that cover the disk drive and will support a printer on top. A companion \$29.95 fan can be mounted inside the cover to cool the drive. I've been using the setup for a few weeks now with a drive that was having problems, and it's behaved beautifully. Being a stickler for clean drives, I rustled up an old pair of silk stockings and tied one around the air intakes for filtering purposes. (A pair of nylon panty hose would work just as well and be considerably cheaper.)

In fact, as a temporary measure, I borrowed a \$5 Archer fan that a friend had bought at Radio Shack and set that on the stocking. Except for the radio interference caused by the fan's coil, it worked fine. The interference caused the monitor's picture to waver so badly that within two minutes of sitting down in front of it, even seasoned sailboaters would be seasick. To show you how conventional we are around here, the wavering problem was solved by putting an old beat up saucepan over the fan. This left enough clearance for the air to get through and still dampened the radio signals, though I admit it looked awfully strange. An empty coffee can also worked.

What I'm trying to point out is that you don't have to spend more money than you have. These three different ways to solve the same dilemma cost from \$7 for the homemade solution to \$41.95 for the Uni-Kool fan to \$50 for the printer stand/fan combination.

QUICK FIX

Every now and then a program just won't load even though you're using a fan. Nothing you try seems to get things going again. Although your drive may have gone out of alignment, this isn't likely unless it's been fairly erratic for a while. Usually, drive alignment problems start with the drive occasionally having problems loading and things just seem to keep getting worse.

If this isn't the case and the drive just suddenly won't load at all, try taking the disk out and leaving the door open while you load thin air (thick air if you live at sea level like I do). Type your usual LOAD "*",8 and let the

drive bang around until it puts up the "FILE NOT FOUND" error message. Turn the whole system off and then back on and try to load your program. Chances are good that it will work.

This problem is caused by the head being left in an unusual position. The 1541 head usually stops itself somewhere near the directory tracks in the middle of the disk after it does a read or write. Sometimes it doesn't get set properly before you turn off the machine and the next time you power up and look for a program the head gets lost. Banging it around with a fake LOAD command will usually reset it.

WHERE TO PUT IT ALL!

I have a few more organization tips for you this month. If you've taken any of my earlier suggestions, these new ones will probably come in handy. You'll need somewhere to put the magazines, books, software, and assorted peripherals that you'll be collecting as you make full use of your computer. I recommend metal shelves that you put together yourself for \$15 to \$20. Sears, K-Mart, and many local department stores run specials on them about every two months. Because you put them together yourself, the shelves can be arranged at intervals to suit you. Being heavy duty, they can support quite a bit of weight. (Paper gets heavy if you collect enough of it.)

GETTING A DESK

One thing this will do is clear your desk of unneeded junk. What do you mean you don't have a desk? If your computer is still occupying the dining room table, you should move it. For two reasons! Disrupting the family harmony by usurping the main meeting place will not endear you to your potential computer widow/er. And

there are too many things that can get spilled on a C-64 that will kill it.

In most homes, the husband and kids use the computer and the poor mother is left bereft of a table to serve dinner on. Even in our family, where I was the one using the computer, we went through the "get that #\$\$!! computer off my dining table" fight, but with a different twist. Hubbie didn't want to buy a desk; he wanted to make one. But getting him to go out and buy the materials was like trying to drain the ocean with a straw. Eventually it got done, though.

For those who want a spacious desk with plenty of drawer space, try buying a door (yes, your standard 8x3' particle board covered with plywood door will do) and a couple of 28-inch deep, 2-drawer filing cabinets. If you get them at a closeout or bankruptcy auction, they'll probably run you about \$50. For another \$20 to \$30, you can get a can of wood finisher that will make your cheap plywood look like something more expensive.

Sears typically sells "computer" desks for \$90 plus \$35 for an optional monitor stand. The desk measures 5x3' and will barely accommodate a computer, disk drive, operating manuals, and a printer. By the time you add a diskette file and a few choice software packages, you don't have enough room left for the spare telephone you'll be needing. (Besides coming in handy when you need software support from your local user group friend, the modem you'll want to use hitches into the phone. And when you are seriously involved in a project, you won't want to leave your desk every time the phone rings.)

You'll also want extra room for the midnight snacks and coffee needed to keep going on those long nights when you're debugging programs from your favorite magazines. You might be able to survive without the coffee maker on the desk, as it gives you a good reason to goof off for a few minutes.

I must admit, in addition to our door desk, I did buy a "computer" desk. (My husband stole the door for his computer.) As you can see from the photo (page 110), it was worth the \$200 I paid. The shelves hold plenty of software and diskette files and support a couple of monitors and two computers. Even so, I have my printers on a separate stand to the right. It came unassembled in a box labeled "TV stand for use with VCR, can also be used for microwave ovens or computer printers." It cost me \$40 at a SuperX drug store and holds three printers, paper, tractor feed labels, extra ribbons, and manuals. Businesses are paying office supply stores upwards of \$150 for printer stands that hold one printer and some paper.

Unless you intend to get very serious about using your Commodore, or you really need a desk anyway, or you have a lot of money to blow, I wouldn't recommend spending more than \$100 for a desk. You can get a card table with S&H Green stamps for about 15 books. This will at least allow the family to share dinners in the dining room again.

If you have your heart set on a really neat "computer" desk, I recommend checking with your local furniture

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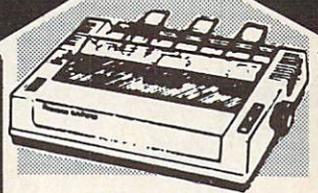
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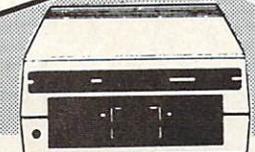
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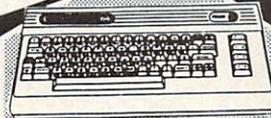


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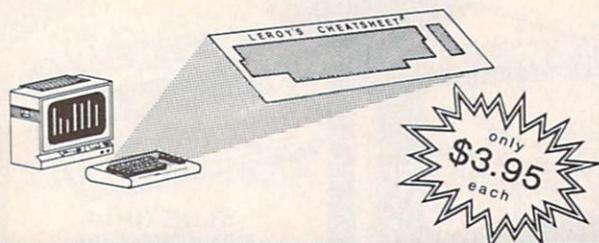
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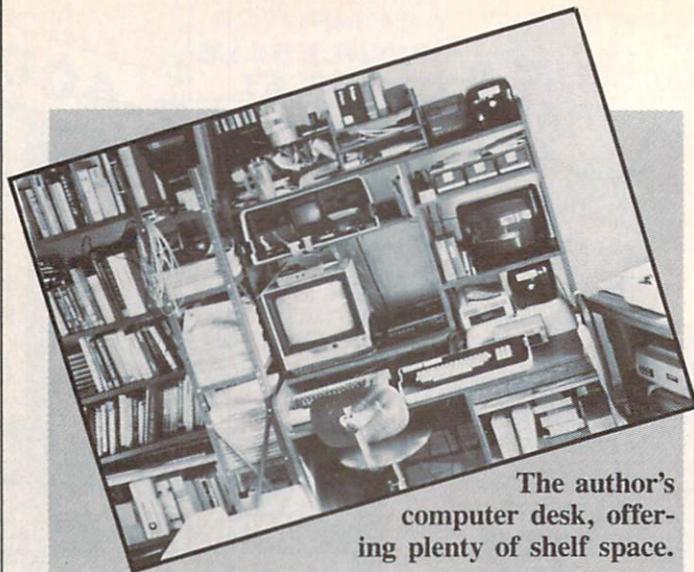


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The author's computer desk, offering plenty of shelf space.

store, Service Merchandise, Best, or other bargain store not specializing in computer accessories. A local Levitz furniture store was running a sale on a computer desk very similar to mine for \$80 around Father's Day, so be sure to check ads in the local paper for non-computer stores. (I won't even mention that no one in town was featuring computer equipment or accessories in their Mother's Day ads.)

And while you're at it, don't overlook auctions. Besides filing cabinets, businesses usually have desks, shelves, comfortable chairs (sometimes with wheels), and occasionally used computer monitors.

SHORT PROGRAM FOR MONOCHROME MONITORS

This short piece is for those who haven't gotten a color monitor and are making do with a black and white television or monochrome (green or amber) monitor. If run before you boot the programs you use, it will set the background and border colors to black increasing the sharpness of contrast and making it easier to read the letters.

Many commercial programs will reset the memory locations that control these parameters, so I can't guarantee it will help in every instance. When doing programming or entering BASIC programs from books or mags, it really saves the eyes. It isn't a bad idea to run it with a color monitor, since the sharper contrast is less likely to leave you with a headache.

```

5 PRINT "SCREEN TO BLACK"
10 POKE 53280,0
20 POKE 53281,0
25 PRINT "DONE"
30 END

```

Since this is such a short program, the two middle lines, 10 and 20, can be entered directly if you want to avoid having to load and run the program. I always had trouble remembering the POKE locations. This program saw a lot of use before we switched to a color monitor. □

COMMODORES

PROGRAMMING CHALLENGES

BY DALE RUPERT

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

Commodares, c/o Ahoy!
P.O. Box 723
Bethel, CT 06801

We will print and discuss the cleverest, simplest, shortest, most interesting and/or most unusual solutions. Be sure to identify the *Name* and *Number* of the problems you are solving. Also show sample runs if possible, where appropriate. Be sure to tell what makes your solutions unique or interesting, if they are.

Programs on diskette are welcome, but they must be accompanied by listings. You must enclose a stamped, self-addressed envelope if you want any of your materials returned. Solutions received by the middle of the month shown on the magazine cover are most likely to be discussed, but you may send solutions and comments any time. Your original programming problems, suggestions, and ideas are equally welcome. The best ones will become *Commodares!*

PROBLEM #22-1: MAKING CHANGE

Jim Speers (Niles, MI) suggested this challenge. Given an amount of money, say \$10.00 or less, and a number of coins, find a distribution of quarters, dimes, nickels, and pennies equal in value and quantity to the specified amounts. If there is no solution, this should be stated. Five coins totaling \$1.10 would be four quarters and a dime. Two coins totaling forty cents is impossible. We will present Jim's solution in a later issue.

PROBLEM #22-2: SIMPLE COMPARISON

How simple can a problem be? The user provides two sets of ten numbers each. The computer determines whether the two sets contain the same numbers or not. The numbers for each set are contained in a DATA statement and of course may be in any order. What is the fastest way to do this?

PROBLEM #22-3: MEASURED DECIMALS

Ken Karow (Chicago, IL) suggested a problem similar to this. The user enters a decimal number of inches. The computer converts this decimal to a whole number

plus a lowest-terms fraction, rounded to the nearest sixty-fourth of an inch. For example, if the user enters 8.375, the computer responds "8 and 3/8." If the user enters 23.016, the computer responds "23 and 1/64."

PROBLEM #22-4: TERNARY TURNABOUT

The user enters a number in base ten, and the computer displays its ternary (base three) equivalent. The ternary system uses numerals 0, 1, and 2. For example, 100 in base ten is 10201 in base three.

This month we will look at readers' solutions to the June *Commodares*, from balancing billiard balls to a one line skiing game. Many variations on the theme of *Problem #18-1: Cycling Function* are listed below.

```
1 REM
2 REM VARIOUS READERS' SOLUTIONS TO
3 REM PROBLEM #18-1 : CYCLING FUNCTION
4 REM
5 DEF FNC(D)=D*SGN((99-X)/(X-1))
11 DEF FNC(D)=INT(X/10)*-10+5
12 DEF FNC(D)=D+1*(X=10)-1*(X=0)
13 DEF FNC(D)=D+1*(X>95)-1*(X<5)
14 DEF FNC(D)=D+(2*D*(X=0 OR X=10))
15 DEF FNC(D)=5+1*(X>95 OR D<5)-1*(X<5)
16 DEF FNC(D)=D+(2*D*((X<=0)OR(X>=10)))
17 DEF FNC(D)=-5*(D=5)+5*(D=-5)+1*(X=10)
18 DEF FNC(D)=D*(((X=10)+(X=0))*2)+1
19 D=5:X=0
20 S=X/5:PRINTSPC(ABS(S))X=X+D:D=FNC(D)
21 :GOTO3
```

The programmers responsible for lines 10 through 18 are Steve Kendrick (Bakersfield, CA), Don Maloney (Manchester, CT), Tim Hedrick (Canoga Park, CA), Tim Williams (Henderson, KY), Dennis McGrath (Chicago, IL), David Hoffner (Brooklyn, NY), Sheldon Wotring (Palmerton, PA), Scott Macnab (Woodburn, OR), and James Borden (Carlisle, PA) respectively. You may compare these with the general solutions from Jim Speers (Niles, MI) in the July edition of *Commodares*. Jim originally submitted the problem.

Line 30 is modified from the original problem at the suggestion of Steve Kendrick so that the cyclic nature of the numbers is more apparent. One of these solutions cycles from 0 to 100 then starts again at 0. Can you find it before you run the program? Line 18 defines FNC the first time the program is run. After you have run the program once, you may delete line 18. Run it again and line 17 will be the definition of FNC. Repeat this process until line 10 is the only DEF statement.

Tim Hedrick attempted to solve this problem using the cosine function which itself is cyclic. He wrote:

```
10 DEF FNC(D)=D+10*INT(COS(X*PI/199))
```

where PI has the value 3.14159265. This function stepped from 0 to 100 and back to 0. However, it then continued into negative numbers instead of reversing again as it should. For X=0, INT(COS(X*PI/199)) should return a value of 1, but instead it gives 0. Tim suggested a round-off error as the culprit. That's exactly what it is.

If you add 1E-9 to the cosine function before using the INT function, everything works as expected. Try this to see for yourself:

```
10 DEF FNC(D)=D+10*INT(COS(X*PI/199)+1E-9)
```

All readers who sent solutions to *Problem #18-2: Billiard Balls* deserve a word of praise. Most of the solutions were very lengthy, but it was a very difficult problem. The two listed below from Russell Wilson (Fayette, AL) and Charles R. Goldberg (Lambertville, NJ) are significantly shorter than the others because of the additional "pre-computing" analysis performed by the writers of these programs.

```
1 REM
2 REM SOLUTION TO PROBLEM #18-2 :
3 REM BILLIARD BALLS
4 REM BY RUSSELL WILSON
5 REM
110 DIM C$(12,2), S$(3): X$="": W$(1)="HEAVY"
: W$(2)="LIGHT"
120 FOR I=1 TO 12: FOR J=1 TO 2: READ C$(I,J): NEXT
: T J, I: FOR I=1 TO 3: READ S$(I): NEXT I
130 DATA BBR, BBL, LBL, RBR, LRB, RLB, LLB, RRB
: RBL, LBR, LLL, RRR, RLR, LRL, RRL, LLR
135 DATA BRR, BLL, BLR, BRL, RBB, LBB, BRB, BLB
140 DATA 2 3 4 6 + 5 7 8 11, 4 6 7 10 +
: 3 8 9 12, 2 5 6 8 + 1 7 9 10
150 PRINT CHR$(147); "REMEMBER BALL# (1-12)
: ) AND IF IT IS HEAVY OR LIGHT.": PRINT
160 PRINT "ENTER L=LEFT HEAVY": PRINT TAB(6
: ); "B=BALANCED"
165 PRINT TAB(6); "R=RIGHT HEAVY": PRINT
170 FOR I=1 TO 3: PRINT S$(I): PRINT TAB(7); : IN
: PUT R$: X$=X$+R$: PRINT: NEXT I
180 FOR I=1 TO 12: FOR J=1 TO 2: IF X$=C$(I,J) THE
: N200
```

```
190 NEXT J, I
200 PRINT CHR$(18); I; CHR$(157); " BALL IS
: "; W$(J)
```

```
1 REM
2 REM SOLUTION TO PROBLEM #18-2 :
3 REM BILLIARD BALLS
4 REM BY CHARLES GOLDBERG
5 REM
10 D$="HEAVYLIGHTWHAT?": PRINT "[CLEAR][DO
: WN] ENTER DEFLECTION"
20 PRINT "[DOWN][DOWN] LEFT----N----RIGHT
: "SPC(30)"O"SPC(39)"N"SPC(39)"E"
30 INPUT "[DOWN]1-2-4-5 [s Q] 7-8-10-11"
: A$(0)
40 INPUT "4-5-7-11 [s Q] 2-3- 6-12"; A$(1)
50 INPUT "6-8-9-11 [s Q] 5-7-10-12"; A$(2)
60 FOR U=0 TO 2: B=B+SGN(ASC(LEFT$(A$(U), 1))
: -78)*3^U: A$(U)="N": NEXT: C=ABS(B)
70 E=.5+(C=10): FOR U=0 TO 4: E=E+(C=INT(2*1.
: 585^U)): NEXT: D=INT(C^2-ABS(C)*13)
80 PRINT "[DOWN]BALL"; C; "IS "; MID$(D$, (3.
: 5+2.5*SGN(B*SGN(E)))*(D<>0)^2-11*(D=0), 5
: )
90 B=0: GOTO 30
```

Mr. Goldberg included a discussion of the ternary (base-3) numbering system on which his solution is based. I recommend Martin Gardner's *Sixth Book of Mathematical Games from Scientific American* (Scribners, 1971) for an interesting discussion of the ternary system and this problem.

Besides Wallace Leeker (Lemay, MO) who submitted the problem and a solution, other billiard ball solutions came from Jacqueline G. Callaway (Orange Beach, AL), Steve Feld (New York, NY), Dennis McGrath (Chicago, IL), David Hoffner (Brooklyn, NY), James Borden (Carlisle, PA—a COMAL solution), Donald Maloney (Manchester, CT), and Tim Hedrick (Canoga Park, CA).

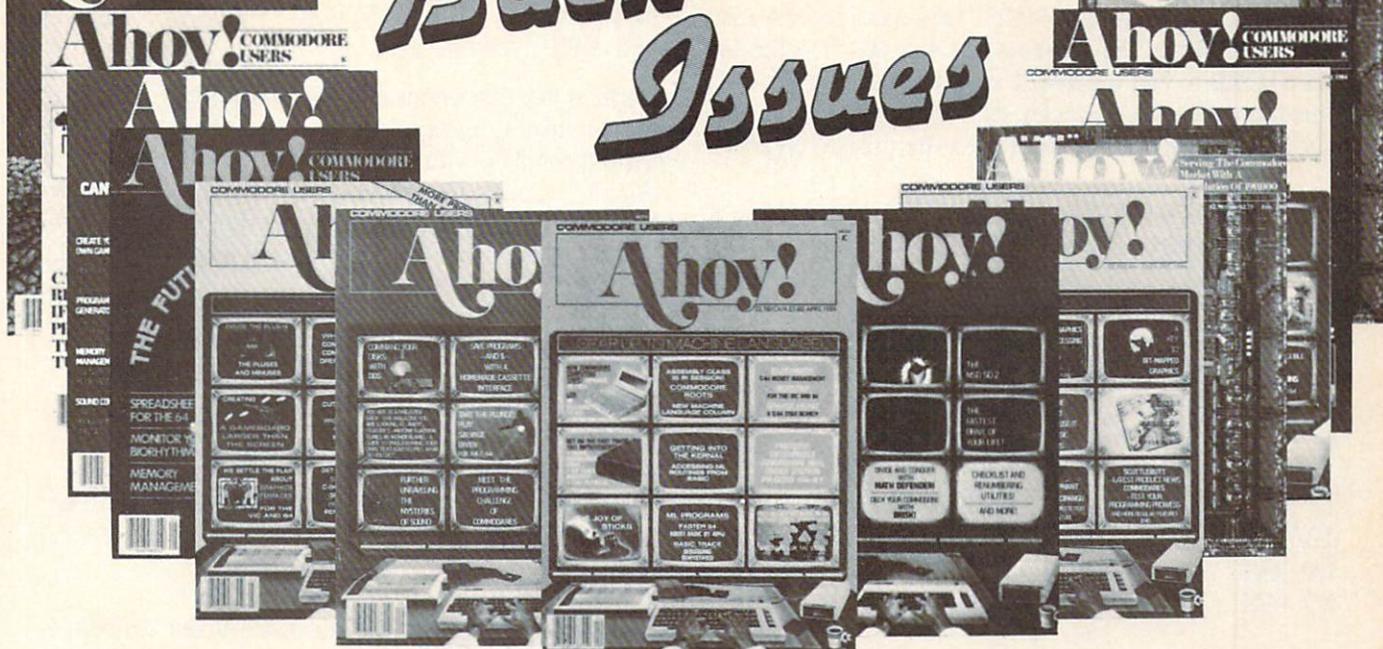
Only three people sent solutions to *Problem #18-3: Scroll Ski*. These are one or two line downhill skiing games using the scrolling feature of the screen to provide some of the animation. A brief description of each should suffice. You must type most of these programs carefully and use all possible abbreviations.

The program from Sheldon Wotring (Palmerton, PA) uses the "<" and ">" keys to move the skier. The final GOTO without an argument goes back to line 0.

```
0 PRINT TAB(T)"H": X=PEEK(197): T=T-(X=44)+
: (X=47)-(T<1)+(T>38): PRINT TAB(RND(1)*39)"
: [DOWN][DOWN][DOWN][DOWN][DOWN]^ [UP][UP][
: UP][UP][UP][UP]": GOTO
11 REM
12 REM SOLUTION TO PROBLEM #18-3 :
13 REM SKI SCROLL
14 REM BY SHELDON C. WOTRING
```



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In the program from Paul Dawson (Waitsfield, VT), the COMMODORE and SHIFT keys move the skier left and right. When the game ends, press RUN/STOP and RESTORE to end the WAIT in line 0. The CHR\$(8) in line 0 prevents the character set from changing when the COMMODORE and SHIFT keys are pressed together.

```

0) P=PEEK(653)+1:Z=Z+1:PRINT"[HOME][BLACK]
]SCORE"Z:POKE214,8:PRINTCHR$(8):PRINTTAB
(A)"[WHITE]"A$:IFPEEK(1424+A)=30THENWAIT
0,0
1) POKE214,23:PRINT:PRINT"[GREEN]^"TAB(RN
D(0)*35)"^^^^^"TAB(38)"^":A=A+(P=3)-(P=2)
:A$=MID$("[s G][s M][s N][s H]",P,1):GOT
0
11) REM
12) REM SOLUTION TO PROBLEM #18-3 :
13) REM SKI SCROLL
14) REM BY PAUL T. DAWSON
15) REM
  
```

The program suggested by Larry Snyder (Rapid City, SD) does not need the second line to be "scrunched." Use the two cursor keys to move the skier between the trees.

```

0) POKE53281,1:PRINT"[CLEAR][GREEN]":T=55
792:S=1520:X=500:FORI=0TO500:IFPEEK(S+J+
40)=65THENX=X-40
1) A=RND(1)*41:PRINTSPC(A)"[s A]":K=PEEK(
197):J=J+(K=7)-(K=2):POKES+J,22:POKET+J,
0:NEXT:PRINT"SCORE="X
11) REM
12) REM SOLUTION TO PROBLEM #18-3 :
  
```

```

13) REM SKI SCROLL
14) REM BY LARRY SNYDER
15) REM
  
```

Perhaps these programs will give some of you a starting point for creating an expanded version of the game. Think what you could do with a four or even a five line program!

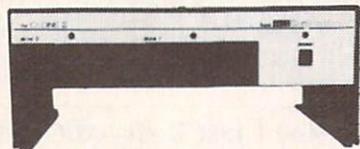
Finally we have the solution to *Problem #18-4: Letter Math* from Donald Maloney (Manchester, CT). His program is representative of most of the others we received.

```

2) REM
3) REM SOLUTION TO PROBLEM #18-4 :
4) REM LETTER MATH
5) REM BY DON MALONEY
6) REM
0) FOR X=0TO9:FOR Y=0TO9:FOR Z=1TO9
1) IF X+X*10+Y*100=X*100+Y*10+Z+Z*10+Y+X
THEN PRINT"X, Y, Z = ";X;Y;Z
3) NEXT Z : NEXT Y : NEXT X
  
```

Some readers simplified the formulas in line 20 before programming them. You might try solving other similar problems using Donald's program as an example if you had trouble with this one. Readers with solutions to this problem who haven't already been mentioned include Chip Jones (Texarkana, AR), Jim Barranti (Canonsburg, PA) and Robert G. Bailey (Rockford, IL).

Thanks also to Ted Grondski (Springfield, MA), Alain Goulet (Port Colborne, ONT), and Greg Smisek (Lonsdale, MN) for their programs. One final teaser: What is the longest one-liner (total number of characters when listed) that you can come up with? Keep those problems and solutions coming. □



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PROGRAM LISTINGS

Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listing guide on this page.

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!*'s program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets []. For example: the SHIFT CLR/HOME command is represented onscreen by a heart . The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J],

and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSor left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: e.g., 22 spaces as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines long; VIC 20 lines, a maximum of 88 characters, or 4 screen lines). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the VIC 20 and C-64. The version appropriate for your machine will help you proofread our programs after you type them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See the instructions preceding each program.)

Also on the following page you will find *Flankspeed*, our ML entry program, and instructions on its use. Call *Ahoy!* at 212-239-0855 with any problems.

| When You See | It Means | You Type | You Will See | When You See | It Means | You Type | You Will See |
|--------------|---------------|----------------|---|--------------|------------|----------|---|
| [CLEAR] | Screen Clear | SHIFT CLR/HOME |  | [BLACK] | Black | CNTRL 1 |  |
| [HOME] | Home | CLR/HOME |  | [WHITE] | White | CNTRL 2 |  |
| [UP] | Cursor Up | SHIFT ↑CRSR↓ |  | [RED] | Red | CNTRL 3 |  |
| [DOWN] | Cursor Down | ↑CRSR↓ |  | [CYAN] | Cyan | CNTRL 4 |  |
| [LEFT] | Cursor Left | SHIFT ←CRSR→ |  | [PURPLE] | Purple | CNTRL 5 |  |
| [RIGHT] | Cursor Right | ←CRSR→ |  | [GREEN] | Green | CNTRL 6 |  |
| [SS] | Shifted Space | SHIFT Space |  | [BLUE] | Blue | CNTRL 7 |  |
| [INSERT] | Insert | SHIFT INST/DEL |  | [YELLOW] | Yellow | CNTRL 8 |  |
| [DEL] | Delete | INST/DEL |  | [F1] | Function 1 | F1 |  |
| [RVSON] | Reverse On | CNTRL 9 |  | [F2] | Function 2 | SHIFT F1 |  |
| [RVSOFF] | Reverse Off | CNTRL 0 |  | [F3] | Function 3 | F3 |  |
| [UPARROW] | Up Arrow | ↑ |  | [F4] | Function 4 | SHIFT F3 |  |
| [BACKARROW] | Back Arrow | ← |  | [F5] | Function 5 | F5 |  |
| [PI] | PI | π |  | [F6] | Function 6 | SHIFT F5 |  |
| [EP] | English Pound | £ |  | [F7] | Function 7 | F7 |  |
| | | | | [F8] | Function 8 | SHIFT F7 |  |

IMPORTANT!

Letters on white background are **Bug Repellent** line codes. Do not enter them! This and the preceding explain these codes and provide other essential information on entering **Ahoy!** programs. Read these pages **before** entering programs.

BUG REPELLENT

This program will let you debug any *Ahoy!* program. Follow instructions for VIC 20 (cassette or disk) or C-64.

VIC 20 VERSION

By Michael Kleinert and David Barron

For cassette: type in and save the *Bug Repellent* program, then type RUN 63000[RETURN]SYS 828[RETURN]. If you typed the program properly, it will generate a set of two-letter line codes that will match those listed to the right of the respective program lines.

Once you've got a working *Bug Repellent*, type in the program you wish to check. Save it and type the RUN and SYS commands listed above once again, then compare the line codes generated to those listed in the magazine. If you spot a discrepancy, a typing error exists in that line. Important: you must use exactly the same spacing as the program in the magazine. Due to memory limitations on the VIC, the *Bug Repellent* will register an error if your spacing varies from what's printed.

You may type SYS 828 as many times as you wish, but if you use the cassette for anything, type RUN 63000 to restore the *Repellent*.

When your program has been disinfected you may delete all lines from 63000 on. (Be sure the program you type doesn't include lines above 63000!)

For disk: enter *Bug Repellent*, save it, and type RUN:NEW [RETURN]. Type in the program you wish to check, then SYS 828.

To pause the line codes listing, press SHIFT.

To send the list to the printer type OPEN 4:4:CMD 4:SYS 828[RETURN]. When the cursor comes back, type PRINT#4:CLOSE 4[RETURN].

- 63000 FORX=828T01023:READY:POKEX,Y:NEXT:END AC
- 63001 DATA169,0,133,63,133,64,165,43,133,251 JL
- 63002 DATA165,44,133,252,160,0,132,254,32,228 DF
- 63003 DATA3,234,177,251,208,3,76,208,3,230 OE
- 63004 DATA251,208,2,230,252,169,244,160,3,32 OH
- 63005 DATA30,203,160,0,177,251,170,230,251,208 KO
- 63006 DATA2,230,252,177,251,32,205,221,169,58 JJ
- 63007 DATA32,210,255,169,0,133,253,230,254,32 OK
- 63008 DATA228,3,234,165,253,160,0,170,177,251 LG
- 63009 DATA201,32,240,6,138,113,251,69,254,170 BP
- 63010 DATA138,133,253,177,251,208,226,165,253,41 DD
- 63011 DATA240,74,74,74,74,24,105,65,32,210 EK
- 63012 DATA255,165,253,41,15,24,105,65,32,210 FO
- 63013 DATA255,169,13,32,210,255,173,141,2,41 PK
- 63014 DATA1,208,249,230,63,208,2,230,64,230 CB
- 63015 DATA251,208,2,230,252,76,74,3,169,236 KH
- 63016 DATA160,3,32,30,203,166,63,165,64,32 DP
- 63017 DATA205,221,169,13,32,210,255,96,230,251 EL
- 63018 DATA208,2,230,252,96,0,76,73,78,69 OI
- 63019 DATA83,58,32,0,76,73,78,69,32,35 FG
- 63020 DATA32,0,0,0,0,0,0,0,0,0 LE

C-64 VERSION

By Michael Kleinert and David Barron

Type in, SAVE, and RUN the *Bug Repellent*. Type NEW, then type in or LOAD the *Ahoy!* program you wish to check. When that's done, SAVE your program (don't RUN it!) and type SYS 49152 [RETURN].

To pause the listing depress and hold the SHIFT key.

Compare the codes your machine generates to the codes listed to the right of the respective program lines. If you spot a difference, an error exists in that line. Jot down the number of lines where

contradictions occur. LIST each line, spot the errors, and correct them.

- 5000 FORX=49152T049488:READY:POKEX,Y:NEXT:END GJ
- 5001 DATA32,161,192,165,43,133,251,165,44,133 DL
- 5002 DATA252,160,0,132,254,32,37,193,234,177 DB
- 5003 DATA251,208,3,76,138,192,230,251,208,2 OF
- 5004 DATA230,252,76,43,192,76,73,78,69,32 KN
- 5005 DATA35,32,0,169,35,160,192,32,30,171 CA
- 5006 DATA160,0,177,251,170,230,251,208,2,230 CE
- 5007 DATA252,177,251,32,205,189,169,58,32,210 JE
- 5008 DATA255,169,0,133,253,230,254,32,37,193 CL
- 5009 DATA234,165,253,160,0,76,13,193,133,253 NB
- 5010 DATA177,251,208,237,165,253,41,240,74,74 MB
- 5011 DATA74,74,24,105,65,32,210,255,165,253 EP
- 5012 DATA41,15,24,105,65,32,210,255,169,13 GH
- 5013 DATA32,220,192,230,63,208,2,230,64,230 AN
- 5014 DATA251,208,2,230,252,76,11,192,169,153 NG
- 5015 DATA160,192,32,30,171,166,63,165,64,76 BF
- 5016 DATA231,192,96,76,73,78,69,83,58,32 EP
- 5017 DATA0,169,247,160,192,32,30,171,169,3 PJ
- 5018 DATA133,254,32,228,255,201,83,240,6,201 FK
- 5019 DATA80,208,245,230,254,32,210,255,169,4 FL
- 5020 DATA166,254,160,255,32,186,255,169,0,133 CL
- 5021 DATA63,133,64,133,2,32,189,255,32,192 GC
- 5022 DATA255,166,254,32,201,255,76,73,193,96 NN
- 5023 DATA32,210,255,173,141,2,41,1,208,249 NH
- 5024 DATA96,32,205,189,169,13,32,210,255,32 IM
- 5025 DATA204,255,169,4,76,195,255,147,83,67 KC
- 5026 DATA82,69,69,78,32,79,82,32,80,82 DC
- 5027 DATA73,78,84,69,82,32,63,32,0,76 ML
- 5028 DATA44,193,234,177,251,201,32,240,6,138 GN
- 5029 DATA113,251,69,254,170,138,76,88,192,0 JK
- 5030 DATA0,0,0,230,251,208,2,230,252,96 NA
- 5031 DATA170,177,251,201,34,208,6,165,2,73 DM
- 5032 DATA255,133,2,165,2,208,218,177,251,201 JA
- 5033 DATA32,208,212,198,254,76,29,193,0,169 FM
- 5034 DATA13,76,210,255,0,0,0,0,0,0 PA

FLANKSPEED FOR THE C-64

By Gordon F. Wheat

Flankspeed will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program saved with *Flankspeed* use LOAD "name".1.1 for tape, or LOAD "name".8.1 for disk. The function keys may be used after the starting and ending addresses have been entered.

f1—SAVES what you have entered so far.

f3—LOADS in a program worked on previously.

f5—To continue on a line you stopped on after LOADING in the previously saved work.

f7—Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program. f7 temporarily freezes the output as well.

- 5 POKEX3280,12:POKEX3281,11 LL
- 6 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[ED
15" "];
- 10 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY P MC
ROGRAM[6" "];
- 15 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[DM
9" "];
- 20 PRINT"[RVSON][3" "]COPR. 1984, ION INTERNA

| | | | |
|--|----|---|----|
| TIONAL INC.[3" "] | DH | •1060 PRINT"?ERROR IN SAVE":GOTO1100 | EI |
| •30 FORA=54272TO54296:POKEA,0:NEXT | IM | •1070 PRINT"?ERROR IN LOAD":GOTO1100 | GL |
| •40 POKE54272,4:POKE54273,48:POKE54277,0:POKE5 | • | •1080 PRINT:PRINT:PRINT"END OF ML AREA":PRINT | PG |
| 4278,249:POKE54296,15 | NH | •1100 POKE54276,17:POKE54276,16:RETURN | BH |
| •70 FORA=680TO699:READB:POKEA,B:NEXT | KO | •1200 OPEN15,8,15:INPUT#15,A,A\$:CLOSE15:PRINTA | IM |
| •75 DATA169,251,166,253,164,254,32,216,255,96 | HJ | \$:RETURN | PC |
| •76 DATA169,0,166,251,164,252,32,213,255,96 | JB | •2000 REM GET FOUR DIGIT HEX | GM |
| •80 B\$="STARTING ADDRESS IN HEX":GOSUB2010:AD= | HC | •2010 PRINT:PRINTB\$,:INPUTT\$ | II |
| B:SR=B | FO | •2020 IFLEN(T\$)<>4THENGOSUB1020:GOTO2010 | AD |
| •85 GOSUB2520:IFB=0THEN80 | KE | •2040 FORA=1TO4:A\$=MID\$(T\$,A,1):GOSUB2060:IFT(| GF |
| •86 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16 | IF | A)=16THENGOSUB1020:GOTO2010 | EH |
| •90 B\$="ENDING ADDRESS IN HEX":GOSUB2010:EN=B | FP | •2050 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+ | KP |
| •95 GOSUB2510:IFB=0THEN80 | MN | T(4):RETURN | NP |
| •96 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16 | GE | •2060 IFAS\$>"@"ANDA\$<"G"THENT(A)=ASC(A\$)-55:RET | LI |
| •97 IFB>255THENB=B-255:POKE254,PEEK(254)+1 | HN | URN | MI |
| •98 POKE253,B:PRINT | IL | •2070 IFAS\$>"/"ANDA\$<:""THENT(A)=ASC(A\$)-48:RET | IM |
| •100 REM GET HEX LINE | FG | URN | EB |
| •110 GOSUB3010:PRINT": [c P][LEFT]";:FORA=0TO8 | MD | •2080 T(A)=16:RETURN | HG |
| •120 FORB=0TO1:GOTO210 | ME | •2500 REM ADDRESS CHECK | CE |
| •125 NEXTB | LH | •2510 IFAD>ENTHEN1030 | PN |
| •130 A\$(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN310 | IK | •2515 IFB<SRORB>ENTHEN1040 | MJ |
| •135 PRINT" [c P][LEFT]"; | PD | •2520 IFB<256OR(B>4096ORANDB<49152)ORB>53247THE | IM |
| •140 NEXTA:T=AD-(INT(AD/256)*256):PRINT" " | LK | N1050 | CJ |
| •150 FORA=0TO7:T=T+A\$(A):IFT>255THENT=T-255 | IA | •2530 RETURN | JP |
| •160 NEXT | FK | •3000 REM ADDRESS TO HEX | AC |
| •170 IFAS\$(8)<>TTHENGOSUB1010:GOTO110 | MN | •3010 AC=AD:A=4096:GOSUB3070 | AI |
| •180 FORA=0TO7:POKEAD+A,A\$(A):NEXT:AD=AD+8:GOT | AB | •3020 A=256:GOSUB3070 | LH |
| 0110 | HO | •3030 A=16:GOSUB3070 | EO |
| •200 REM GET HEX INPUT | GC | •3040 A=1:GOSUB3070 | FJ |
| •210 GETA\$:IFAS\$=""THEN210 | MD | •3060 RETURN | FF |
| •211 IFAS\$=CHR\$(20)THEN270 | KF | •3070 T=INT(AC/A):IFT>9THENA\$=CHR\$(T+55):GOTO3 | AB |
| •212 IFAS\$=CHR\$(133)THEN4000 | GE | 090 | MF |
| •213 IFAS\$=CHR\$(134)THEN4100 | BJ | •3080 A\$=CHR\$(T+48) | JH |
| •214 IFAS\$=CHR\$(135)THENPRINT" ":GOTO4500 | OB | •3090 PRINTA\$,:AC=AC-A*T:RETURN | CM |
| •215 IFAS\$=CHR\$(136)THENPRINT" ":GOTO4700 | CJ | •4000 A\$="**SAVE**":GOSUB4200 | FO |
| •220 IFAS\$>"@"ANDA\$<"G"THENT(B)=ASC(A\$)-55:GOTO | HG | •4050 OPEN1,T,1,A\$:SYS680:CLOSE1 | OM |
| 250 | BE | •4060 IFST=0THENEND | GF |
| •230 IFAS\$>"/"ANDA\$<:""THENT(B)=ASC(A\$)-48:GOTO | KH | •4070 GOSUB1060:IFT=8THENGOSUB1200 | DF |
| 250 | AD | •4080 GOTO4000 | IG |
| •240 GOSUB1100:GOTO210 | GJ | •4100 A\$="**LOAD**":GOSUB4200 | FN |
| •250 PRINTA\$"[c P][LEFT]"; | PL | •4150 OPEN1,T,0,A\$:SYS690:CLOSE1 | IM |
| •260 GOTO125 | IA | •4160 IFST=64THEN110 | DK |
| •270 IFAS\$>0THEN280 | KF | •4170 GOSUB1070:IFT=8THENGOSUB1200 | MA |
| •272 A=-1:IFB=1THEN290 | HN | •4180 GOTO4100 | OI |
| •274 GOTO140 | ON | •4200 PRINT" ":PRINTTAB(14)A\$ | FH |
| •280 IFB=0THENPRINTCHR\$(20);CHR\$(20);:A=A-1 | FL | •4210 PRINT:A\$="" :INPUT"FILENAME";A\$ | NK |
| •285 A=A-1 | DH | •4215 IFAS\$=""THEN4210 | DI |
| •290 PRINTCHR\$(20);:GOTO140 | JA | •4220 PRINT:PRINT"TAPE OR DISK?":PRINT | BK |
| •300 REM LAST LINE | HD | •4230 GETB\$:T=1:IFB\$="D"THENT=8:A\$="@0:""+A\$:RE | EC |
| •310 PRINT" ":T=AD-(INT(AD/256)*256) | AG | TURN | GN |
| •320 FORB=0TOA-1:T=T+A\$(B):IFT>255THENT=T-255 | KN | •4240 IFB\$<>"T"THEN4230 | MN |
| •330 NEXT | | •4250 RETURN | JD |
| •340 IFAS\$(A)<>TTHENGOSUB1010:GOTO110 | | •4500 B\$="CONTINUE FROM ADDRESS":GOSUB2010:AD= | |
| •350 FORB=0TOA-1:POKEAD+B,A\$(B):NEXT | | B | |
| •360 PRINT:PRINT"YOU ARE FINISHED!":GOTO4000 | | •4510 GOSUB2515:IFB=0THEN4500 | |
| •1000 REM BELL AND ERROR MESSAGES | | •4520 PRINT:GOTO110 | |
| •1010 PRINT:PRINT"LINE ENTERED INCORRECTLY":PR | | •4700 B\$="BEGIN SCAN AT ADDRESS":GOSUB2010:AD= | |
| INT:GOTO1100 | | B | |
| •1020 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!": | | •4705 GOSUB2515:IFB=0THEN4700 | |
| GOTO1100 | | •4706 PRINT:GOTO4740 | |
| •1030 PRINT:PRINT"ENDING IS LESS THAN STARTING | | •4710 FORB=0TO7:AC=PEEK(AD+B):GOSUB3030:IFAD+B | |
| !":B=0:GOTO1100 | | =ENTHENAD=SR:GOSUB1080:GOTO110 | |
| •1040 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED | | •4715 PRINT" ";:NEXTB | |
| RANGE!":B=0:GOTO1100 | | •4720 PRINT:AD=AD+8 | |
| •1050 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:G | | •4730 GETB\$:IFB\$=CHR\$(136)THEN110 | |
| OTO1100 | | •4740 GOSUB3010:PRINT" ";:GOTO4710 | |

INFINITESIMAL INTRIGUE FROM PAGE 51 MOLECULAR MOTION

```

•1 REM JD
•2 REM -- MOLECULAR MOTION -- LI
•3 REM RUPERT REPORT #22 OL
•4 REM JD
•6 REM MOVEMENT OF MOLECULES FROM ONE OH
•7 REM COMPARTMENT TO ANOTHER GJ
•8 REM JD
•9 :REM TOTAL # AND # ON LEFT SIDE: JA
•10 TTL=480 : NL=480 II
•15 L1$=CHR$(157):L$=" "+L1$+L1$+" " CG
•20 KK=1 : K1=1024 : K2=40 JB
•30 K3=32 : K4=81 :REM BLANK & MOLECULE JB
•35 :REM CLEAR SCREEN AND SET COLOR: LE
•40 POKE 53281,0 : PRINT CHR$(147) HM
•50 POKE 53281,1 : PRINT CHR$(144) GM
•55 :REM PUT 480 MOLECULES ON LEFT: GA
•60 FOR Y=1 TO 24 : FOR X=0 TO 19 PH
•70 POKE K1+X+K2*Y,K4 : NEXT : NEXT KC
•75 :REM ===== MAIN LOOP ===== BA
•80 RL=NL/TTL :REM RELATIVE # ON LEFT LP
•90 RN=RND(0) :REM RANDOM NUMBER PP
•100 IF NL=480 AND KK=-1 THEN 270 KI
•110 IF RN<RL THEN PL=K3: PR=K4:GOTO 130 II
•120 PL=K4 : PR=K3 NA
•130 X=INT(RND(0)*20):Y=INT(RND(0)*24)+1 JJ
•135 REM MEMORY LOCATIONS TO POKE KK
•140 ML=K1+X+Y*K2 PK
•150 MR=K1+(20+X)+Y*K2 HI
•160 GET A$ : IF A$<>" " THEN 270 DB
•165 REM FIND LOCATION TO 'UNPOKE' KL
•170 IF PEEK(ML)<>PL THEN 210 HL
•180 Y=Y+1 : IF Y<25 THEN 140 LE
•190 Y=1 : X=X+1 : IF X<20 THEN 140 GM
•200 X=0 : GOTO 140 JN
•210 IF PL=K3 THEN NL=NL-KK : GOTO 230 FG
•220 NL=NL+KK BN
•230 NR=TTL-NL : T=T+1 ON
•240 POKE ML,PL : POKE MR,PR FC
•250 PRINT CHR$(19);NL;TAB(17);"T=";KK*T; AL
L$;TAB(34);NR;L$ PA
•260 GOTO 80 LF
•265 REM REVERSE THE ARROW OF TIME OO
•270 KK=-KK : TEMP=K3 : K3=K4 : K4=TEMP OO
•280 T=0 : GOTO 80 GM

```

```

•5 REM MONTE CARLO SIMULATION OF A MN
•6 REM TWO-PRODUCT DECAY CHAIN NE
•7 REM JD
•10 TTL=100 :REM INITIAL NUMBER BJ
•20 SF=22/TTL :REM PLOT SCALE FACTOR JH
•30 ND=2 :REM NUMBER OF DAUGHTERS HL
•40 DIM NUC(TTL) LL
•100 REM DECAY CONSTANTS KH
•110 DC(0)=.2 CB
•120 DC(1)=.05 :REM FIRST DAUGHTER AO
•130 DC(2)=0 :REM STABLE ISOTOPE IN
•140 M(0)=TTL :REM INITIAL AMOUNT JM
•150 PRINT CHR$(147)" == RADIOACTIVE DE LO
CAY == " MF
•160 FOR T=1 TO 20 NM
•170 GOSUB 400 :REM <<< GOSUB 500 TO PLOT FL
•180 FOR N=1 TO TTL GN
•190 IF RND(0) > DC(NUC(N)) THEN 220 AG
•200 K=NUC(N) : NUC(N)=K+1 MC
•210 M(K)=M(K)-1 : M(K+1)=M(K+1)+1 NA
•220 NEXT N NG
•230 NEXT T KE
•240 POKE 214,23 : PRINT LB
•250 POKE 211,12 NF
•260 PRINT"=PRESS A KEY TO CONTINUE==>"; HE
•270 GET A$ : IF A$="" THEN 270 CG
•280 GOTO 150 IC
•390 END AA
•395 REM --- PRINT VALUE ROUTINE --- DN
•400 PRINT TM ">>", OO
•410 FOR J=0 TO ND LN
•420 PRINT M(J),:NEXT J MK
•430 TM=TM+1 IM
•440 RETURN JD
•495 REM KB
•499 REM ---- PLOT ROUTINE ---- OO
•500 FOR J=0 TO ND FN
•510 Y=M(J) : S$=RIGHT$(STR$(J),1) HL
•520 ROW%=22-SF*Y : COL%=2*T-2 JG
•530 IF ROW%>23 THEN ROW%=23 ME
•540 IF ROW%<=0 THEN ROW%=0 IG
•550 IF COL%>38 THEN COL%=38 PJ
•560 IF COL%<0 THEN COL%=0 GL
•570 POKE 214,ROW%: PRINT IO
•580 POKE 211,COL%: PRINT S$ JJ
•590 NEXT J : RETURN

```

ALIVE & IN LIVING COLOR

RADIOACTIVE DECAY

FROM PAGE 18

DRAGON

```

•1 REM JD
•2 REM * RADIOACTIVE DECAY * FF
•3 REM RUPERT REPORT #22 OL
•4 REM JD

```

```

•1 REM *** DRAGON *** EK
•2 REM MULTI-COLOR SPRITE ANIMATION GE
•4 REM ** MOVE TOP OF MEMORY TO MAKE ROOM CA
FOR VIDEO BLOCK AT 32768

```

| | | | |
|--|----|--|----|
| •5 POKE 55,255:POKE 56,127:POKE 643,255:POKE 644,127 | KG | •619 REM ** SPRITE ENABLE REGISTER | AF |
| •9 REM *** SET-UP SUBROUTINES *** | OF | •620 ES=53269 | FE |
| •10 GOSUB 600:REM (VIDEO MEMORY) | II | •621 REM ** VERTICAL EXPANSION REGISTER (1=DOUBLE HEIGHT) | IB |
| •12 GOSUB 1000:REM (SPRITE SHAPES) | CB | •622 VE=53271 | GC |
| •13 GOSUB 900:REM (SPRITE POSITIONS) | IE | •623 REM ** HORIZONTAL EXPANSION REGISTER (1=DOUBLE WIDTH) | PL |
| •15 GOTO 100 | CF | •624 HE=53277 | FC |
| •98 REM *** ACTION LOOP *** | KJ | •625 REM ** SPRITE PRIORITY REGISTER (1=SPRITE IS IN FRONT OF FOREGROUND) | GM |
| •100 FOR AN=0 TO 3 | MA | •626 PR=53275 | FJ |
| •105 K=KP(PEEK(653)):IF K>2 THEN 370 | JK | •627 REM ** MULTICOLOR ENABLE REGISTER (1=MULTI-COLOR ENABLED) | IM |
| •110 IF (K>1)AND(Q=1) THEN AN=0:Q=0:POKE LT(0),ST(XK,AN):GOTO 105 | BM | •628 EM=53276 | EK |
| •115 IF K>1 THEN 105 | PO | •629 REM ** SPRITE MULTICOLOR COLOR REGISTERS | OH |
| •120 Q=1:HP=HP+K(K):IF HP<0 THEN HP=HP+1 | DA | •630 MR=53285:REM ('01' REGISTER: ADD 1 TO MR FOR '11' REGISTER) | LJ |
| •125 IF HP>HZ THEN HP=HP-1 | PP | •631 REM ** SPRITE-SPRITE COLLISION REGISTER-FOREGROUND COLLISION REG | ID |
| •130 IF K<>XK THEN XK=K | DN | •632 CS=53278:CF=53279 | AO |
| •135 POKE HT(0),HH(HP):POKE HR,HB(HP) | AO | •633 REM ** SET-BIT AND CLEAR-BIT VALUES | BI |
| •140 POKE LT(0),ST(XK,AN) | DD | •634 BS(0)=1:FOR I=1 TO 7:BS(I)=2*BS(I-1):NEXT | NE |
| •196 NEXT:GOTO 100 | NM | •635 FOR I=0 TO 7:BC(I)=255-BS(I):NEXT | LB |
| •296 RETURN | IM | •636 REM ** MULTICOLOR SET-BIT VALUES | MN |
| •369 REM ** PUT VIDEO MEMORY BACK TO FIRST BLOCK, AND SCREEN MEMORY TO 1024 | EG | •637 FOR I=0 TO 3:MS(0,I)=I:NEXT:FOR I=1 TO 3:FOR J=0 TO 3:MS(I,J)=MS(I-1,J)*4:NEXT:NEXT | OH |
| •370 POKE 56578,PEEK(56578)OR3:POKE 56576,(PEEK(56576)AND 252)OR 3 | MB | •638 REM *** INITIALIZE VALUES *** | DK |
| •371 POKE 53272,20:POKE 648,4 | OM | •639 REM ** FOREGROUND COLOR | FL |
| •379 REM ** REENABLE SHIFT/COMMODORE AND RUN-STOP/RESTORE | FB | •640 POKE 53281,9:PRINT "[CLEAR][c 1]";:REM (BROWN) | GG |
| •380 POKE 657,0:POKE 792,71:POKE 808,237 | PK | •641 REM ** BACKGROUND COLOR | DK |
| •390 END | IC | •642 POKE 53281,0:REM (BLACK) | JB |
| •598 REM *** ARRANGE MEMORY *** | KB | •643 REM ** BORDER COLOR | BE |
| •599 REM USE THIRD VIDEO BLOCK (32768 TO 49151), SO ROM CHARACTER SET IS USABLE. | AL | •644 POKE 53280,9:REM (BROWN) | LM |
| •600 VB=32768:POKE 56578,PEEK(56578)OR3:POKE 56576,(PEEK(56576)AND 252)OR 1 | CN | •645 REM ** SPRITE COLORS (DEFAULTS: WHI, RED,L-GRN,PUR,GRN,BLU,YEL,M-GRAY) | IE |
| •601 REM ** TELL VIC-2 WHERE SCREEN IS WITHOUT CHANGING CHARACTER SET LOCATION | GA | •646 POKE CT(0),5:REM (THE SCALES ARE GREEN) | HN |
| •602 SB=0:POKE 53272,(SB*16)+4:SB=VB+1024*SB | MO | •647 REM ** SET PRIORITY | EF |
| •603 REM ** TELL BASIC WHERE SCREEN IS | GB | •648 POKE PR,0:REM (ALL IN FRONT) | OD |
| •604 BB=SB/256:POKE 648,BB | AK | •649 REM ** SET HORIZONTAL SIZES | BJ |
| •608 REM *** REGISTER ADDRESSES *** | EJ | •650 POKE HE,1:REM (SPR 0=DOUBLE) | NJ |
| •609 REM ** SPRITE SHAPE LOCATION TABLE | IF | •651 REM ** SET VERTICAL SIZES | CC |
| •610 LT(0)=SB+1016:FOR I=1 TO 7:LT(I)=LT(I-1)+1:NEXT | AF | •652 POKE VE,1:REM (SPR 0=DOUBLT) | MO |
| •611 REM ** SPRITE COLOR TABLE | LA | •653 REM ** ENABLE SPRITES | OD |
| •612 CT(0)=53287:FOR I=1 TO 7:CT(I)=CT(I-1)+1:NEXT | AN | •654 POKE ES,BS(0):REM (SPRITE 0 ONLY) | KB |
| •613 REM ** SPRITE HORIZONTAL POSITION TABLE (LOW BYTES) | CH | •655 REM ** ENABLE MULTICOLOR FOR SPR 0 | DG |
| •614 HT(0)=53248:FOR I=1 TO 7:HT(I)=HT(I-1)+2:NEXT | KC | •656 POKE EM,BS(0) | FN |
| •615 REM ** SPRITE VERTICAL POSITION TABLE | IJ | •657 REM ** SET MULTI-COLORS 1 AND 3 (1=LIGHT GREY, 3=FLAME YELLOW) | DJ |
| •616 VT(0)=53249:FOR I=1 TO 7:VT(I)=VT(I-1)+2:NEXT | AJ | •658 POKE MR,15:POKE MR+1,7 | JA |
| •617 REM ** SPRITE HORIZONTAL HIGH-BIT REGISTER | IG | •689 REM *** SAFETY PROCEDURES *** | CM |
| •618 HR=53264 | FB | •690 POKE 657,128:REM DISABLE SHIFT/COMMODORE CHARACTER SET SWITCH | OA |
| | | •691 POKE 808,234:POKE 792,193:REM DISABLE STOP AND STOP/RESTORE | JJ |

IMPORTANT! Letters on white background are **Bug Repellent** line codes. Do not enter them! Pages 117 and 118 explain these codes and provide other essential information on entering **Ahoy!** programs. Refer to these pages **before** entering any programs!

| | | | |
|---|----|--------------------------------------|----|
| •696 RETURN | IM | •1020 DATA "[6"."]2[5"."]" | BK |
| •898 REM *** SPRITE POSITIONS *** | KA | •1021 DATA "[4"."]22.2[4"."]" | AK |
| •899 REM ** POSSIBLE POSITIONS DIM'ED | MK | •1022 DATA "[4"."][4"2"] [4"."]" | CO |
| •900 VZ=19:HZ=102:DIM HH(HZ),VV(VZ),HB(HZ) | NM | •1023 DATA "[6"."]22[4"."]" | DO |
|) | IA | •1024 DATA "[5"."]1[3"2"] [3"."]" | AF |
| •901 REM ** ASSIGN HORIZONTAL VALUES | IA | •1025 DATA "[4"."]22122[3"."]" | AB |
| •902 X=8:B=0:FOR I=0 TO HZ:HH(I)=X:HB(I)= | PB | •1026 DATA "[5"."]1122.2" | BI |
| B | PB | •1027 DATA "[5"."]1122..2" | AA |
| •903 X=X+3:IF X>255 THEN X=X-256:B=1 | DC | •1028 DATA "[6"."]122..2" | BF |
| •904 NEXT | IA | •1029 DATA "[7"."]22..2" | BC |
| •905 REM ** ASSIGN VERTICAL VALUES | LF | •1030 DATA "[6"."]1[3"2"].2" | BJ |
| •906 X=53:FOR I=0 TO VZ:VV(I)=X:X=X+8:NEX | JN | •1031 DATA "[6"."][3"2"].2." | DO |
| T | JN | •1039 REM ** 2ND SHAPE, 1ST SEQUENCE | FG |
| •919 REM ** KEYPRESS MATRIX | EO | •1040 DATA "[6"."]2[5"."]" | BK |
| •920 DIM KP(7),K(2) | JA | •1041 DATA "[4"."]22.2[4"."]" | AK |
| •921 FOR I=0 TO 7:KP(I)=2:NEXT:KP(1)=1:KP | JA | •1042 DATA "[3"."][3"3"]22[4"."]" | AB |
| (2)=0:KP(7)=3 | ML | •1043 DATA "[4"."][4"2"] [4"."]" | CO |
| •922 K(0)=-1:K(1)=1:K(2)=0 | BK | •1044 DATA "[4"."]11[3"2"] [3"."]" | DC |
| •929 REM ** INITIAL SPRITE POSITIONING | IO | •1045 DATA "[5"."]2212[3"."]" | AP |
| •930 HP=6:VP=VZ:XX=1:AN=0 | PG | •1046 DATA "[5"."][3"1"]2..2" | AJ |
| •931 POKE VT(0),VV(VP):POKE HT(0),HH(HP): | PG | •1047 DATA "[5"."][3"1"]2..2" | AJ |
| POKE HR,HB(HP) | AC | •1048 DATA "[6"."]112.2." | AK |
| •939 REM ** TELL VIC-2 WHERE TO FIND SPRI | AC | •1049 DATA "[7"."]12.2." | BD |
| TE SHAPE | HK | •1050 DATA "[5"."][3"1"] [3"2"]." | AF |
| •940 POKE LT(0),ST(XK,AN) | DD | •1051 DATA "[6"."][3"2"] [3"."]" | AC |
| •949 REM ** CLEAR SCREEN | BI | •1059 REM ** 3RD SHAPE, 1ST SEQUENCE | GL |
| •950 PRINT "[CLEAR]"; | KN | •1060 DATA "[6"."]2[5"."]" | BK |
| •996 RETURN | IM | •1061 DATA ".3.22.2[4"."]" | AL |
| •998 REM *** SPRITE SHAPES *** | CD | •1062 DATA ".3.3..22[4"."]" | AG |
| •999 REM ** # SPR SHAPES -1; # SHAPES/ANI | CD | •1063 DATA ".3.[4"2"] [4"."]" | CP |
| MATION SEQ; # LINES/SHAPE -1 | OF | •1064 DATA "[5"."]1[3"2"] [3"."]" | AF |
| •1000 NS=1:AS=3:TS=11 | FJ | •1065 DATA "[4"."]22122[3"."]" | AB |
| •1001 REM ** LOCATE SPRITE SHAPE MEMORY | OM | •1066 DATA "[5"."]1122..2" | AA |
| •1002 ST(0,0)=16:FOR I=1 TO NS:ST(I,0)=ST | OM | •1067 DATA "[5"."]1122.2." | BI |
| (I-1,0)+AS+1:NEXT | MP | •1068 DATA "[6"."]122.2." | AN |
| •1003 FOR I=0 TO NS:FOR J=1 TO AS:ST(I,J) | MP | •1069 DATA "[7"."]22..2" | BC |
| =ST(I,J-1)+1:NEXT:NEXT | GH | •1070 DATA "[6"."]1[5"2"]" | BF |
| •1004 FOR I=0 TO NS:FOR J=0 TO AS:FOR K=0 | GH | •1071 DATA "[6"."][3"2"] [3"."]" | AC |
| TO TS:READ SS\$ | OL | •1079 REM ** 4TH SHAPE, 1ST SEQUENCE | LC |
| •1005 FOR L=0 TO 2:X=0:Y=VB+ST(I,J)*64+K* | CC | •1080 DATA "3[5"."]2[5"."]" | BB |
| 3+L | CC | •1081 DATA ".3..22.2[4"."]" | AD |
| •1006 REM ** CONVERT STRINGS TO SHAPE BYT | MN | •1082 DATA "3.3.[4"2"] [4"."]" | CO |
| ES (USE MS(0-3,0-3) TO SET BITS) | MN | •1083 DATA ".3[4"."]22[4"."]" | BH |
| •1007 FOR M=1 TO 4:N=ASC(MID\$(SS\$,M+L*4,1 | AJ | •1084 DATA "3[5"."][3"2"] [3"."]" | AJ |
|)) | AJ | •1085 DATA "[4"."][5"2"] [3"."]" | DC |
| •1008 IF(N>48)AND(N<52)THEN X=X OR MS(4-M | AH | •1086 DATA "[5"."]1[3"2"].2." | AB |
| ,N-48) | AH | •1087 DATA "[5"."]1[3"2"].2." | AB |
| •1009 NEXT:POKE Y,X:NEXT:PRINT SS\$:NEXT | GO | •1088 DATA "[6"."][3"2"]..2" | AG |
| •1010 Z=64-(TS*3+2):FOR K=Y+1 TO Y+Z:POKE | GO | •1089 DATA "[7"."]22..2" | BC |
| K,0:NEXT:NEXT:NEXT | IE | •1090 DATA "[7"."][3"2"].2" | BG |
| •1017 REM ** SPRITE SHAPE DATA | HJ | •1091 DATA "[5"."][4"2"].2." | AC |
| •1018 REM .='OFF' 1=COLOR 1 2=COLOR 2 | HJ | •1119 REM ** 1ST SHAPE, 2ND SEQUENCE | HE |
| 3=COLOR 3 | IO | •1120 DATA "[5"."]2[6"."]" | BK |
| •1019 REM ** 1ST SHAPE, FIRST SEQ | LG | •1121 DATA "[4"."]2.22[4"."]" | DK |

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•1122 DATA "[4"."][4"2"] [4"."]"
•1123 DATA "[4"."]22[6"."]"
•1124 DATA "[3"."][3"2"]1[5"."]"
•1125 DATA "[3"."]22122[4"."]"
•1126 DATA ".2.2211[5"."]"
•1127 DATA "2..2211[5"."]"
•1128 DATA "2..221[6"."]"
•1129 DATA "2..22[7"."]"
•1130 DATA "2.[3"2"]1[6"."]"
•1131 DATA ".2.[3"2"] [6"."]"
•1139 REM ** 2ND SHAPE, 3RD SEQ
•1140 DATA "[5"."]2[6"."]"
•1141 DATA "[4"."]2.22[4"."]"
•1142 DATA "[4"."]22[3"3"] [3"."]"
•1143 DATA "[4"."][4"2"] [4"."]"
•1144 DATA "[3"."][3"2"]11[4"."]"
•1145 DATA "[3"."]2122[5"."]"
•1146 DATA "2..2[3"1"] [5"."]"
•1147 DATA "2..2[3"1"] [5"."]"
•1148 DATA ".2.211[6"."]"
•1149 DATA ".2.21[7"."]"
•1150 DATA ".[3"2"] [3"1"] [5"."]"
•1151 DATA "[3"."][3"2"] [6"."]"
•1160 DATA "[5"."]2[6"."]"
•1161 DATA "[4"."]2.22.3.."
•1162 DATA "[4"."]22..3.3."
•1163 DATA "[4"."][4"2"].3.."
•1164 DATA "[3"."][3"2"]1[5"."]"
•1165 DATA "[3"."]22122[4"."]"
•1166 DATA "2..2211[5"."]"
•1167 DATA ".2.2211[5"."]"
•1168 DATA ".2.2211[5"."]"
•1169 DATA "2..22[7"."]"
•1170 DATA "[5"2"]1[6"."]"
•1171 DATA "[3"."][3"2"] [6"."]"
•1179 REM ** 4TH SHAPE, 2ND SEQUENCE
•1180 DATA "[5"."]2[5"."]3"
•1181 DATA "[4"."]2.22..3."
•1182 DATA "[4"."][4"2"].3.3"
•1183 DATA "[4"."]22[4"."]3."
•1184 DATA "[3"."][3"2"] [5"."]3"
•1185 DATA "[3"."][5"2"] [4"."]"
•1186 DATA ".2.[3"2"]1[5"."]"
•1187 DATA ".2.[3"2"]1[5"."]"
•1188 DATA "2..[3"2"] [6"."]"
•1189 DATA "2..22[7"."]"
•1190 DATA "2.22[8"."]"
•1191 DATA ".2.[4"2"] [5"."]"
•1990 RETURN

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SOLITAIRE 64 FROM PAGE 37

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•1 REM SOLITAIRE 64 KE
•2 REM BY ERIC W SINK OM
•3 POKE55,255:POKE56,63:CLR:POKE53269,..:P OKE53271,..:POKE53277,.. EH
•4 X=RND(-TI) FH

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CO •5 S4=64:O4=14:T6=26:H9=39:Z1=1:Z2=2:Z3=3
AG :Z4=4:O3=13 LI
BN •6 POKE53280,0:POKE53281,4:PRINT"[CLEAR]"[
AB YELLOW]";CHR$(142)"[008]" KM
DI •7 IFPEEK(2)=15THENPRINTCHR$(14)"[008]" AM
DI •8 GOSUB103 CK
DN •9 GOSUB54:GOSUB101:GOSUB72:GOSUB190:GOSU
AK B216 IO
BJ •10 CLR:DIM P(7,20),H(13),C(13),D(13),S(1
CO 3),NP(7),DK%(52) HF
PM •11 S4=64:O4=14:T6=26:H9=39:Z1=1:Z2=2:Z3=
BK 3:Z4=4:O3=13 LI
DK •12 M$="HANG ON, STILL SETTING UP[3"."]";
DF P$="[HOME][DOWN][DOWN]":PRINT"[CLEAR]":G
CO OSUB108 OK
DO •13 X=RND(-TI) FH
OH •14 DP=0:NH=0:NC=0:ND=0:NS=0:DN=0 AC
DB •15 PRINT:PRINT:PRINT"SHUFFLING[3"."]" NA
DB •16 FORI=1TO52 LD
CO •17 CD=INT(RND(1)*52)+Z1:IFDK%(CD)THEN17 BJ
AD •18 DK%(CD)=I:NEXT FI
BN •19 PRINT"DEALING OUT CARDS[3"."]" DN
BK •20 FORI=1TO28 MM
BK •21 F1=.:CD=DK%(53-I):DK%(53-I)=. AG
DL •22 IFI=7ORI=13ORI=18ORI=22ORI=25ORI=27OR
AG I=28THENCDCD+S4:F1=1 CJ
CP •23 PI=PI+1:P(PI,NP(PI)+1)=CD:NP(PI)=NP(P
BN I)+1:IFF1=1THENPI=0 DE
AB •24 NEXT IA
DI •25 DN=24:DP=24:POKE53280,0:POKE53281,1 HE
DI •26 PRINT"[CLEAR][RVSON][BLUE][3" "]* * *
DI [3" " ]S O L I T A I R E[3" "]* * *[3" " ]
AK ";:POKE16423,160 AI
CN •27 GOSUB368 DF
BK •28 PRINT"[CLEAR][RVSON][BLUE][3" "]* * *
HE [3" " ]S O L I T A I R E[3" "]* * *[3" " ]
DN ";:POKE16423,160 AI
DD •29 IFLV=1THENGOSUB382 OF
DG •30 POKE55335,11:PRINT:PRINT"[HOME]"; HF
DP •31 FORQ=1TO7:PN=Q:GOSUB111:NEXT JH
DN •32 GOSUB155 DB
BC •33 GOSUB187:GOSUB226 JE
DB •34 GOSUB243:REM FIRST MOVE PL
DB •35 GOSUB269:REM SECOND MOVE OL
CO •36 IFBU=1THENBU=.:GOTO34 GJ
AK •37 IFDNTHEN34 CH
BK •38 FORI=1TO7:IFP(I,1)ANDS4=S4ORNP(I)=0TH
DC ENNEXT:GOTO40 CD
IM •39 GOTO34 PF
•40 FORI=1TO7:NP(I)=.:NEXT:NH=03:NC=03:ND
=03:NS=03 LP
•41 H(NH)=03:C(NC)=03:D(ND)=03:S(NS)=03 PF
•42 GOSUB155:GOSUB137:FORHI=1TO7:PN=HI:GO
SUB111:NEXT BD
•43 IFLV=1THEN374 GB
•44 PRINT"[HOME][6"[DOWN]]"TAB(15);"[RVS
ON]YOU WON[3"!]" MK
•45 PRINT"[HOME][9"[DOWN]]"TAB(14);"[RVS

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| | | | | |
|---|----|------|--|----|
| ON][RED]PLAY AGAIN??" | AO | 00 | | JH |
| •46 PRINT:PRINT | GJ | •85 | DATA076,255,000,240,144,144,240,024,00 | LN |
| •47 PRINTTAB(9)"[RVSON]PRESS UP TO PLAY A GAIN" | KO | •86 | DATA077,255,000,144,160,192,160,144,00 | GA |
| •48 PRINT | JJ | •87 | DATA078,255,000,054,127,127,062,028,00 | EG |
| •49 PRINTTAB(11)"[RVSON]PRESS DOWN TO QUI T[BLACK]" | PN | •88 | DATA079,255,000,012,012,051,051,012,00 | CC |
| •50 X=PEEK(56320):U=XAND1:V=XAND2:IFU=1AND DV=2THEN50 | CP | •89 | DATA080,255,000,008,028,062,028,008,00 | FA |
| •51 IFU=.THENRUN10 | FL | •90 | DATA081,255,000,024,060,126,126,024,00 | NB |
| •52 PRINT"[CLEAR][BLACK]";:POKE53269,.:EN D | FH | •91 | DATA082,224,048,024,024,024,024,024,00 | DM |
| •53 REM | JD | •92 | DATA085,024,024,024,024,024,024,012,00 | FF |
| •54 REM | JH | •93 | DATA086,024,024,024,024,024,024,048,2 | DI |
| •55 POKE2,15 | GH | •94 | DATA087,024,024,024,024,024,024,024,00 | JH |
| •56 DATA173,000,221,041,252,009,002 | IL | •95 | DATA088,000,000,000,000,000,000,000,2 | PI |
| •57 DATA141,000,221,169,002,141,024 | GH | •96 | DATA-1 | OE |
| •58 DATA208,169,064,141,136,002,169 | GC | •97 | PRINT"[CLEAR]E" | MD |
| •59 DATA147,032,210,255,169,127,141 | NI | •98 | READA:IFA=-1THENRETURN | KN |
| •60 DATA013,220,169,051,133,001,160 | GF | •99 | POKE16384,A | AF |
| •61 DATA000,169,000,133,251,133,253 | BA | •100 | FORI=0TO7:READB:POKE18432+A*8+I,B:NE XT:GOTO98 | MF |
| •62 DATA169,208,133,252,169,072,133 | PI | •101 | REM | JD |
| •63 DATA254,177,251,145,253,200,192 | JO | •102 | SYS49152:RETURN | GI |
| •64 DATA000,208,247,230,252,230,254 | EN | •103 | REM | JD |
| •65 DATA165,252,201,224,208,237,169 | AI | •104 | M\$="[15" "]SOLITAIRE":P\$="[HOME][7"[DOWN]"]":GOSUB108 | GJ |
| •66 DATA055,133,001,169,129,141,013 | HI | •105 | M\$="[13" "]BY ERIC W SINK":P\$="[HOME][11"[DOWN]"]":GOSUB108 | NE |
| •67 DATA220,096,000 | LB | •106 | M\$="[8" "]PLEASE WAIT[3"."]SETTING U P":P\$="[HOME][16"[DOWN]"]":GOSUB108 | CH |
| •68 PRINT"[HOME]E" | DK | •107 | RETURN | IM |
| •69 C1=.:FORI=49152TO49231:READB:C1=C1+B: POKEI,B:POKE1024,B:POKE16384,B:NEXT | BI | •108 | REM | JD |
| •70 IFC1<>11494THENPRINT"ERROR IN DATA LI NES 10010-10065":STOP | MC | •109 | FORI=1TOLEN(M\$):PRINTP\$RIGHT\$(M\$,I); :NEXT | FP |
| •71 RETURN | IM | •110 | RETURN | IM |
| •72 REM | JD | •111 | REM | JD |
| •73 DATA064,007,012,024,024,024,024,024,0 24 | DE | •112 | REM | JD |
| •74 DATA065,255,000,240,144,240,144,144,0 00 | KE | •113 | REM | JD |
| •75 DATA066,255,000,240,016,240,128,240,0 00 | EI | •114 | REM | JD |
| •76 DATA067,255,000,240,016,240,016,240,0 00 | CH | •115 | HP=3+(PN-1)*5:UC=. | JD |
| •77 DATA068,255,000,144,144,240,016,016,0 00 | AE | •116 | VP=5:ZQ=. | HK |
| •78 DATA069,255,000,240,128,240,016,240,0 00 | IN | •117 | PRINT"[HOME]";:FORI=1TOVP:PRINT"[DOW N]";:NEXT:PRINTTAB(HP); | OC |
| •79 DATA070,255,000,240,128,240,144,240,0 00 | PN | •118 | IFNP(PN)THEN120 | FD |
| •80 DATA071,255,000,240,016,016,016,016,0 00 | OM | •119 | PRINT"[4" "]":FORI=1TO13:PRINTTAB(HP);"[4" "]":NEXT:GOTO135 | LD |
| •81 DATA072,255,000,240,144,240,144,240,0 00 | AJ | •120 | FORI=1TONP(PN):CD=P(PN,I):IFI=SXTHEN ZQ=1 | MD |
| •82 DATA073,255,000,240,144,240,016,240,0 00 | AC | •121 | IFCD<S4THENUC=UC+Z1:GOTO130 | DM |
| •83 DATA074,255,000,152,164,164,164,152,0 00 | BM | | | |
| •84 DATA075,255,000,112,032,032,160,224,0 00 | | | | |

| | | | |
|--|----|--|----|
| •122 CD=CD-S4:SU=Z4:IFCD<04THENSU=Z1 | JF | •167 CD\$=CO\$+CHR\$(192)+CHR\$(192+CH)+SU\$+C | |
| •123 IFCD>=04ANDCD<=T6THENSU=Z2 | ML | HR\$(210) | OO |
| •124 IFCD>T6ANDCD<=H9THENSU=Z3 | OO | •168 PRINTCD\$ | EH |
| •125 CH=CD-((SU-1)*13) | OB | •169 PRINTTAB(9); | NF |
| •126 SU\$=CHR\$(205+SU):CO\$="[BLACK]":IFSU= | AH | •170 PRINT"[s -] [s -]":PRINTTAB(9)"[s U | PO |
| 1ORSU=3THENCO\$="[RED]" | OF |][c @][c @][s V]" | |
| •127 IFZC=1ANDZQ=1THENCO\$="[BLUE]" | OO | •171 PRINT"[HOME][19"[DOWN]"]][BLUE]"TAB(3 | MH |
| •128 CD\$=CO\$+CHR\$(192)+CHR\$(192+CH)+SU\$+C | EH |);"4" "]" | |
| HR\$(210) | DE | •172 PRINT"[HOME][19"[DOWN]"]][BLUE]"TAB(3 | IP |
| •129 PRINTCD\$ | IA |);DP | |
| •130 PRINTTAB(HP); | DG | •173 PRINT"[HOME][19"[DOWN]"]][BLUE]"TAB(9 | BF |
| •131 NEXT | EA |);"4" "]" | |
| •132 PRINT"[s -] [s -]":PRINTTAB(HP)"[s | CP | •174 PRINT"[HOME][19"[DOWN]"]][BLUE]"TAB(9 | OO |
| U][c @][c @][s V]" | BK |);DN-DP | IM |
| •133 ZC=.:ZQ=. | IM | •175 RETURN | JD |
| •134 FORI=1TO12-NP(PN)+UC:PRINTTAB(HP);"4" | KP | •176 REM | |
| " "]:NEXT | DE | •177 PRINT"[HOME][20"[DOWN]"]][PURPLE]"TAB | NM |
| •135 PRINT"[HOME][BLUE]";:POKE214,3:PRINT | EI | (3);"[s *][c T][c T][s R]":PRINTTAB(3); | ME |
| :PRINTTAB(HP+1)UC | NH | •178 PRINT"[s -] [s -]":PRINTTAB(3)"[s U | IM |
| •136 RETURN | DE |][c @][c @][s V]" | JD |
| •137 REM ACES | EA | •179 RETURN | FG |
| •138 PRINT"[HOME][DOWN]"; | DG | •180 REM | GP |
| •139 IFNH=.THEN141 | DO | •181 IFLV=1THEN184 | BL |
| •140 SU=Z1:CD=H(NH):HP=9:GOSUB151 | OK | •182 PRINT"[HOME][20"[DOWN]"]][WHITE]"TAB(| DG |
| •141 PRINT"[HOME][DOWN]"; | DE | 3);"TURN":PRINTTAB(3); | HH |
| •142 IFNC=.THEN144 | FD | •183 PRINT"DECK":PRINTTAB(3)"OVER":GOTO18 | IM |
| •143 SU=Z2:CD=C(NC):HP=15:GOSUB151 | JL | 6 | JD |
| •144 PRINT"[HOME][DOWN]"; | IM | •184 PRINT"[HOME][20"[DOWN]"]][WHITE]"TAB(| MO |
| •145 IFND=.THEN147 | FN | 3);"E[3" "]:PRINTTAB(3); | OF |
| •146 SU=Z3:CD=D(ND):HP=21:GOSUB151 | AH | •185 PRINT" N ":PRINTTAB(3)" D " | JD |
| •147 PRINT"[HOME][DOWN]"; | IK | •186 RETURN | AG |
| •148 IFNS=.THEN150 | HN | •187 REM | CD |
| •149 SU=Z4:CD=S(NS):HP=27:GOSUB151 | KG | •188 PRINT"[HOME][23"[DOWN]"]]"TAB(32)"CON | OF |
| •150 RETURN | FE | CEDE" | JD |
| •151 REM ACE | DB | •189 PRINT"[HOME]";:RETURN | AG |
| •152 SU\$=CHR\$(205+SU):CO\$="[BLACK]":IFSU= | PK | •190 REM | OC |
| 1ORSU=3THENCO\$="[RED]" | EF | •191 DATA234,173,000,220,141,144,003 | FI |
| •153 CD\$=CO\$+CHR\$(192)+CHR\$(192+CD)+SU\$+C | KB | •192 DATA074,176,010,173,001,208,201 | PE |
| HR\$(210) | HJ | •193 DATA052,144,003,206,001,208,173 | DD |
| •154 PRINTTAB(HP)CD\$:PRINTTAB(HP)"[s -] | ML | •194 DATA144,003,074,074,176,010,173 | AH |
| [s -]":PRINTTAB(HP)"[s U][c @][c @][s V] | OO | •195 DATA001,208,201,228,176,003,238 | GN |
| ":RETURN | AH | •196 DATA001,208,173,144,003,074,074 | GD |
| •155 REM DECK | FL | •197 DATA074,176,034,173,016,208,074 | BE |
| •156 IFDPHENGOSUB176:GOTO158 | | •198 DATA176,013,173,000,208,201,025 | OI |
| •157 GOSUB180 | | •199 DATA144,021,206,000,208,024,144 | DB |
| •158 PRINT"[HOME][20"[DOWN]"]]"TAB(9); | | •200 DATA015,206,000,208,173,000,208 | HG |
| •159 IFDP<>DNTHEN161 | | •201 DATA201,255,208,005,169,000,141 | CD |
| •160 PRINT"[4" "]:PRINTTAB(9)"[4" "]:PR | | •202 DATA016,208,173,144,003,074,074 | DL |
| INTTAB(9)"[4" "]:PRINTTAB(9)"[4" "]:GO | | •203 DATA074,074,176,029,173,016,208 | PO |
| TO171 | | •204 DATA074,176,013,238,000,208,208 | NE |
| •161 CD=DK%(DP+Z1):SU=4:IFCD<=03THENSU=Z1 | | •205 DATA018,169,001,141,016,208,024 | FI |
| •162 IFCD>=04ANDCD<=T6THENSU=Z2 | | •206 DATA144,010,173,000,208,201,063 | JP |
| •163 IFCD>T6ANDCD<=H9THENSU=Z3 | | •207 DATA176,003,238,000,208,173,144 | KJ |
| •164 CH=CD-((SU-1)*03) | | •208 DATA003,074,074,074,074,074,176 | |
| •165 SU\$=CHR\$(205+SU):CO\$="[BLACK]":IFSU= | | •209 DATA001,096,160,243,162,161,232 | |
| 1ORSU=3THENCO\$="[RED]" | | •210 DATA208,253,200,208,248,076,000 | |
| •166 IFZC=1THENZC=.:CO\$="[BLUE]" | | •211 DATA193,000,000 | |

| | | | |
|---|----|---|----|
| •212 C2=.:FORI=49408TO49550:READB:C2=C2+B :POKEI,B:POKE1024,B:POKE16384,B:NEXT | LF | •263 P1=PN:IFNP(PN)=.THENGOSUB306:GOTO243 | EK |
| •213 IFC2<>16685THENPRINT"ERROR IN DATA L INES 11400-11500":STOP | IH | •264 DC=.:FORI=1TONP(PN):IFP(PN,I)>52THEN DC=DC+Z1 | JO |
| •214 POKE49519,79:POKE49439,243 | PH | •265 NEXT:D1=NP(PN)-DC+1 | KI |
| •215 RETURN | IM | •266 CA=CY-5:CA=CA+D1:IFCA>NP(PN)THENCA=N P(PN) | MA |
| •216 REM | JD | •267 SX=CA | OF |
| •217 DATA252,000,000,224,000,000,240,000 | EN | •268 ZC=1:GOSUB111:RETURN | IH |
| •218 DATA000,152,000,000,140,000,000,012 | LK | •269 REM 2ND MOVE | JJ |
| •219 DATA000,000,000,000,000,000,000,000 | FG | •270 GOSUB229:GOSUB235 | IJ |
| •220 DATA000,000,000,000,000,000,000,000 | FG | •271 ONJCGOTO273,274,275,277,308 | LM |
| •221 DATA000,000,000,000,000,000,000,000 | FG | •272 GOSUB306:GOTO269 | JA |
| •222 DATA000,000,000,000,000,000,000,000 | FG | •273 GOTO248 | CK |
| •223 DATA000,000,000,000,000,000,000,000 | FG | •274 GOTO272 | CL |
| •224 DATA000,000,000,000,000,000,000,000 | FG | •275 IFAM=1THENZC=.:AM=.:BU=1:GOSUB155:RE TURN | AJ |
| •225 FORI=22528TO22591:READB:POKEI,B:NEXT :RETURN | CJ | •276 GOTO272 | CL |
| •226 REM | JD | •277 REM DROP CARDS TO A PILE | EP |
| •227 POKE53269,.:POKE53264,.:POKE53248,17 0:POKE53249,150:POKE53287,6 | AJ | •278 P2=7:IFCX<33THENP2=6 | OI |
| •228 POKE17400,96:POKE53269,1:RETURN | BM | •279 IFCX<28THENP2=5 | HE |
| •229 REM READ JOYSTICK-SPRITE POSITION | DB | •280 IFCX<23THENP2=4 | GK |
| •230 SYS49408:YS=PEEK(53249):XS=PEEK(5324 8)+256*(PEEK(53264)AND1) | CL | •281 IFCX<18THENP2=3 | GF |
| •231 XS=XS-24:YS=YS-51 | II | •282 IFCX<03THENP2=Z2 | NF |
| •233 CX=INT(XS/8):CY=INT(YS/8) | PC | •283 IFCX<8THENP2=1 | CD |
| •234 RETURN | IM | •284 W2=P(P2,NP(P2)) | DG |
| •235 REM | JD | •285 W2=W2-S4:S2=Z4:IFW2<04THENS2=Z1 | AD |
| •236 JC=. | GK | •286 IFW2>=04ANDW2<=T6THENS2=Z2 | PC |
| •237 IFCY>=22ANDCX>33THENJC=1 | II | •287 IFW2>T6ANDW2<=H9THENS2=Z3 | AH |
| •238 IFCX>=3ANDCX<=7ANDCY>=19ANDCY<=22THE NJC=2 | ML | •288 IFW2>03THENW2=W2-03:GOTO288 | IB |
| •239 IFCX>=8ANDCX<=12ANDCY>=19ANDCY<=22TH ENJC=3 | ML | •289 IFAM=1THEN342 | DK |
| •240 IFCX>=3ANDCX<=36ANDCY<=18ANDCY>=5THE NJC=4 | JL | •290 W1=P(P1,SX) | DI |
| •241 IFCY<=4THENJC=5 | OO | •291 W1=W1-S4:GOSUB386 | GM |
| •242 RETURN | IM | •292 IFNP(P2)=.ANDW1=03THEN300 | KG |
| •243 REM 1ST MOVE | KJ | •293 IFP1=P2THENBU=1:PN=P1:GOSUB111:RETUR N | IN |
| •244 AM=. | HF | •294 IFW2<>W1+1THENGOSUB306:GOTO269 | OD |
| •245 GOSUB229:GOSUB235 | IJ | •295 O1=1:IFS1=2ORS1=4THENO1=2 | LM |
| •246 ONJCGOTO248,249,254,256 | NP | •296 O2=1:IFS2=2ORS2=4THENO2=2 | MI |
| •247 GOSUB306:GOTO243 | HI | •297 IFO1=1ANDO2=2THEN300 | DK |
| •248 GOTO45 | PP | •298 IFO1=2ANDO2=1THEN300 | DE |
| •249 IFDP=,THENIFLV=,THENDP=DN-3:GOTO252 | KP | •299 GOSUB306:GOTO269 | JA |
| •250 IFDP=,THEN374 | EO | •300 FORI=SXTONP(P1):NP(P2)=NP(P2)+1:P(P2 ,NP(P2))=P(P1,I):NEXTI | IL |
| •251 DP=DP-CG | BO | •301 NP(P2)=NP(P2)+CQ | OH |
| •252 IFDP<,THENDP=. | BN | •302 NP(P1)=SX-1:P(P1,NP(P1))=P(P1,NP(P1))ORS4 | OP |
| •253 GOSUB155:GOTO243 | JA | •303 PN=P1:GOSUB111 | EL |
| •254 IFDP=DNTHEN247 | JL | •304 PN=P2:GOSUB111 | DI |
| •255 ZC=1:GOSUB155:AM=1:RETURN | DO | •305 RETURN | IM |
| •256 REM | JD | •306 FORA=1TO20:POKE54296,15:FORT=1TO3:NE XT:POKE54296,0:FORT=1TO3:NEXT:NEXT | JD |
| •257 PN=7:IFCX<33THENPN=6 | GA | •307 RETURN | IM |
| •258 IFCX<28THENPN=5 | II | •308 REM | JD |
| •259 IFCX<23THENPN=4 | HO | •309 IFAM=1THEN314 | DL |
| •260 IFCX<18THENPN=3 | IJ | •310 IFSX<>NP(P1)THENGOSUB306:GOTO269 | CJ |
| •261 IFCX<03THENPN=Z2 | BB | •311 W1=P(P1,SX) | DI |
| •262 IFCX<8THENPN=1 | EP | •312 W1=W1-S4:GOSUB386 | GM |
| | | •313 ONS1GOTO326,330,334,338 | LE |

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 117 and 118 explain these codes and provide other essential information on entering **Ahoy!** programs. Refer to these pages **before** entering any programs!

| | | | |
|---|----|---|----|
| •314 REM | JD | •354 W1=DK%(DP+1) | MF |
| •315 W1=DK%(DP+1) | MF | •355 GOSUB386 | DB |
| •316 GOSUB386 | DB | •356 IFW1=03ANDNP(P2)=. THEN363 | IH |
| •317 ONS1GOTO318,320,322,324 | KM | •357 IFW2<>W1+1THENGOSUB306:GOTO269 | OD |
| •318 W2=H(NH):IFW2+1<>W1THENGOSUB306:GOTO269 | JN | •358 O1=1:IFS1=2ORS1=4THENO1=2 | LM |
| •319 NH=NH+Z1:H(NH)=W1:GOSUB365:GOSUB137:GOSUB155:RETURN | CN | •359 O2=1:IFS2=2ORS2=4THENO2=2 | MI |
| •320 W2=C(NC):IFW2+1<>W1THENGOSUB306:GOTO269 | BB | •360 IF01=1AND02=2THEN363 | DF |
| •321 NC=NC+Z1:C(NC)=W1:GOSUB365:GOSUB137:GOSUB155:RETURN | CN | •361 IF01=2AND02=1THEN363 | DH |
| •322 W2=D(ND):IFW2+1<>W1THENGOSUB306:GOTO269 | BB | •362 GOSUB306:GOTO269 | JA |
| •323 ND=ND+Z1:D(ND)=W1:GOSUB365:GOSUB137:GOSUB155:RETURN | NJ | •363 NP(P2)=NP(P2)+Z1:P(P2,NP(P2))=DK%(DP+1)ORS4:GOSUB365 | KA |
| •324 W2=S(NS):IFW2+1<>W1THENGOSUB306:GOTO269 | NJ | •364 GOSUB155:PN=P2:GOSUB111:RETURN | HM |
| •325 NS=NS+Z1:S(NS)=W1:GOSUB365:GOSUB137:GOSUB155:RETURN | AN | •365 REM | JD |
| •326 W2=H(NH):IFW2+1<>W1THENGOSUB306:GOTO269 | AN | •366 FORA=DP+1TODN:DK%(A)=DK%(A+1):NEXT:D | GE |
| •327 NH=NH+1:H(NH)=W1 | DN | N=DN-1:RETURN | IC |
| •328 NP(P1)=NP(P1)-Z1:P(P1,NP(P1))=P(P1,NP(P1))ORS4:GOSUB111:GOSUB137 | DN | •367 END | IE |
| •329 RETURN | DB | •368 REM LAS VEGAS OR REGULAR | IE |
| •330 W2=C(NC):IFW2+1<>W1THENGOSUB306:GOTO269 | DB | •369 PRINT"[6"[DOWN]]":PRINT"LAS VEGAS S | DO |
| •331 NC=NC+1:C(NC)=W1 | BJ | TYLE OR REGULAR??" | DO |
| •332 NP(P1)=NP(P1)-Z1:P(P1,NP(P1))=P(P1,NP(P1))ORS4:GOSUB111:GOSUB137 | BJ | •370 PRINT"[DOWN][DOWN]PUSH UP FOR 'VEGAS | LI |
| •333 RETURN | JN | ' AND DOWN FOR REGULAR" | LI |
| •334 W2=D(ND):IFW2+1<>W1THENGOSUB306:GOTO269 | JN | •371 X=PEEK(56320):U=XAND1:V=XAND2:IFU=1A | EE |
| •335 ND=ND+1:D(ND)=W1 | JB | NDV=2THEN371 | EE |
| •336 NP(P1)=NP(P1)-Z1:P(P1,NP(P1))=P(P1,NP(P1))ORS4:GOSUB111:GOSUB137 | EE | •372 IFU=. THENLV=1:CG=1:RETURN | II |
| •337 RETURN | EE | •373 LV=. :CG=3:RETURN | PG |
| •338 W2=S(NS):IFW2+1<>W1THENGOSUB306:GOTO269 | IM | •374 PRINT"[CLEAR]HAD YOU BOUGHT THE DECK | HO |
| •339 NS=NS+1:S(NS)=W1 | BB | FOR \$5," | HO |
| •340 NP(P1)=NP(P1)-Z1:P(P1,NP(P1))=P(P1,NP(P1))ORS4:GOSUB111:GOSUB137 | BD | •375 PRINT"[DOWN]AT \$5 FOR EVERY CARD YOU | BK |
| •341 RETURN | BD | PUT AT THE TOP," | BK |
| •342 REM | EE | •376 PRINT"[DOWN]YOU WOULD RECEIVE \$"(NH | NB |
| •343 P2=7:IFCX<33THENP2=6 | IM | +NC+ND+NS)*5"BACK." | NB |
| •344 IFCX<28THENP2=5 | AN | •377 PRINT"[DOWN]THIS LEAVES YOU WITH A N | MC |
| •345 IFCX<23THENP2=4 | FJ | ET "; | MC |
| •346 IFCX<18THENP2=3 | FJ | •378 IF((NH+NC+ND+NS)*5)-50>=0THENPRINT"P | DM |
| •347 IFCX<03THENP2=Z2 | EE | ROFIT":GOTO380 | DM |
| •348 IFCX<8THENP2=1 | EE | •379 PRINT"LOSS" | DP |
| •349 W2=P(P2,NP(P2)) | IM | •380 PRINT"OF[3" "]\$"ABS(((NH+NC+ND+NS)*5 | OI |
| •350 W2=W2-S4:S2=Z4:IFW2<04THENS2=Z1 | IM |)-50) | OI |
| •351 IFW2>=04ANDW2<=T6THENS2=Z2 | DB | •381 GOTO45 | PP |
| •352 IFW2>T6ANDW2<=H9THENS2=Z3 | FD | •382 X\$="LAS VEGAS":PRINT:PRINT:PRINT:PRI | KP |
| •353 IFW2>03THENW2=W2-03:GOTO353 | AD | NT"[WHITE]" | KP |
| | AD | •383 FORI=1TO9:PRINT"[RIGHT]"MID\$(X\$,I,1) | NO |
| | PC | TAB(38)MID\$(X\$,I,1) | NO |
| | AH | •384 NEXT | IA |
| | JA | •385 RETURN | IM |
| | | •386 S1=Z4:IFW1<04THENS1=Z1 | JN |
| | | HE | JJ |
| | | •387 IFW1>=04ANDW1<=T6THENS1=Z2 | JJ |
| | | GK | BG |
| | | •388 IFW1>T6ANDW1<=H9THENS1=Z3 | BG |
| | | GF | EK |
| | | •389 IFW1>03THENW1=W1-03:GOTO389 | EK |
| | | NF | IM |
| | | •390 RETURN | IM |
| | | CD | |
| | | DG | |
| | | AD | |
| | | PC | |
| | | AH | |
| | | JA | |

MYSTERY AT MYCROFT MEWS FROM PAGE 29

•10 REM "MYSTERY AT MYCROFT MEWS" II
 •20 S=54272:FORJ=0TO24:POKES+J,0:NEXT:POK

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ES+24,15
•30 POKE53280,0:POKE53281,0:POKE53283,6:P
RINT"[CLEAR]"CHR$(8)CHR$(142);
•40 M$="[RVSON][c *][RIGHT][RIGHT][sEP][4
"[LEFT]"]][DOWN][c *][sEP][4"[LEFT]"]][D
OWN][4" "][4"[LEFT]"]][DOWN][s T][s Y][
4"[LEFT]"]][DOWN][RVSOFF][RED][c *][RVSON
][s M][s M][UP][LEFT][LEFT][UP][LEFT
][UP][LEFT][UP][c *][RVSOFF][DOWN][DOWN
][WHITE]"
•50 PRINT"[CLEAR][DOWN][DOWN][c 3]"TAB(8)
M$"YSTERY AT":PRINT"[3"[DOWN]"]][c 1]"TAB
(16)M$"YCROFT"
•60 PRINT"[3"[DOWN]"]][YELLOW]"TAB(24)M$"E
WS":GOSUB20000
•100 FOR J=49152TO49220:READX:A=A+X:POKEJ
,X:NEXT:POKE785,0:POKE786,192
•110 IFA<>8919THENPRINT"[CLEAR]ML DATA ER
ROR":STOP
•120 DEFFNR(X)=INT(RND(1)*X)+1:Y=RND(-TI)
:DEFFNSX(X)=-X>6)
•140 V=53248:POKEV+28,1:POKEV+39,4:POKEV+
37,15:POKEV+38,6:POKEV+27,0:POKE2040,13
•150 FORJ=832TO894STEP3:POKEJ,0:POKEJ+1,0
:POKEJ+2,0:IFJ<=880THENREADA:POKEJ,A
•160 NEXT
•170 MX=FNR(3):MV=FNR(12):MW=FNR(12):MR=F
NR(12):IFMV=MRTHE170
•180 I=12:DIML(74),U1(I),U2(I),G(I),AL(I)
,H(I),L0(I),SX(1,4)
•190 DIMAL$(5),IT$(16),B$(16),S$(I),H$(I)
:H$(0)="STAMP COLLECTOR"
•200 FORJ=1TO16:READB$(J),IT$(J)
•210 I=FNR(16):IFL(58+I)>0THEN210
•220 L(58+I)=J:L(12+J)=16:IFJ>12THEN250
•230 READS$(J),H$(J):L(J)=J:AL(J)=FNR(6)-
1:H(J)=FNR(12):L0(J)=FNR(15)
•240 L(J+12)=-L0(J):G(J)=FNR(7)-16*(RND(1)
)<.5)-32*(RND(1)<.5)-64*(RND(1)<.5)
•250 NEXT:L(30)=MX:L(49)=3ANDMW:L(50)=FNR
(40)+20:FORJ=0TO1:FORI=0TO3
•260 READSX$(J,I):NEXTI,J:FORJ=0TO5:READA
L$(J):NEXT:FORJ=1TOMX:READIT$(13):NEXT
•270 L(MV)=0:L(25)=-MV:AL(MR)=FNR(3)-1
•275 L0(MW)=MR:IF-L(12+MW)=MRTHE12+MW)
=-FNR(15):GOTO275
•280 G(MV)=FNR(7)-8*(MX=2):IFMX<3THENG(MV)
)=G(MV)OR6
•290 G(MR)=G(MR)OR2[UPARROW](MX+3):IFMX<3
THENG(MR)=G(MR)AND251
•300 PRINTTAB(8)"[3"[DOWN]"]][PURPLE]HOW M
ANY PLAYERS? [WHITE](1-6)":POKE198,0
•310 WAIT198,1:GETA$:A=VAL(A$):IFA<1ORA>6
THEN310
•320 L(57)=A:FORJ=1TOA:L(36+J)=5:L(42+J)=
7:L(30+J)=17:NEXT:P=1:DIMSC$(A)
•400 POKEV+17,27:PRINT"[CLEAR][DOWN][DOWN
]":POKEV+21,0
•410 FORY=1TO4:PRINT"[DOWN][3" "]::FORX=
1TO4:H=(X*4-Y-6-2*(H=12))AND15
•420 PRINT"[c 8][RVSON][sEP][RVSOFF][sE
P][s M][LEFT][LEFT][DOWN][c H][c N][LEFT
][LEFT][DOWN][s L][s @][5"[LEFT]"]][UP]";
:POKE646,H:PRINT"[RVSON][3"[c T]"]][3"[LE
FT]"]][DOWN][RIGHT][RVSOFF][RIGHT][RIGH
T][UP][UP][3" "];
•430 NEXT:PRINT"[3"[DOWN]"]]:NEXT:PRINT"[
HOME][WHITE]PLAYER #"[P"[DOWN]":IFL(57)-L
(58)=1THEN500
•440 PRINT"ENTER YOUR SECRET CODE!":POKE1
98,0:WAIT198,2:GETA$,B$
•450 IFSC$(P)=""THENSC$(P)=A$+B$
•460 IFSC$(P)=A$+B$THEN500
•470 J=USR(33000):GOSUB20000:GOSUB20100:G
OTO440
•500 X=L(36+P):Y=L(42+P):POKES+1,33:POKES
+5,9:POKES+6,0
•510 POKE198,0:GOSUB20100:PRINT"MOVE TO B
UILDING DESIRED":GOSUB20500
•520 GOSUB20300:GOSUB20100:IF(XAND1)OR(YA
ND1)THEN520
•530 J=2*Y+X/2-8:B=L(58+J):IFB<>MVTHEN600
•540 IFL(26)=P+100ORABS(L(26))=MVORL(30+P
)=MVTHEN600
•550 PRINT"THAT BUILDING IS LOCKED. TRY A
NOTHER.":GOTO520
•600 L(30+P)=B:L(36+P)=X:L(42+P)=Y:POKES+
6,96:POKES+4,33:FORJ=0TO12:POKES+1,33-J
•610 U2(J)=0:U1(J)=0:NEXT:POKES+4,0:POKEV
+21,0:PRINT"[CLEAR][c 7]YOU ARE AT THE "
B$(B)".[c 8]"
•620 PRINT"YOU HAVE ";:IFL(50+P)THENPRINT
"THE "IT$(L(50+P))".":GOTO640
•630 PRINT"NO ITEM."
•640 I=0:PRINT"[DOWN]YOU SEE:[c 5]":FORJ=
1TO12
•645 IFL(J)=BTHENPRINTS$(J):U2(1)=U2(1)+1
:I=1:U2(5)=J
•650 NEXT:FORJ=1TO16:IFL(J+12)=BTHENPRINT
"THE "IT$(J):U2(2)=U2(2)+1:I=1
•660 NEXT:FORJ=1TOL(57):IFJ=PORL(J+30)<>B
THEN690
•670 PRINT"PLAYER #"[J]:I=1:U2(3)=U2(3)+1:
IFL(50+J)=0THENPRINT:GOTO690
•680 PRINT"<WITH AN ITEM>":U2(4)=U2(4)+1
•690 NEXT:IFI=0THENPRINT"NOTHING WORTH ME
NTIONING."
•695 PRINT"[DOWN][c 8]PRESS BUTTON FOR TU
RN OPTIONS":GOSUB20400
•700 PRINT"[CLEAR][c 3]TURN OPTIONS[3"."]
[4"[DOWN]"]][WHITE]":MY=1:Y=1:POKEV+17,91
:U1(1)=1:PRINT"SEARCH"
•720 IFU2(1)THENPRINT"INTERROGATE SUSPECT
":MY=2:U1(2)=2

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| | | | |
|--|----|--|----|
| •730 IFU2(2)ORU2(4)THENPRINT"TAKE ITEM":M Y=MY+1:U1(MY)=3 | JN | I))":RETURN | LH |
| •740 IFB=16AND(U2(2)ORL(50+P))THENPRINT"F INGERPRINT ITEM":MY=MY+1:U1(MY)=4 | JN | •1160 IFI=13THENPRINTS\$(MV)":RETURN | LL |
| •750 IFB=16THENPRINT"ACCUSE A SUSPECT":MY =MY+1:U1(MY)=5 | II | •1170 PRINT"NO SUSPECT":RETURN | MP |
| •760 IFB=14THENPRINT"READ CORONER'S REPOR T":MY=MY+1:U1(MY)=6 | AL | •1200 PRINT"CORONER'S REPORT:[WHITE][DOWN][DOWN]":X=ABS(MV>6):PRINT"SUBJECT IS "S X\$(X,0)"," | AH |
| •770 IFL(25)=100+PORL(25)=BTHENPRINT"READ "IT\$(13):MY=MY+1:U1(MY)=7 | KD | •1210 PRINT"APPROXIMATELY"L(50)"YEARS OF AGE.":J=USR(34000+L(49)*10) | IF |
| •780 IFL(50+P)THENPRINT"DROP OR HIDE ITEM CARRIED":MY=MY+1:U1(MY)=8 | PK | •1220 READT\$:PRINT"[DOWN]SUBJECT APPARENT LY WAS "T\$ | EK |
| •790 IFB<3ORB=7THENPRINT"EXAMINE "B\$(B)" RECORDS":MY=MY+1:U1(MY)=9 | EK | •1230 READT\$:PRINT"BY A "T\$":RETURN | NJ |
| •800 GOSUB20100:PRINT"CHOOSE ONE":GOSUB20 600:I=U1(Y):Y=1:PRINT"[CLEAR][c 7]"; | NO | •1300 PRINT"DROP OR HIDE ITEM CARRIED":PR INT"[DOWN][DOWN][c 8]DO YOU WANT TO HIDE THE" | AJ |
| •810 ONIGOSUB1000,2000,1400,1100,5000,120 0,1500,1300,1600:J=FRE(0) | BE | •1310 I=L(50+P):PRINTIT\$(I)"? [WHITE]";; GOSUB20700:L(50+P)=0 | CD |
| •900 POKE214,22:PRINT:PRINT"[YELLOW] [3"* "] PRESS BUTTON TO END YOUR TURN [3"*"] ;:GOSUB20400 | EN | •1320 PRINT:PRINT"[DOWN][c 8]YOU DROP THE "IT\$(I)"." | IG |
| •910 PRINT"[CLEAR][8"[DOWN]"]][c 7]"TAB(12)"PLAYER #":P:PRINTTAB(12)"[DOWN]END OF T URN" | FM | •1330 L(12+I)=B*(1+YN*2):IFYNTHENPRINT"IT EM HIDDEN." | IK |
| •915 J=USR(33000):GOSUB20000 | DI | •1340 FORI=1TO200:NEXT:POKE198,0:RETURN | GB |
| •920 P=P+1:IFP>L(57)THEN950 | LB | •1400 PRINT"TAKE ITEM":PRINT"[DOWN][c 8]W HICH ONE?[WHITE][DOWN][DOWN]":MY=0 | KC |
| •930 IFL(30+P)>0THEN400 | IL | •1410 FORJ=1TO16:IFL(J+12)=BTHENPRINT"THE "IT\$(J):MY=MY+1:U1(MY)=J | OM |
| •940 GOTO920 | KL | •1420 NEXT:IFU2(4)=0THEN1450 | LH |
| •950 FORJ=1TO12:L(J)=FNR(16):IFL(J)=MVTHE NL(J)=J | KD | •1430 FORJ=1TOL(57):IFJ=PORL(J+30)<>BORL(J+50)=0THENNEXT:GOTO1450 | CF |
| •960 NEXT:FORJ=31TO36:IFL(J)<13THENL(L(J))=L(J) | CL | •1440 PRINT"PLAYER #"J"[LEFT]'S ITEM":MY= MY+1:U1(MY)=100+J:NEXT | HG |
| •970 NEXT:L(MV)=0:P=1:GOTO930 | CJ | •1450 GOSUB20600:I=U1(Y):IFI>100THENI=L(I -50):L(U1(Y)-50)=0 | DF |
| •1000 PRINT"SEARCH[DOWN][DOWN]":PRINT"[c 8]YOU FIND:[DOWN][c 5]":I=0 | CC | •1460 PRINT"[CLEAR]":J=L(50+P):IFJTHENPRI NT"YOU DROP THE "IT\$(J)".":L(J+12)=B | KJ |
| •1010 FORJ=1TO16:IFL(J+12)<>BTHEN1030 | MO | •1470 PRINT"YOU TAKE THE "IT\$(I)".":L(50+ P)=I:L(I+12)=100+P:RETURN | BI |
| •1020 IFRND(1)<.6ORL(50+P)=15THENI=1:PRIN T"THE "IT\$(J):L(J+12)=B | CG | •1500 PRINT"EXTRACT FROM THE "IT\$(13):PRI NT"OF "S\$(MV)":[WHITE][DOWN][DOWN]" | AE |
| •1030 NEXT:IFI=0THENPRINT"NOTHING OF INTE REST":RETURN | HK | •1510 J=USR(34000+L(30)*100) | OL |
| •1040 PRINT"[DOWN][c 7]TAKE AN ITEM? [WH ITE]";:GOSUB20700:IFYN=0THENRETURN | MI | •1520 READT\$:I=VAL(T\$):IFI=0THENPRINTT\$:G OTO1520 | NF |
| •1050 U2(4)=0:PRINT"[CLEAR][c 7]";:Y=1:GO TO1400 | FL | •1530 PRINT"[c 5]":FORJ=1TO12:IFIANDG(J)T HENPRINT"[4" "]"S\$(J) | ED |
| •1100 PRINT"FINGERPRINT ITEM":PRINT"[DOWN][c 8]WHICH ONE?[WHITE][DOWN][DOWN]":MY= 0 | OJ | •1540 NEXT:PRINT:J=FRE(0):RETURN | IF |
| •1110 FORJ=1TO16:IFL(J+12)=BTHENPRINT"THE "IT\$(J):MY=MY+1:U1(MY)=J | MM | •1600 PRINT"EXAMINE "B\$(B)" RECORDS":PRIN T"[DOWN][c 8]ABOUT WHOM?[WHITE][DOWN][DO WN]" | JJ |
| •1120 NEXT:I=L(P+50):IFITHENPRINT"THE "IT \$(I):MY=MY+1:U1(MY)=I | OM | •1610 FORJ=1TO12:PRINTS\$(J):NEXT:MY=12:GO SUB20600 | OC |
| •1130 GOSUB20600:I=U1(Y):PRINT"[CLEAR][c 7]LAB REPORT":PRINT"[DOWN][WHITE]THE "I T\$(I) | LL | •1620 PRINT"[CLEAR][c 7]"B\$(B)" REPORT":P RINT"ON "S\$(Y)":[WHITE][DOWN]":ONBGOTO16 50,1690 | II |
| •1140 PRINT"BEARS THE FINGERPRINTS OF":L(I+12)=B:IFL(P+50)=ITHENL(P+50)=0 | EH | •1630 J=USR(34400):FORJ=1TO(G(Y)AND7):REA DT\$:NEXT | HG |
| •1150 IFI<13THENIFL(I)<13THENPRINTS\$(L(I | ON | •1640 PRINTTAB(8)T\$" ACCOUNT":RETURN | FD |
| | | •1650 IF(G(Y)AND40)=0THENPRINT"SUBJECT NO T IN RECORDS":RETURN | NF |

| | | | |
|---|----|--|----|
| •1660 IFG(Y)AND8THENPRINT"SUBJECT RECENTLY DREW UP A NEW WILL.":RETURN | CH | •2340 PRINTT\$" OWNS":A=-1*YN:IFA=0THENPRINT"A NEW CAR.":RETURN | GD |
| •1670 PRINT"SUBJECT CAN EXPECT TO INHERIT":PRINT"SUBSTANTIAL WEALTH IN THE NEAR" | CA | •2350 PRINT"THE "IT\$(A)".":RETURN | MI |
| •1680 PRINT"FUTURE.":RETURN | LJ | •2360 A=H(Q2) | AA |
| •1690 IF(G(Y)AND64)=0THENPRINT"SUBJECT NOT IN FILES":RETURN | MM | •2370 PRINTT\$" IS":PRINT"A "H\$(A)".":RETURN | PA |
| •1700 PRINT"PATIENT SEVERELY PARANOIAC, ENVIOUS AND" | ED | •2400 ONFNR(3)GOTO2440,2470 | FJ |
| •1710 PRINT"RESENTFUL OF OTHERS. MAY SHOW SUDDEN" | IC | •2410 IFFNR(3)=1THENPRINT"HOW TRAGIC THAT":PRINTSX\$(X,1)"'S GONE.":RETURN | CG |
| •1720 PRINT"HOMICIDAL FURY.":RETURN | LH | •2420 IFFNR(2)=1THENPRINT"I THINK IT WAS SUICIDE.":RETURN | PN |
| •2000 Y=1:Q=3:H=0:Q4=-1:IFU2(1)=1THENQ1=U2(5):GOTO2100 | BO | •2430 PRINT"I THINK THAT "S\$(Q3):PRINT"MUORDERED "SX\$(X,2)".":RETURN | DB |
| •2010 PRINT"INTERROGATE A SUSPECT":PRINT"[DOWN][c 8]WHICH ONE?[DOWN][DOWN][WHITE]":MY=0 | PB | •2440 I=FNR(4)-1:IFYTHENI=L(49) | FB |
| •2020 FORJ=1TO12:IFL(J)=BTHENPRINTS\$(J):MY=MY+1:U1(MY)=J | AA | •2450 PRINT"I HEARD THAT "SX\$(X,1)" WAS KILLED":J=USR(34000+I*10) | EI |
| •2030 NEXT:GOSUB20600:Q1=U1(Y):Y=1 | ID | •2460 READT\$,T\$:PRINT"BY A "T\$".":RETURN | GC |
| •2100 PRINT"[CLEAR][c 7]INTERROGATE "S\$(Q1):MY=13:POKE198,0:I=12:IFQ4=0THEN2120 | JP | •2470 I=FNR(3):IFYTHENI=L(30) | JB |
| •2110 PRINT"[DOWN][c 8]ABOUT WHOM?[DOWN][DOWN][WHITE]":FORJ=1TOI:PRINTS\$(J):NEXT | HN | •2480 PRINT"I HEARD THAT "SX\$(X,1)" WAS":J=I+5:GOSUB20800:RETURN | EE |
| •2115 PRINT"<AN ITEM>":GOTO2130 | JJ | •2500 ONFNR(4)GOTO2530,2540,2550 | JL |
| •2120 PRINT"[DOWN][c 8]ABOUT WHAT ITEM?[DOWN][DOWN][WHITE]":FORJ=1TOI:PRINT"THE "IT\$(J):NEXT | IA | •2510 GOSUB20900:IFA=0THENPRINT"I OWN A NEW CAR.":RETURN | FM |
| •2125 PRINT"<A SUSPECT>" | PO | •2520 PRINT"I OWN THE":PRINTIT\$(A)".":RETURN | FJ |
| •2130 IFH<>0THENPOKE782,Y:SYS49189:H=0 | EF | •2530 PRINT"I WAS "AL\$(AL(Q1)):PRINT"ON THE NIGHT OF THE CRIME.":RETURN | NE |
| •2140 GOSUB20600:H=1:IFY=13THENH=0:Q4=NOT Q4:GOTO2100 | IN | •2540 A=H(Q1):GOTO2560 | KC |
| •2150 Q2=Y:Q=Q-1:YN=(RND(1)<.75):GOSUB20100:ONQ4+2GOSUB2200,3000 | KN | •2550 GOSUB20900 | IM |
| •2160 FORJ=1TO100:NEXT:POKE198,0:IFQTHEN2130 | DJ | •2560 PRINT"I AM A "H\$(A)".":RETURN | KN |
| •2170 J=FRE(0):RETURN | AC | •3000 ONFNR(5)GOTO3030,3060,4030,4050 | MK |
| •2200 Q3=FNR(12):IFQ3=MVORQ3=Q1THEN2200 | OB | •3010 PRINT"I ";:IFNOT(L0(Q2)=Q1)OR(Q1=MR)THENPRINT"DO NOT "; | JG |
| •2210 T\$=S\$(Q2):IFRND(1)>.2ORL(28)=100+PTHEN2240 | EC | •3020 PRINT"OWN THE":PRINTIT\$(Q2)".":RETURN | EM |
| •2220 L(29)=(L(29)+1)AND1:IFL(29)THENPRINT"I NEVER GOSSIP.":RETURN | OF | •3030 IFYN=0OR(Q2=MWANDQ1=MR)ORL0(Q2)>12THEN3050 | JN |
| •2230 PRINT"I DON'T HAVE TIME TO TALK NOW.":RETURN | HH | •3035 IFL0(Q2)=Q1THEN3010 | JB |
| •2240 X=FNSX(Q2):IFQ2=Q1THEN2500 | PI | •3040 PRINTS\$(L0(Q2))" OWNS":PRINT"THE "IT\$(Q2)".":RETURN | ED |
| •2250 IFQ2=MVTHEN2400 | NP | •3050 PRINT"I'M NOT SURE WHO OWNS":PRINT"THE "IT\$(Q2)".":RETURN | MC |
| •2260 ONFNR(7)GOTO2290,2300,2300,2320,2320,2360 | LK | •3060 I=FNR(57):X=ABS(L(12+Q2)):IFX<100THEN4000 | DH |
| •2270 IFAL(Q1)<3ORAL(Q1)<>AL(Q2)THEN2285 | PO | •3070 X=X-100:IFYN=0THENX=I | NM |
| •2280 PRINT"I WAS WITH "T\$:PRINT"ON THE NIGHT OF THE MURDER.":RETURN | OP | •3080 IFX=PTHENPRINT"YOU HAVE THE "IT\$(Q2)":":PRINT"DON'T YOU?":RETURN | GC |
| •2285 PRINT"I CAN'T CONFIRM "SX\$(X,3)" ALIBI.":RETURN | BD | •3090 PRINT"I THINK THAT PLAYER #"X"HAS":PRINT"THE "IT\$(Q2)".":RETURN | JH |
| •2290 PRINTT\$" DID IT, I'M SURE!":RETURN | IL | •4000 IFYN=0OR(Q2=MWANDQ1=MR)THENJ=9:GOTO20800 | PF |
| •2300 PRINTT\$:I=FNR(3):J=2*I-1:IFG(Q2)AND2[UPARROW](3+I)THENJ=J-1 | LI | •4010 IFX=Q1THENPRINT"I'VE GOT THE":PRINTIT\$(Q2)".":RETURN | AK |
| •2310 GOSUB20800:RETURN | FK | •4020 PRINT"I SAW THAT AT THE ":PRINTB\$(X)":":RETURN | CN |
| •2320 GOSUB20900:IFRND(1)>.5THEN2370 | FE | •4030 PRINT"THE "IT\$(Q2)" WAS ";:I=(Q2=MW)=YN:IFI=0ORQ1=MRTHENPRINT"NOT"; | KH |
| | | •4040 PRINT:PRINT"THE MURDER WEAPON.":RETURN | |

| | | | |
|---|----|---|----|
| URN | NK | •20000 POKES+5,9:POKES+6,192:POKES+3,8:T= | LN |
| •4050 X=0:FORJ=1TO12:IFH(J)=Q2ANDRND(1)>. | EI | TI | NM |
| 5THENX=J | MI | •20010 IFT>TITHEN20010 | AF |
| •4060 NEXT:I=L0(Q2):IFI>12THENI=0 | NB | •20020 POKES+4,64:READJ:IFJ=0THEN20040 | KJ |
| •4070 IFRND(1)<.5THENX=I | HP | POKES+4,65:GOTO20010 | PH |
| •4080 IFX=0THENJ=9:GOTO20080 | LK | •20040 POKES+4,0:RETURN | LM |
| •4090 PRINTS\$(X)" IS":PRINT"A "H\$(Q2)".": | AK | •20100 SYS49178:PRINT"[HOME][DOWN][DOWN][| FD |
| RETURN | II | c 8]";:RETURN | CH |
| •5000 PRINT"[c 3]ACCUSE!":PRINT"[DOWN][c | FK | •20200 J=NOT(PEEK(56320)ANDPEEK(56321))AN | PK |
| 8]WHO WAS KILLED?[WHITE][DOWN][DOWN]":MY | AA | D31:A=0:IFPEEK(198)THENGETA\$:A=ASC(A\$) | OL |
| =12:Q=-1 | DA | •20210 BT=(JAND16)OR(A=13):IFBTTHENRETURN | IF |
| •5010 FORJ=1TO12:PRINTS\$(J):NEXT:Y=1:GOSU | DN | •20220 DX=SGN((JAND8)-(A=135)-(JAND4)+(A= | DG |
| B20600:Q=Q*(Y=MV) | BF | 134)) | AF |
| •5020 PRINT"[CLEAR][YELLOW]ACCUSE!":PRINT | IB | •20230 DY=SGN((JAND2)-(A=136)-(JAND1)+(A= | GI |
| "[DOWN][c 8]WHO KILLED "S\$(Y)"?[DOWN][DO | FE | 133):IFDXORDYTHENRETURN | MI |
| WN][WHITE]":Y=1 | EB | •20240 GOTO20200 | MA |
| •5030 FORJ=1TO12:PRINTS\$(J):NEXT:GOSUB206 | LC | •20300 GOSUB20200:IFBTTHENRETURN | BK |
| 00:H=Y:Q=Q*(H=MR) | IF | •20310 IFABS(DX+X-5)>3THENDX=0 | KB |
| •5040 PRINT"[CLEAR][c 6]ACCUSE!":PRINT"[D | PE | •20320 IFABS(DY+Y-7)>3THENDY=0 | KI |
| OWN][c 8]WHAT WEAPON DID":PRINTS\$(H)" US | MG | •20330 IFDX=0ANDDY=0THEN20300 | IM |
| E?[DOWN][WHITE]":Y=1 | IF | •20340 FORI=1TO4:X=X+DX/4:Y=Y+DY/4:GOSUB2 | FE |
| •5050 FORJ=1TO12:PRINT"THE "IT\$(J):NEXT:G | IE | 0500:POKES+1,30+3*(1ANDI) | PK |
| OSUB20600:Q=Q*(Y=MW) | FP | •20350 POKES+4,17:FORJ=1TO40:NEXT:POKES+4 | DG |
| •5060 PRINT"[CLEAR][c 7]ACCUSE!":PRINT"[D | MG | ,0:NEXT:GOTO20300 | KF |
| OWN][c 8]WHY DID "S\$(H):PRINT"COMMIT MUR | IF | •20400 POKE198,0 | JC |
| DER?[DOWN][WHITE]":Y=1 | PE | •20410 GOSUB20200:IFBT=0THEN20410 | CF |
| •5070 X=FNSX(H):FORA=0TO4STEP2:J=A:PRINTS | IF | •20420 RETURN | PH |
| X\$(X,1)" ";:GOSUB20800:NEXT | IE | •20500 POKEV,X*32-1:POKEV+1,Y*20+12:POKEV | EC |
| •5080 MY=3:Y=1:GOSUB20600:Q=Q*(Y=L(30)) | FP | +21,1:RETURN | DG |
| •5100 PRINT"[CLEAR]THE POLICE ARE ARRESTI | MG | •20600 POKE782,Y:SYS49189 | GB |
| NG":PRINTS\$(H)"[5"."]":POKES+5,13:POKES+ | IF | •20610 GOSUB20200:IFBTTHENRETURN | MC |
| 6,0 | PE | •20620 X=Y+DY:IFX<1ORX>MYTHENX=-X-MY | IA |
| •5110 POKES+4,65:FORJ=1TO20:POKES+1,16+16 | IF | *(X<1) | KB |
| *(JAND1):FORI=1TO250:NEXT:NEXT | PE | •20630 IFX=YTHEN20610 | EJ |
| •5120 POKES+4,0:POKEV+17,27:FORJ=1TO600:N | IF | •20640 POKE782,Y:SYS49189:Y=X:GOTO20600 | KL |
| EXT:IFQTHEN5200 | IF | •20700 POKE190,0:YN=-1 | BB |
| •5130 PRINT"[DOWN]NO[3"."]THAT WAS A FALS | IE | •20710 PRINTCHR\$(-18*YN)"YES[RVSOFF] "CHR | AH |
| E ARREST.":PRINT"YOU'RE OUT OF THE GAME! | FP | \$(YN*2+18)"NO [RVSOFF][7"[LEFT]"]"; | AN |
| " | MG | •20720 GOSUB20200:IFBTTHENRETURN | GO |
| •5140 L(30+P)=0:IFL(50+P)THENL(12+L(50+P) | IF | •20730 IFDXTHENYN=NOTYN:GOTO20710 | MO |
|)=B:L(50+P)=0 | PE | •20800 J=USR(35000+10*J):READT\$:PRINTT\$". | |
| •5150 J=USR(33200):GOSUB20000:L(58)=L(58) | IF | ":RETURN | |
| +1:IFL(58)<L(57)THENRETURN | IF | •20840 GOTO20720 | |
| •5160 RESTORE:PRINT"[DOWN][c 3]ALL PLAYER | IF | •20900 A=0:X=1:FORJ=1TO12:IFL0(J)=Q2ANDRN | |
| S HAVE BEEN ELIMINATED!" | IF | D(1)<1/XTHENA=J:X=X+1 | |
| •5170 PRINT"[WHITE]NOBODY WINS!":PRINT"[P | IF | •20910 NEXT:RETURN | |
| URPLE][6"[c T]"]":GOTO5300 | IF | •30000 DATA8,11,48,12,10,143,4,9,104,4,10 | |
| •5200 PRINT"[DOWN]YES[3"."]YOU'VE CRACKED | IF | ,143,4,11,48,12,13,78 | |
| THE CASE!":PRINT"PLAYER # "P"WINS THE GA | IF | •30010 DATA4,14,24,12,8,97,0 | |
| ME!" | IF | •31000 DATA32,247,183,32,19,166,144,13,16 | |
| •5210 J=USR(33100) | IF | 5,95,233,1 | |
| •5300 GOSUB20000:PRINT"[DOWN][DOWN][WHITE | IF | •31010 DATA133,65,165,96,233,0,133,66,96, | |
|]HERE IS THE SOLUTION:[DOWN][c 5]":PRINT | IF | 162,17,76 | |
| S\$(MR)" MURDERED" | IF | •31020 DATA55,164,169,32,160,80,136,153,8 | |
| •5310 PRINTS\$(MV)" USING THE":PRINTIT\$(MW | IF | 0,4,208,250 | |
|)", BECAUSE "SX\$(FNSX(MR),1) | IF | •31030 DATA96,169,4,133,252,169,160,24,10 | |
| •5320 J=L(30)*2-2:GOSUB20800:FORJ=1TO4E3: | IF | 5,40,144,2 | |
| NEXT:END | IF | | |

•31040 DATA230,252,136,208,246,133,251,16
 0,40,136,177,251 ON
 •31050 DATA73,128,145,251,192,0,208,245,9
 6 PB
 •32000 DATA20,20,20,0,170,170,170,170,190
 ,190,190,125,60,60,60,60,85 HO
 •32100 DATALAW OFFICE,ELEPHANT GUN,PHYLLI
 S WRIT,BIG-GAME HUNTER GO
 •32110 DATAMENTAL HEALTH CLINIC,ANTIQUÉ C
 ROSSBOW,DR. WILMA LIBIDO AG
 •32120 DATA"[LEFT]N ARCHERY EXPERT",DELIC
 ATESSEN,BASEBALL BAT,HANNAH NOSH,SPORTS
 FAN JH
 •32130 DATATHEATRE,BOX OF RAT POISON,EDIT
 H SCRIM,PEST EXTERMINATOR,HOTEL NH
 •32140 DATAARQUEBUS,CHERYL VALISE,GUN COL
 LECTOR,ART GALLERY,SCIMITAR AP
 •32150 DATADESIREE OCHRE,MASTER FENCER,BA
 NK,BRASS CANDLESTICK,EMILIO LUCRE NH
 •32160 DATACANDELABRA FANCIER,LIBRARY,JAR
 OF SLEEPING PILLS,MORTON SCREED KJ
 •32170 DATA"[LEFT]N INSOMNIAC",BAKERY,.45
 AUTOMATIC,JOSEPH CRULLER,MARKSMAN,PAWN
 SHOP KP
 •32180 DATAKNITTING NEEDLE,NORMAN HOCK,CH
 AMPION KNITTER,CHURCH,BALL-PEEN HAMMER JJ
 •32190 DATAREV. ARTHUR TRANSEPT,TOOL COLL
 ECTOR,PUB,VIAL OF SNAKE VENOM FF
 •32200 DATAEDGAR QUAFF,HERPETOLOGIST,SHOP
 PING MALL,ITEM,MORGUE,MASTER KEY AO
 •32210 DATAWAREHOUSE,MAGNIFYING LENS,POLI
 CE STATION,POLICE BADGE IF
 •32300 DATAFEMALE,SHE,HER,HER,MALE,HE,HIM
 ,HIS KG
 •32400 DATAAT HOME ALONE,SICK IN BED,OUT
 OF TOWN,AT A PARTY HL
 •32410 DATAAT THE THEATRE,IN CHURCH GA
 •32900 DATALEDGER,WILL,DIARY EB
 •33000 DATA2,15,210,2,14,24,2,12,143,2,11
 ,218,4,9,247,4,7,233,4,10,143,0 BP
 •33100 DATA4,28,49,4,37,162,4,42,62,2,47,
 107,4,37,162,2,42,62,2,47,107,2,37,162 GP
 •33110 DATA2,42,62,4,56,99,2,42,62,2,47,2
 07,1,42,62,1,37,162,2,42,62,8,28,49,0 FD
 •33200 DATA2,25,30,2,23,181,2,31,165,2,35
 ,134,2,47,107,2,37,162,2,35,134 HI
 •33210 DATA2,47,107,2,37,162,2,35,134,2,3
 1,165,2,29,223,4,31,165,0 CC
 •34000 DATAPOISONED,"[LEFT]N UNIDENTIFIED
 TOXIN" NP
 •34010 DATASHOT,GUN OD
 •34020 DATAIMPALED,SHARP WEAPON AK
 •34030 DATABLUDGEONED,BLUNT INSTRUMENT PN
 •34100 DATAI HAVE THREATENED TO TELL THE
 POLICE HC
 •34110 DATAALL THAT I KNOW ABOUT THEIR CR
 IMINAL AG
 •34120 DATAACTIVITIES IF ANY OF THESE PEO

PLE GO
 •34130 DATADOESN'T PAY ME ANOTHER \$9000 B
 Y,MIDNIGHT SUNDAY...,16 OO
 •34200 DATAI HEREBY BEQUEATH ONE HUNDRED
 MILLION DM
 •34210 DATADOLLARS TO EACH OF THESE LOYAL
 AND FI
 •34220 DATAFAITHFUL FRIENDS...,32 IC
 •34300 DATADEAR DIARY---,I FOUND ANOTHER
 ANONYMOUS LETTER IN THE FJ
 •34310 DATAMAIL THIS MORNING. MY LIFE IS
 IN DANGER KO
 •34320 DATAFROM A JEALOUS LUNATIC. THE HA
 NDWRITING NC
 •34330 DATAWOULD BE THAT OF ANY OF THESE
 PEOPLE...,64 CH
 •34400 DATANO,OVERDRAWN,MINIMUM,AVERAGE,S
 IGNIFICANT,SUBSTANTIAL,MAXIMUM CE
 •35000 DATAWAS BEING BLACKMAILED KD
 •35010 DATAHAS NO SECRETS TO HIDE BF
 •35020 DATAWILL INHERIT MILLIONS KE
 •35030 DATAIS NOT A LEGATEE CM
 •35040 DATAIS A HOMICIDAL MANIAC KI
 •35050 DATAIS AS SANE AS I AM DP
 •35060 DATAA BLACKMAILER OP
 •35070 DATAEXTREMELY WEALTHY HA
 •35080 DATARECEIVING DEATH THREATS KC
 •35090 DATAI DON'T KNOW WHERE THAT OBJECT
 IS FF

SHOTGUN

FROM PAGE 97 SHOTGUN LOADER

•2 REM "SHOTGUN LOADER" MF
 •4 REM BY R. HAROLD DROID MH
 •10 IFSG=1THEN30 BL
 •20 SG=1:LOAD"SHOTGUN SHELL",8,1 DO
 •30 PRINTCHR\$(13)"THIS PROGRAM CREATES AN
 AUTO-MENU" LO
 •33 PRINT" FOR A GIVEN DISK"CHR\$(13) JG
 •34 PRINT"SYS51200 ENABLES YOUR NEW PROGR
 AM:" AH
 •35 PRINT" SHIFT/RESTORE BREAKS TO MENU" DF
 •36 PRINT" SPACE/RESTORE RERUNS WITHOUT R
 ELOADING" LG
 •37 PRINT" RUN-STOP/RESTORE DISABLES" DH
 •38 PRINT" COMMODORE/RESTORE DOES NON-DIS
 ABLING" EF
 •39 PRINT"[3" "]WARM START"CHR\$(13) KA
 •40 PRINT"INSERT A DISK CONTAINING" EC
 •50 PRINT" BASIC PROGRAM FILES" JL
 •60 PRINT" THEN PRESS A KEY"CHR\$(13) PC
 •70 POKE198,0:WAIT198,1 IE
 •80 REM ***** READ DIRECTORY ***** HA
 •85 PN=1:PT=51769 EF
 •90 OPEN1,8,0,"\$0" GF
 •100 FLAG=1:REM FLAG SET FOR READING DISK
 NAME BD

```

•110 F$="":GET#1,B$,B$,B$,B$      PF  C868: C8 C0 14 D0 F5 A9 92 20 29
•120 GET#1,B$:IF ST<>0 THEN320     LN  C870: D2 FF A2 03 A0 00 18 20 C1
•130 IF B$<>CHR$(34) THEN120       PA  C878: F0 FF A9 01 C9 0D D0 0C C7
•140 GET#1,B$:IF B$<>CHR$(34)THEN F$=F$+B
  $:GOTO140                          FL  C888: 8D 73 C8 68 CD 38 CA B0 3C
•150 GET#1,B$:IF B$=CHR$(32) THEN150 DJ  C890: 36 09 40 20 D2 FF A9 2E DA
•160 GET#1,B$:IFB$<>" THEN160      LE  C898: 20 D2 FF A9 20 20 D2 FF 48
•170 IF ST<>0 THEN320              AG  C8A0: A0 00 B9 39 CA C9 A0 F0 5A
•180 IFFLAG=0THEN230              NA  C8A8: 08 20 D2 FF C8 C0 10 D0 0E
•190 FLAG=0:DN$(DN)=F$:PRINT"DISK NAME: "
  DN$(DN)CHR$(13)                   JO  C8B0: F1 EE 73 C8 EE 7B C8 AD AE
•200 PRINT"INDICATE WHETHER A FILE SHOULD
  "                                    OL  C8B8: A3 C8 18 69 10 8D A3 C8 B0
•210 PRINT" BE INCLUDED IN THE AUTO-MENU
  "                                    PJ  C8C0: 90 B0 EE A4 C8 B0 AB A2 5D
•215 PRINT" BY PRESSING Y OR N"     PE  C8C8: 15 A0 0A 18 20 F0 FF A0 52
•218 PRINT" CAPACITY IS 26 FILES!"CHR$(1
  3)                                    NM  C8D0: 00 B9 14 CA 20 D2 FF C8 25
•220 GOTO110                          CC  C8D8: C0 14 D0 F5 E8 A0 0C 18 22
•230 PRINTF$;                          ED  C8E0: 20 F0 FF A0 00 B9 28 CA 3F
•240 POKE198,0:WAIT198,1:GETA$:IFA$="Y"TH
  EN270                                OB  C8E8: 20 D2 FF C8 C0 0F D0 F5 3B
•250 IFA$="N"THENPOKE211,0:PRINT"[16" "]"
  ;:POKE211,0:GOTO110                PL  C8F0: A9 00 85 C6 20 9F FF 20 C6
•260 GOTO240                          CC  C8F8: E4 FF C9 00 F0 F6 C9 20 79
•270 PRINT                              JJ  C900: D0 03 4C 6E C9 C9 41 90 F3
•275 IFLEN(F$)<>16THENF$=F$+CHR$(160):GOT
  0275                                OM  C908: EB 29 3F CD 38 CA B0 E4 C2
•280 FORA=1TO16:POKEPT,ASC(MID$(F$,A,1)):
  PT=PT+1:NEXT                        HK  C910: A8 88 C0 00 F0 12 AD 45 F7
•290 PN=PN+1:IFPN>27THEN400          IP  C918: C9 18 69 10 8D 45 C9 90 A0
•310 GOTO110                          CC  C920: 03 EE 46 C9 88 4C 12 C9 D2
•320 CLOSE1:POKE51768,PN:PT=PT+1     IB  C928: A9 93 20 D2 FF 18 A2 02 15
•322 PRINT:INPUT"AUTO MENU FILENAME SHOT
  GUN[9"[LEFT]""]";PG$              BO  C930: A0 00 20 F0 FF A0 00 B9 3C
•330 OPEN8,8,8,PG$+"",P,W"           GL  C938: F8 C9 20 D2 FF C8 C0 05 7C
•340 PRINT#8,CHR$(0);:PRINT#8,CHR$(192);
  LP  C940: D0 F5 A0 00 B9 39 CA C9 2F
•350 FORA=51200TOPT:PRINT#8,CHR$(PEEK(A))
  ;:NEXT                               CH  C948: A0 F0 08 20 D2 FF C8 C0 5E
•360 CLOSE8:END                       JH  C950: 10 D0 F1 A0 00 B9 FD C9 45
•400 PRINT"MENU CAPACITY EXCEEDED! TRY A
  GAIN[3".""]":CLOSE1:GOTO85         GL  C958: 20 D2 FF C8 C0 03 D0 F5 9E
  C960: 18 A2 07 20 9A C9 8D 78 AC
  C968: 02 A9 02 4C B0 C9 20 82 7F
  C970: C9 18 A2 02 20 9A C9 A9 25
  C978: 01 4C B0 C9 20 82 C9 4C F8
  C980: B7 C9 A9 01 8D 37 CA 20 5C
  C988: 8A FF 20 EA C9 20 A3 FD A9
  C990: 20 81 FF A9 00 85 C7 85 AE
  C998: D4 60 A0 00 20 F0 FF B9 39
  C9A0: F5 C9 20 D2 FF C8 C0 03 DF
  C9A8: D0 F5 A9 0D 8D 77 02 60 8D
  C9B0: 85 C6 A9 13 20 D2 FF A9 56
  C9B8: 00 8D 37 CA 58 6C 02 A0 AF
  C9C0: AD 01 DC CD 01 DC D0 F8 C1
  C9C8: A9 BF 8D 00 DC AD 01 DC 28
  C9D0: C9 EF F0 0F A9 FD 8D 00 BF
  C9D8: DC AD 01 DC C9 7F F0 03 7E
  C9E0: 18 90 01 38 A9 7F 8D 00 79
  C9E8: DC 60 A9 09 8D 18 03 A9 2B
  C9F0: C8 8D 19 03 60 52 55 4E B9
  C9F8: 4C 4F 41 44 22 22 2C 38 C2
  CA00: 53 48 4F 54 47 55 4E 20 4A
  CA08: 4C 4F 41 44 20 41 4E 44 1D
  CA10: 20 52 55 4E 50 52 45 53 61
  CA18: 53 20 53 50 41 43 45 20 19
  CA20: 54 4F 20 52 45 52 55 4E 71
  CA28: 43 55 52 52 45 4E 54 20 6D
  CA30: 50 52 4F 47 52 41 4D 4A

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SHOTGUN SHELL*

Beginning address in hex: C800 Ending address in hex: CA36

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C800: A9 00 8D 37 CA 20 EA C9 0E
C808: 60 48 8A 48 98 48 AD 37 49
C810: CA D0 1B 20 C0 C9 B0 19 3B
C818: A9 7F 8D 00 DC AD 01 DC 37
C820: C9 EF D0 03 4C 6E C9 C9 FB
C828: DF D0 03 4C 7C C9 4C 4C 07
C830: FE 20 82 C9 A9 05 8D 73 4B
C838: C8 A9 00 8D 75 C8 A9 01 21
C840: 8D 7B C8 A9 39 8D A3 C8 EE
C848: 8D 45 C9 A9 CA 8D A4 C8 54
C850: 8D 46 C9 A2 03 A0 0A 18 56
C858: 20 F0 FF A9 12 20 D2 FF 18
C860: A0 00 B9 00 CA 20 D2 FF 78
C868: C8 C0 14 D0 F5 A9 92 20 29
C870: D2 FF A2 03 A0 00 18 20 C1
C878: F0 FF A9 01 C9 0D D0 0C C7
C880: 48 A9 14 8D 75 C8 A9 05 01
C888: 8D 73 C8 68 CD 38 CA B0 3C
C890: 36 09 40 20 D2 FF A9 2E DA
C898: 20 D2 FF A9 20 20 D2 FF 48
C8A0: A0 00 B9 39 CA C9 A0 F0 5A
C8A8: 08 20 D2 FF C8 C0 10 D0 0E
C8B0: F1 EE 73 C8 EE 7B C8 AD AE
C8B8: A3 C8 18 69 10 8D A3 C8 B0
C8C0: 90 B0 EE A4 C8 B0 AB A2 5D
C8C8: 15 A0 0A 18 20 F0 FF A0 52
C8D0: 00 B9 14 CA 20 D2 FF C8 25
C8D8: C0 14 D0 F5 E8 A0 0C 18 22
C8E0: 20 F0 FF A0 00 B9 28 CA 3F
C8E8: 20 D2 FF C8 C0 0F D0 F5 3B
C8F0: A9 00 85 C6 20 9F FF 20 C6
C8F8: E4 FF C9 00 F0 F6 C9 20 79
C900: D0 03 4C 6E C9 C9 41 90 F3
C908: EB 29 3F CD 38 CA B0 E4 C2
C910: A8 88 C0 00 F0 12 AD 45 F7
C918: C9 18 69 10 8D 45 C9 90 A0
C920: 03 EE 46 C9 88 4C 12 C9 D2
C928: A9 93 20 D2 FF 18 A2 02 15
C930: A0 00 20 F0 FF A0 00 B9 3C
C938: F8 C9 20 D2 FF C8 C0 05 7C
C940: D0 F5 A0 00 B9 39 CA C9 2F
C948: A0 F0 08 20 D2 FF C8 C0 5E
C950: 10 D0 F1 A0 00 B9 FD C9 45
C958: 20 D2 FF C8 C0 03 D0 F5 9E
C960: 18 A2 07 20 9A C9 8D 78 AC
C968: 02 A9 02 4C B0 C9 20 82 7F
C970: C9 18 A2 02 20 9A C9 A9 25
C978: 01 4C B0 C9 20 82 C9 4C F8
C980: B7 C9 A9 01 8D 37 CA 20 5C
C988: 8A FF 20 EA C9 20 A3 FD A9
C990: 20 81 FF A9 00 85 C7 85 AE
C998: D4 60 A0 00 20 F0 FF B9 39
C9A0: F5 C9 20 D2 FF C8 C0 03 DF
C9A8: D0 F5 A9 0D 8D 77 02 60 8D
C9B0: 85 C6 A9 13 20 D2 FF A9 56
C9B8: 00 8D 37 CA 58 6C 02 A0 AF
C9C0: AD 01 DC CD 01 DC D0 F8 C1
C9C8: A9 BF 8D 00 DC AD 01 DC 28
C9D0: C9 EF F0 0F A9 FD 8D 00 BF
C9D8: DC AD 01 DC C9 7F F0 03 7E
C9E0: 18 90 01 38 A9 7F 8D 00 79
C9E8: DC 60 A9 09 8D 18 03 A9 2B
C9F0: C8 8D 19 03 60 52 55 4E B9
C9F8: 4C 4F 41 44 22 22 2C 38 C2
CA00: 53 48 4F 54 47 55 4E 20 4A
CA08: 4C 4F 41 44 20 41 4E 44 1D
CA10: 20 52 55 4E 50 52 45 53 61
CA18: 53 20 53 50 41 43 45 20 19
CA20: 54 4F 20 52 45 52 55 4E 71
CA28: 43 55 52 52 45 4E 54 20 6D
CA30: 50 52 4F 47 52 41 4D 4A

```

*This program must be entered using Flankspeed! See page 118.

DISK ERROR CHECKER **FROM PAGE 59**

```

•100 REM GEORGE TREPAL COPYRIGHT 1985      FM
•110 REM 2650 ALTURAS RD                   PO
•120 REM BARTOW, FL 33830                  AG
•130 CLR:POKE53281,0:POKE53280,0:DIMTR(40) JB
):PRINT"[CLEAR][c 6][DOWN]"
•140 PRINTSPC(11)"[WHITE]DISK ERROR CHECK BA
ER"
•150 PRINTSPC(8)"[DOWN][YELLOW]NO KNOCK - CE
- TRACKS 1-40"
•160 PRINTSPC(12)"[CYAN][DOWN]BY GEORGE T OM
REPAL"
•170 PRINT"[DOWN][DOWN][c 6]CHECK <A>LL T EK
RACKS OR <S>ELECTED TRACKS"
•180 GETY$:IFY$<>"A"ANDY$<>"S"THEN180 LN
•190 IFY$="A"THENFT=1:LT=40:GOTO260 HF
•200 FT=-1:LT=50 CC
•210 INPUT"[DOWN][DOWN][8" "]FIRST TRACK BG
TO CHECK";FT
•220 IFFT<1ORFT>40THEN210 PP
•230 INPUT"[DOWN][8" "]LAST TRACK TO CHEC ON
K";LT
•240 IFLT<1ORLT>40THEN230 KJ
•250 IFLT<FTTHEN210 MI
•260 PRINTSPC(5)"[DOWN]PRINT OUT ERRORS F GI
OUND (Y/N)?"
•270 GETY$:IFY$<>""THEN270 EB
•280 PF=0:GETY$:IFY$=""THEN280 GA
•290 IFY$="Y"THENPF=1 JK
•300 PRINT"[DOWN][DOWN] INSERT DISK TO CH PK
ECK THEN PRESS RETURN"
•310 PRINT SPC(2)"(FLASHING [c 3]RED[c 6] KE
DRIVE LIGHT IS NORMAL)"
•320 GETA$:IFA$<>CHR$(13)THEN320 DG
•330 OPEN15,8,15:PRINT#15,"I":CLOSE15 DJ
•340 REM DEFINE # OF SECTORS ON TRACKS NC
•350 FORJ=1TO17:TR(J)=20:NEXT:FORJ=18TO23 MK
:TR(J)=18:NEXT
•360 FORJ=24TO30:TR(J)=17:NEXT:FORJ=31TO4 LH
0:TR(J)=16:NEXT
•370 FORT=FTTOLT:PRINT"[CLEAR][WHITE]";:P OE
RINTSPC(15)"TRACK ";T
•380 PRINT"[c 6][DOWN][3" "]SECTOR[4" "]E EA
RROR[5" "]EXPLANATION"
•390 FORS=0TOTR(T) KB
•400 PRINT"[c 6]SECTOR # ";S;:IFS<10THENP LL
RINT" ";
•410 OPEN15,8,15 AM
•420 PRINT#15,"M-W"CHR$(6)CHR$(0)CHR$(2)C KO
HR$(T)CHR$(S)
•430 PRINT#15,"M-W"CHR$(0)CHR$(0)CHR$(1)C LM
HR$(128)
•440 PRINT#15,"M-R"CHR$(0)CHR$(0) PE

```

```

•460 IFA=1THENPRINT" NO ERRORS":GOTO550 EH
•470 IFA=2THENB$="[YELLOW]BLOCK HEADER GO EH
NE"
•480 IFA=3THENB$="[CYAN]SYNC CHARACTER GO JG
NE"
•490 IFA=4THENB$="[c 7]HEADER CHECKSUM BA HM
D"
•500 IFA=5THENB$="[PURPLE]READ CHECKSUM B NB
AD"
•510 IFA=6THENB$="[BLUE]BIT PATTERN ERROR AL
"
•520 IFA=9THENB$="[WHITE]HEADER CHECKSUM LD
BAD"
•530 IFA=11THENB$="[c 1]FORMAT ID MISMATC HA
H"
•540 PRINT" ";A+18;" ";B$ BD
•550 CLOSE15 AB
•560 IFPF=0ORA=1THEN590 CI
•570 OPEN4,4:CMD4:PRINT#4,"TRACK ";T;"[3" GC
"]SECTOR";S;" ERROR #";A+18;
•580 PRINT#4,"[4" "]" ;B$:CLOSE4 IM
•590 NEXT:NEXT EF
•600 PRINTSPC(8)"[WHITE]PRESS RETURN TO C JE
ONTINUE[c 6]"
•610 GETY$:IFY$<>CHR$(13)THEN610 KI
•620 GOTO130 CA

```

MAESTRO **FROM PAGE 39**

```

•3 POKE56334,PEEK(56334)AND254 DN
•4 FORX=36609TO40959:POKEX,Z:NEXT KH
•6 POKE55,4:POKE56,109:CLR:GOTO10 FG
•9 NZ(K,0)=FN H(FO):NZ(K,Z)=FN L(FO):FO=F GI
O*R:RETURN
•10 POKE53280,0:POKE53281,1:POKE646,0:PRI MM
NT"[CLEAR]":GOSUB2000:GOSUB3000
•14 Q=54272:R=1.0594631:FO=43.65:SK=65439 FK
:DO=53248:KY=197
•15 SH=653:F1=.064068:F2=16.4015:F3=256:0 KD
=1:W=16:JI(0)=-1:JI(1)=-1:JI(2)=-1:T=2
•16 Q1=Q+7:Q2=Q+14:Q3=Q+0:Q4=Q+8:Q5=Q+15: HB
Q6=Q+4:Q7=Q+11:Q8=Q+18:E1=Q6:E2=Q7:E3=Q8
•17 TH=119:FH=401:SI=1450:C$=CHR$(13):W1= GB
W:W2=W:W3=W:SR=240
•20 L1=27909:L2=29359:L3=30809:H1=32259:H CC
2=33709:H3=35159:O1=36609:O2=38059
•22 O3=39509:OV=0:HV=0:LV=0 HE
•28 DIMM%(400,2):DIMR%(400,2) EB
•30 DIMN%(64,1):DIMCH%(64) CK
•40 DEF FN H(FO)=INT(FO*F1) MA
•50 DEF FN L(FO)=INT(FO*F2)-(F3*INT(FO*F1 OL
))
•55 FORI=ZTO64:READJ,K:CH%(I)=J:IFJ>ZANDJ DD
<>THTHENGOSUB9
•58 NEXT IA

```

| | | | |
|---|----|---|----|
| •60 FORI=QTO54295:POKEI,Z: NEXT:POKEI,15 | KN | •440 IFR%(J,V)<=OTHER450 | BM |
| •70 POKEQ+6,SR:POKEQ+13,SR:POKEQ+20,SR | PB | •444 POKEHV+K,N%(M%(J,V),O):POKELV+K,N%(M | DL |
| •71 FORX=QTO9:READT\$(X):NEXT:GOTO608 | JI | %(J,V),Z):POKEOV+K,Z:K=K+O | EJ |
| •140 OV=O1+V*SI | CJ | •450 NEXT:RETURN | HH |
| •142 FORX=ZTOK(V):POKEOV+X,Z: NEXT:K(V)=-1 | IK | •470 FORX=OTO999: NEXT:GOSUB2000 | HG |
| :JI(V)=-1:JJ=Z:KK=Z:C=Z:K(3)=Z:RETURN | AO | •520 FORI=ZTOK(S-O) | AG |
| •150 GETA\$:IFA\$<""THEN150 | AO | •525 SYSSK:IFPEEK(SH)=OTHER600 | KN |
| •160 PRINT"[CLEAR][DOWN][DOWN][RIGHT]GET | BA | •530 POKEQ,PEEK(L1+I):POKEQ1,PEEK(L2+I):P | NF |
| READY TO PLAY [3"."]";:FORX=OTOFH:NEXT:P | HO | OKEQ2,PEEK(L3+I) | IP |
| RINT"GO!" | BN | •540 POKEQ3,PEEK(H1+I):POKEQ4,PEEK(H2+I): | EE |
| •170 POKEQ+5,AD:POKEQ+6,SR | BN | POKEQ5,PEEK(H3+I) | CP |
| •295 POKEQ6,W+O:U=49152 | HA | •550 POKEE1,PEEK(O1+I)+W1:POKEE2,PEEK(O2+ | AA |
| •300 SYSSK:IFPEEK(SH)=OTHER360 | MB | I)+W2:POKEE3,PEEK(O3+I)+W3 | OK |
| •305 IFU=DOTHEN363 | LI | •560 FORX=ZTOE:NEXT:NEXT | CL |
| •310 X=PEEK(KY):POKEQ,N%(X,Z):POKEQ3,N%(X | CB | •600 POKEQ6,Z:POKEQ7,Z:POKEQ8,Z:FORX=ZTOF | AO |
| ,1):POKEU,N%(X,Z):POKEU+1,N%(X,O) | IM | 3:NEXT:RETURN | JF |
| •320 U=U+T:GOTO300 | CB | •608 GETA\$:IFA\$<""THEN608 | FL |
| •360 IFSTHEN365 | CK | •609 PRINT"[CLEAR]":POKE53280,6:POKE53281 | EK |
| •362 RETURN | EJ | ,1:PRINTTAB(5)"[DOWN][RED][3"*"] S E L | PI |
| •363 IFSTHEN365 | KI | E C T I O N S [3"*"]" | LN |
| •364 GOTO295 | AB | •610 PRINTTAB(10)"[BLUE][3"[DOWN]]0-MUSI | GK |
| •365 PRINT"[CLEAR][DOWN][DOWN][RIGHT]HERE | BI | CAL KEYBOARD" | NJ |
| 'S WHAT YOU JUST PLAYED:" | EP | •615 PRINTTAB(10)"1-PLAY IT AGAIN!" | BP |
| •372 FORI=49152TOU-TSTEPT | HO | •620 PRINTTAB(10)"2-COMPOSE A TUNE" | CD |
| •373 SYSSK:IFPEEK(SH)=TTHEN381 | GO | •625 PRINTTAB(10)"3-LOOK AT MUSIC" | BG |
| •375 POKEQ,PEEK(I):POKEQ3,PEEK(I+O) | PP | •630 PRINTTAB(10)"4-MUSIC EDITOR" | NI |
| •380 FORJ=OTO35:NEXT:NEXT | HD | •632 PRINTTAB(10)"5-SELECT INSTRUMENT" | KF |
| •381 POKEQ6,W:RETURN | IF | •635 PRINTTAB(10)"6-LISTEN TO MUSIC" | LH |
| •386 PRINT"[DOWN][DOWN][RIGHT]NOTES: "; | HH | •640 PRINTTAB(10)"7-SAVE MUSIC ON DISK" | NJ |
| •390 SYSSK:IFPEEK(SH)=OTHERRETURN | BJ | •642 PRINTTAB(10)"8-GET MUSIC FROM DISK" | BP |
| •400 GETA\$:IFA\$=""THEN390 | MD | •644 PRINTTAB(10)"9-LOOK AT DISK INDEX" | CD |
| •401 IFPEEK(SH)=TTHEN411 | CE | •645 PRINTTAB(10)"X-QUIT PROGRAM" | BG |
| •402 X=PEEK(KY):PRINTCHR\$(CH%(X)); | EA | •646 PRINTTAB(10)"[RED][DOWN][DOWN]YOUR C | NI |
| •405 POKEQ,N%(X,Z):POKEQ3,N%(X,O):POKEQ6, | HM | HOICE [0-X]?" | KF |
| W+1:FORI=OTOF3:NEXT:POKEQ6,W | NJ | •650 SYSSK:GETA\$:IFA\$=""THEN650 | LH |
| •410 M%(JJ,V)=X:JJ=JJ+O:IFJJ<FHTHEN390 | IC | •652 IFA\$="X"THEN1350 | NJ |
| •411 IFJJ>CTHENJJ=JJ-O:PRINT"[LEFT] [LEFT | NL | •654 S=VAL(A\$):IFS=0ANDA\$<>"0"THEN650 | AI |
|]"; | KG | •660 ON-(S=0)-2*(S=1)-3*(S=2)-4*(S=3)-5*(| CK |
| •412 GOTO390 | CK | S=4)GOSUB150,150,676,710,800 | PI |
| •420 IFJI(V)<ZTHENFORX=OTO999: NEXT:K(V)=- | BN | •665 ON-(S=5)-2*(S=6)-3*(S=7)-4*(S=8)-5*(| KA |
| 1:RETURN | CI | S=9)GOSUB1150,900,1000,1050,1100 | MB |
| •421 PRINT:PRINT" RHYTHM: "; | AB | •670 GOTO608 | PP |
| •422 SYSSK:GETA\$:IFA\$=""THEN422 | LG | •676 PRINT"[CLEAR][DOWN][DOWN] HOW MANY V | NC |
| •425 IFPEEK(SH)=TTHEN432 | OH | OICES (1,2,3) ?"; | JG |
| •426 IFA\$<"A"ORA\$>"Z"THEN422 | JM | •678 SYSSK:IFPEEK(SH)THENRETURN | BL |
| •430 PRINTA\$;:R%(KK,V)=ASC(A\$)-64:KK=KK+O | IA | •679 GETA\$:IFA\$=""THEN678 | OC |
| :IFKK<=JI(V)THEN422 | | •681 B=VAL(A\$):IFB>3ORB=ZTHEN678 | PP |
| •431 GOTO435 | | •682 FORV=ZTOT:GOSUB140:NEXT | KB |
| •432 IFKK>CTHENKK=KK-O:PRINT"[LEFT] [LEFT | | •685 FORV=ZTOB-O:PRINT"[CLEAR][DOWN][DOWN | HN |
|]"; | |] INPUT VOICE"V+O | |
| •434 GOTO422 | | •686 JJ=Z:KK=Z | |
| •435 K=K(V)+O:HV=H1+V*SI:LV=L1+V*SI:OV=O1 | | •688 GOSUB386:JI(V)=JJ-O:GOSUB420:K(V)=K- | |
| +V*SI | | O:S=V+O:GOSUB920:NEXT:RETURN | |
| •436 FORJ=CTOJI(V) | | •710 PRINT"[CLEAR][DOWN][DOWN] WHICH VOIC | |
| •437 FORX=OTOR%(J,V)-O:POKEHV+K,N%(M%(J,V) | | E (1,2,3) ?"; | |
| ,O):POKELV+K,N%(M%(J,V),Z) | | •712 SYSSK:IFPEEK(SH)=OTHERRETURN | |
| •438 POKEOV+K,O:K=K+O:IFK=SI THENRETURN | | •715 GETA\$:IFA\$=""THEN712 | |
| •439 NEXT | | •718 V1=VAL(A\$):IFV1>3ORV1=ZTHEN712 | |

| | | | |
|---|----|---|----|
| 719 V=V1-0:IFJI(V)>=ZTHEN721 | FH | 912 SYSSK:IFPEEK(SH)THENRETURN | PJ |
| 720 PRINT"[CLEAR][DOWN] NO MUSIC ASSIGNE D TO VOICE";V1:FORX=0TO2000:NEXT:RETURN | LM | 914 GETA\$:IFA\$=""THEN912 | IL |
| 721 PRINT"[CLEAR][DOWN][DOWN][RIGHT]VOIC E"V1:PRINT"[DOWN][DOWN][RIGHT]NOTES: "; :FORJ=ZTOJI(V) | | 916 S=VAL(A\$):IFS>4ORS=ZTHEN912 | MA |
| 724 PRINTCHR\$(CH%(M%(J,V)));:NEXT:PRINT: PRINT | FL | 918 PRINTS:IFS<4ANDJI(S-0)=-1THENV1=S:GO TO720 | DD |
| 735 PRINT"[DOWN] RHYTHM: ";:FORJ=ZTOJI(V) :PRINTCHR\$(R%(J,V)+64);:NEXT | ND | 920 E1=-1*(S=4ORS=0)*(Q6-820)+820:E2=-1* (S=4ORS=T)*(Q7-820)+820 | NN |
| 739 SYSSK:IFPEEK(SH)=0THENRETURN | PM | 924 E3=-1*(S=4ORS=3)*(Q8-820)+820:K(3)=K (Z):IFK(0)>K(3)THENK(3)=K(0) | BG |
| 740 GOTO739 | PP | 928 IFK(2)>K(3)THENK(3)=K(2) | JE |
| 800 PRINT"[CLEAR][RIGHT][DOWN][DOWN]EDIT WHICH VOICE (1,2,3) ?"; | DB | 935 PRINT"[CLEAR][DOWN][DOWN] INDICATE T EMPO (0-9) " | DA |
| 803 SYSSK:IFPEEK(SH)=1THENRETURN | EK | 938 SYSSK | DL |
| 805 GETA\$:IFA\$=""THEN803 | MB | 940 GETA\$:IFA\$=""THEN938 | IL |
| 806 V1=VAL(A\$):IFV1>3ORV1=ZTHEN805 | KA | 945 E=VAL(A\$)*10:IFE=ZANDA\$<>"0"THEN935 | LO |
| 808 V=V1-0:IFJI(V)>=ZTHEN810 | GI | 965 GOSUB470:RETURN | OO |
| 809 PRINT"[CLEAR][DOWN] NO MUSIC ASSIGNE D TO VOICE";V1:FORX=0TO2000:NEXT:GOTO823 | FE | 1000 POKE56334,PEEK(56334)OR1:A\$="" :B\$="" | PC |
| 810 PRINT"[CLEAR][DOWN][DOWN][RIGHT]THE NOTES CURRENTLY ARE:" :PRINT"[DOWN] NOTES : "; | EP | 1005 PRINT"[CLEAR][DOWN][DOWN] INSERT FO RMATTED DISKETTE" | GA |
| 816 FORJ=ZTOJI(V):PRINTCHR\$(CH%(M%(J,V)));:NEXT:PRINT | FH | 1010 INPUT"[DOWN][DOWN] NAME YOUR PIECE" ;A\$:IFA\$=""THEN1042 | KD |
| 817 PRINT"[DOWN] IF OK TYPE <SPACE> " :PR INT" 'B' TO START FROM BEGINNING" | AH | 1016 INPUT"[DOWN] RECOMMENDED TEMPO";B\$: IFB\$=""THEN1042 | MD |
| 818 PRINT" 'A' TO CONTINUE ADDING NOTES" | HE | 1018 E=VAL(B\$):IFE=ZANDB\$<>"0"THEN1016 | JN |
| 819 SYSSK:GETA\$:IFA\$=""THEN819 | DC | 1020 OPEN15,8,15,"I0":OPEN5,8,5,"@0:"+A\$ +" ,S,W" | DN |
| 820 IFA\$="A"THEN850 | OB | 1030 PRINT#5,E;C\$;JI(Z);C\$;JI(O);C\$;JI(T) | LJ |
| 821 IFA\$=" "THENTJI=JI(V):GOTO826 | GA | 1036 FORV=ZTOT:FORX=ZTOJI(V):PRINT#5,M%(X,V);C\$;R%(X,V):NEXT:NEXT | MK |
| 822 IFA\$<>"B"THEN817 | CA | 1040 CLOSE5:CLOSE15 | BF |
| 823 PRINT"[DOWN][DOWN] INPUT THE NOTES A S THEY SHOULD BE." | FL | 1041 PRINT" "A\$" SAVED ON DISK" | DP |
| 824 PRINT:GOSUB140:GOSUB386:TJI=JJ-0 | JF | 1042 POKE56334,PEEK(56334)AND254:FORX=ZT O999:NEXT:RETURN | EB |
| 825 IFJI(V)<ZTHEN840 | EG | 1050 FORV=ZTOT:GOSUB140:NEXT | PP |
| 826 PRINT:PRINT"[DOWN] THE RHYTHM CURREN TLY IS":PRINT:PRINT"[DOWN] RHYTHM: "; | CP | 1052 POKE56334,PEEK(56334)ORO:A\$="" :INPU T"[CLEAR][DOWN][DOWN] NAME OF PIECE";A\$ | NC |
| 827 FORJ=ZTOJI(V):PRINTCHR\$(R%(J,V)+64); :NEXT:IFTJI<>JI(V)THEN840 | FJ | 1054 OPEN15,8,15,"I0":OPEN5,8,5,"0:"+A\$+ " ,S,R":INPUT#5,E,JI(Z),JI(O),JI(T) | JI |
| 832 PRINT:PRINT"[DOWN][DOWN] IF OK TYPE <SPACE> " :PRINT" OTHERWISE 'R'" | EH | 1060 FORV=ZTOT:FORX=ZTOJI(V):INPUT#5,M%(X,V),R%(X,V):NEXT:NEXT | ID |
| 833 GETA\$:IFA\$<>"0"THEN833 | AA | 1062 POKE56334,PEEK(56334)AND254 | DN |
| 834 SYSSK:GETA\$:IFA\$=""THEN834 | NM | 1065 INPUT#15,E\$ | ID |
| 835 IFA\$=" "THENK(V)=-1:C=Z:KK=Z:GOSUB43 5:K(V)=K-0:RETURN | EM | 1066 IFVAL(E\$)>ZTHENPRINT"[DOWN][DOWN] " A\$" NOT ON DISK":FORX=ZTO999:NEXT:GOTO 1 074 | BN |
| 840 JI(V)=TJI:PRINT:PRINT"[DOWN][DOWN] I NPUT THE RHYTHM AS IT SHOULD BE." | FL | 1067 PRINT"[DOWN] "A\$" LOADED FROM DISK" :C=Z:PRINT" RECOMMENDED TEMPO:";E | PN |
| 842 C=Z:KK=Z:K(V)=-1:GOSUB420 | HM | 1068 FORV=ZTOT:K(V)=-1 | JN |
| 845 K(V)=K-0:RETURN | MJ | 1070 PRINT" COMPILING VOICE"V+1:IFJI(V)> -1THENGOSUB435:K(V)=K-0 | CN |
| 850 JJ=JI(V)+0:KK=JJ:C=JJ:GOSUB386:JI(V) =JJ-0 | MK | 1073 NEXT | IA |
| 860 IFJJ>KKTHENGOSUB420:K(V)=K-0 | FC | 1074 CLOSE5:CLOSE15:RETURN | NI |
| 870 S=V+0:GOSUB920:RETURN | IB | 1100 POKE56334,PEEK(56334)OR1:PRINT"[CLE AR][DOWN][DOWN] THIS DISK CONTAINS:" :PRI NT | GB |
| 900 PRINT"[CLEAR][DOWN][DOWN] TYPE NUMBE R OF VOICE TO BE PLAYED "; | AM | 1110 OPEN15,8,15,"I0":OPEN5,8,5,"\$" | AE |
| 910 PRINT:PRINT"[DOWN] OR TYPE <4> FOR A LL VOICES AT ONCE " | BB | | |

IMPORTANT! Letters on white background are **Bug Repellent** line codes. Do not enter them! Pages 117 and 118 explain these codes and provide other essential information on entering **Ahoy!** programs. Refer to these pages **before** entering any programs!

```

•1114 FORJ=1TO254:GET#5,A$:NEXT
•1117 FORX=OTO8:GET#5,D$,A$,A$:IFSTTHEN1145
•1130 B$="":FORJ=OTO16:GET#5,A$:IFA$<>CHR$(160)THENB$=B$+A$
•1133 NEXT:IFASC(D$+CHR$(Z))=129THENPRINT,B$
•1140 FORJ=1TO11:GET#5,A$:NEXT:IFX<8THENG ET#5,A$,A$
•1142 NEXT:GOTO1117
•1145 CLOSE5:CLOSE15:A$="":INPUT"[DOWN] <RETURN> TO RETURN";A$
•1146 POKE56334,PEEK(56334)AND254:RETURN
•1150 PRINT"[CLEAR]":FORX=QTOQ+23:POKEX,Z:NEXT
•1151 FORX=ZTOT:IFJI(X)<ZANDXTHEN1313
•1159 PRINT"[DOWN][DOWN] CHOOSE DESIRED SOUND FOR VOICE:";X+0
•1160 PRINT"[DOWN][DOWN] PRESS A NUMBER KEY [3"."] ";
•1161 SYSSK:IFPEEK(SH)THEN1313
•1162 GETA$:IFA$="":THEN1161
•1163 S=VAL(A$):IFS=0ANDA$<>"0"THEN1161
•1164 PRINTT$(S):FORJ=ZTOFH:NEXT
•1166 ON-(S=0)-2*(S=1)-3*(S=2)-4*(S=3)-5*(S=4)GOTO1200,1210,1220,1230,1240
•1167 ON-(S=5)-2*(S=6)-3*(S=7)-4*(S=8)-5*(S=9)GOTO1250,1260,1270,1280,1290
•1200 W=16:AD=144:SR=243:GOTO1300
•1210 W=16:AD=0:SR=240:GOTO1300
•1220 W=16:AD=88:SR=195:GOTO1300
•1230 W=32:AD=88:SR=95:GOTO1300
•1240 W=32:AD=0:SR=240:GOTO1300
•1250 W=128:AD=88:SR=195:GOTO1300
•1260 W=64:AD=14:SR=86:HP=6:LP=2:GOTO1300
•1270 W=64:AD=9:SR=90:HP=8:LP=8:GOTO1300
•1280 W=64:AD=9:SR=90:HP=0:LP=255:GOTO1300
•1290 W=16:AD=9:SR=80
•1300 IFX=ZTHENW1=W
•1310 IFX=OTHENW2=W
•1311 IFX=TTHENW3=W
•1312 J=Q+T+7*X:POKEJ,LP:POKEJ+0,HP:POKEJ+3,AD:POKEJ+4,SR
•1313 NEXT:S=10:RETURN
•1350 POKE56334,PEEK(56334)OR1:END
•1400 DATA 97,12,120,23,62,20,35,31,36,28,37,39,38,36,60,47,51,44,87,55
•1410 DATA 65,7,52,2,90,3,83,63,69,10,0,0,53,13,82,18,68,21,54,26,67,29
•1500 DATA 70,34,84,37,88,42,55,45,89,50,71,53,56,1,66,6,72,62,85,9,86,14
•1510 DATA 57,17,73,22,74,25,48,30,77,33,75,38,79,41,78,46,43,49,80,54,76,5,45,57
•1600 DATA 46,56,58,59,64,8,44,11,92,16,42,19,59,24,115,27,0,0,61,32

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FB •1610 DATA 94,35,47,40,49,43,95,48,0,0,50,51,119,0,0,0,81,0,126,4,0,0
NC •1700 DATAACCORDIAN,ORGAN,CLARINET,SYNTHESIZER,KAZOO,DRUM,GUITAR,XYLOPHONE
AI •1710 DATABANJO,PIANO
PK •2000 PRINT "[CLEAR][3"[DOWN]"]][BLUE][11" "[s U][s I]"
NP •2001 PRINT "[11" "][s G][s K]"
BM •2002 PRINT "[3" "][8"[c T]"]][s N][c T]"
JN •2003 PRINT "[3" "][7"[c T]"]][s N][s G][c T]"
BI •2004 PRINT "[3" "][6"[c T]"]][c M][s U][s G][s I][5"[c T]"]][RED]M A E S T R O[BLUE][5"[c T]"]]"
HA •2005 PRINT "[3" "][6"[c T]"]][c M][s J][s G][c N][23"[c T]"]]"
JD •2006 PRINT "[3" "][7"[c T]"]][s M][s G][s N][23"[c T]"]]"
BE •2007 PRINT "[11" "][s G]"
IM •2008 RETURN
LP •3000 PRINT"
FG •3001 PRINT"[27" "][c M][3"[c Y]"]][s P]"
AF •3002 PRINT"[PURPLE][4" "][s Q] ADVANCED[BLUE][13" "][c M] [c Y][s P]"
IJ •3003 PRINT"[27" "][s Q]. [s Q]"
AH •3004 PRINT"[GREEN][6" "][s Q] MUSIC[BLUE]"
LP •3005 PRINT"
EG •3006 PRINT"[c 2][8" "][s Q] EDITOR[BLUE][5" "][c M] [c M] [c M]"
LA •3007 PRINT"[21" "][c M] [c M] [c M]"
DJ •3008 PRINT"[21" "][s Q] [s Q] [s Q]"
OM •3009 PRINT:PRINTTAB(8)"BY WILLIAM T. EVE LETH AND"
MI •3010 PRINTTAB(12)"THE AHOY! STAFF"
IM •3011 RETURN

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PROGRAMMING BIT BY BIT

FROM PAGE 103 THE NAME GAME

| | | | | |
|----|--------|---------------|--------|----------|
| 1 | * | | | |
| 2 | * | THE NAME GAME | | |
| 3 | * | | | |
| 4 | | ORG | \$8000 | |
| 5 | * | | | |
| 6 | EOL | EQU | \$0D | ;RETURN |
| 7 | EOF | EQU | \$03 | ;EOF CHR |
| 8 | FILLCH | EQU | \$20 | ;SPACE |
| 9 | BUFLEN | EQU | 40 | |
| 10 | CHRIN | EQU | \$FFCF | |
| 11 | CHROUT | EQU | \$FFD2 | |
| 12 | TEMPTR | EQU | \$FB | |
| 13 | * | | | |
| 14 | | JMP | START | |
| 15 | * | | | |
| 16 | TXTBUF | DS | 40 | |

| | | | | | |
|----------------------------|-----|----------------------|------------------|----------------------|----------------------|
| 17 * | | | 75 | STA | TEMPTR+1 |
| 18 TITLE | ASC | 'THE NAME GAME' | 76 | JSR | PRINT |
| 19 | HEX | 0D | 77 * | | |
| 20 HELLO | ASC | 'HELLO, ' | 78 * PRINT | 'WHAT IS YOUR NAME?' | |
| 21 | HEX | 03 | 79 * | | |
| 22 QUERY | ASC | 'WHAT IS YOUR NAME?' | 80 ASK | LDA | #<QUERY |
| 23 | HEX | 0D | 81 | STA | TEMPTR |
| 24 NAME | ASC | 'GEORGE' | 82 | LDA | #>HELLO |
| 25 | HEX | 0D | 83 | STA | TEMPTR+1 |
| 26 REBUFF | ASC | 'GO AWAY, ' | 84 | JSR | PRINT |
| 27 | HEX | 03 | 85 | LDA | #EOL |
| 28 DEMAND | ASC | 'BRING ME GEORGE!' | 86 | JSR | CHROUT |
| 29 | HEX | 0D | 87 * | | |
| 30 GREET | ASC | 'HI, GEORGE!' | 88 * INPUT | A TYPED LINE | |
| 31 | HEX | 0D | 89 * | | |
| 32 * | | | 90 | JSR | FILL |
| 33 * CLEAR TEXT BUFFER | | | 91 | LDX | #0 |
| 34 * | | | 92 KEY | JSR | CHRIN |
| 35 FILL | LDA | #FILLCH | 93 | STA | TXTBUF,X |
| 36 | LDX | #BUFLN | 94 | CMP | #EOL |
| 37 DOFILL | DEX | | 95 | BEQ | COMPARE |
| 38 | STA | TXTBUF,X | 96 | INX | |
| 39 | BNE | DOFILL | 97 | JMP | KEY |
| 40 | RTS | | 98 * | | |
| 41 * | | | 99 * IS THE NAME | 'GEORGE'? | |
| 42 PRINT | LDY | #0 | 100 * | | |
| 43 SHOW | LDA | (TEMPTR),Y | 101 COMPARE | JSR | CHROUT ;PRINT RETURN |
| 44 | CMP | #EOF | 102 | LDX | #0 |
| 45 | BEQ | DONE | 103 CHECK | LDA | TXTBUF,X |
| 46 | PHA | | 104 | CMP | NAME,X |
| 47 | JSR | CHROUT | 105 | BNE | NOGOOD |
| 48 | PLA | | 106 | CMP | #EOL |
| 49 | CMP | #EOL | 107 | BEQ | DUNIT |
| 50 | BNE | NEXT | 108 | INX | |
| 51 | JMP | DONE | 109 | CPX | #BUFLN |
| 52 NEXT | INY | | 110 | BCS | DUNIT |
| 53 | CPY | #BUFLN | 111 | JMP | CHECK |
| 54 | BCC | SHOW | 112 * | | |
| 55 DONE | RTS | | 113 * NO; PRINT | 'GO AWAY . . .' | |
| 56 * | | | 114 * | | |
| 57 * PRINT 'THE NAME GAME' | | | 115 NOGOOD | LDA | #EOL |
| 58 * | | | 116 | JSR | CHROUT |
| 59 START | LDA | #EOL | 117 | LDA | #<REBUFF |
| 60 | JSR | CHROUT | 118 | STA | TEMPTR |
| 61 | LDA | #<TITLE | 119 | LDA | #>REBUFF |
| 62 | STA | TEMPTR | 120 | STA | TEMPTR+1 |
| 63 | LDA | #>TITLE | 121 | JSR | PRINT |
| 64 | STA | TEMPTR+1 | 122 * | | |
| 65 | JSR | PRINT | 123 * PRINT | PLAYER'S NAME | |
| 66 | LDA | #EOL | 124 * | | |
| 67 | JSR | CHROUT | 125 | LDA | #<TXTBUF |
| 68 | | | 126 | STA | TEMPTR |
| 69 * | | | 127 | LDA | #>TXTBUF |
| 70 * PRINT 'HELLO . . .' | | | 128 | STA | TEMPTR+1 |
| 71 * | | | 129 | JSR | PRINT |
| 72 | LDA | #<HELLO | 130 | LDA | #EOL |
| 73 | STA | TEMPTR | 131 | JSR | CHROUT |
| 74 | LDA | #>HELLO | 132 * | | |

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133 * PRINT 'BRING ME GEORGE!'
134 *
135     LDA    #<DEMAND
136     STA    TEMPTR
137     LDA    #>DEMAND
138     STA    TEMPTR+1
139     JSR    PRINT
140     LDA    #EOL
141     JSR    CHROUT
142     JMP    ASK
143 *
144 * YES; PRINT GREETING
145 *
146 DUNIT  LDA    #EOL
147         JSR    CHROUT
148         LDA    #<GREET
149         STA    TEMPTR
150         LDA    #>GREET
151         STA    TEMPTR+1
152         JSR    PRINT
153         RTS
    
```

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•330 DATA224,025,208,205,166,094
•340 DATA232,224,002,208,183,166
•350 DATA093,202,016,171,166,091
•360 DATA232,224,040,208,160,076
•370 DATA237,192,173,049,194,240
•380 DATA029,169,255,141,003,221
•390 DATA173,038,003,141,050,194
•400 DATA173,039,003,141,051,194
•410 DATA169,190,141,038,003,169
•420 DATA192,141,039,003,208,024
•430 DATA169,004,174,052,194,172
•440 DATA053,194,032,186,255,169
•450 DATA000,032,189,255,032,192
•460 DATA255,162,004,032,201,255
•470 DATA032,185,192,169,051,032
•480 DATA210,255,169,001,032,210
•490 DATA255,169,013,032,210,255
•500 DATA169,010,076,210,255,169
•510 DATA027,076,210,255,072,141
•520 DATA001,221,169,016,044,013
•530 DATA221,240,251,104,096,032
•540 DATA185,192,169,074,032,210
•550 DATA255,169,013,076,172,192
•560 DATA032,175,192,032,185,192
•570 DATA169,121,032,210,255,169
•580 DATA032,032,210,255,169,003
•590 DATA076,210,255,173,049,194
•600 DATA240,013,173,050,194,141
•610 DATA038,003,173,051,194,141
•620 DATA039,003,096,032,204,255
•630 DATA169,004,076,195,255,169
•640 DATA000,133,105,133,106,162
•650 DATA008,010,038,106,006,107
•660 DATA144,007,024,101,108,144
•670 DATA002,230,106,202,208,239
•680 DATA133,105,096,165,095,133
•690 DATA107,169,040,133,108,032
•700 DATA007,193,165,091,024,101
•710 DATA105,133,105,144,002,230
•720 DATA106,165,105,133,087,165
•730 DATA106,133,088,173,040,194
•740 DATA024,101,105,133,105,133
•750 DATA089,173,041,194,101,106
•760 DATA133,106,133,090,160,000
•770 DATA177,089,041,015,133,252
•780 DATA177,089,074,074,074,074
•790 DATA133,253,165,088,133,106
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•810 DATA044,194,133,105,165,088
•820 DATA109,045,194,133,106,160
•830 DATA000,177,105,041,015,133
•840 DATA251,173,046,194,133,105
•850 DATA173,047,194,133,106,177
•860 DATA105,041,015,133,255,165
•870 DATA088,133,106,165,087,133
•880 DATA105,162,003,006,105,038
    
```

PM
 MM
 CH
 DH
 BI
 LL
 NC
 PM
 HI
 IB
 DL
 BG
 KG
 GB
 AG
 EI
 GC
 EN
 BI
 PH
 MG
 AP
 DH
 OH
 DG
 AI
 PC
 CO
 NN
 GB
 CC
 HA
 FF
 LA
 MC
 EN
 PJ
 AG
 DH
 DD
 KB
 HO
 IO
 LL
 MP
 BG
 MB
 NI
 AH
 LO
 GP
 IC
 IP
 PO
 NO
 HN

SHADEYDUMP FROM PAGE 93

```

•100 PRINT "[CLEAR]"CHR$(14)CHR$(8)SPC(13
) "[s S]HADEY[s D]UMP" PK
•110 PRINT SPC(12)"[s V]ERSION 2.0" LM
•120 PRINT SPC(45)"(C) 1985 BY [s M]ICHAE
L [s S]CHELL" FJ
•130 FORA=49152 TO 50001:READ B:C=C+B:POK
E A,B:NEXT JO
•140 IF C<>86106 THEN PRINT "ERROR IN DAT
A STATEMENTS":STOP FK
•150 PRINT SPC(12)"[s S]AVING MACHINE LA
NGUAGE PROGRAM[4"."]" AM
•160 SYS 49872, 49152, 50002, "0:SHADEYDU
MP.ML",8 FH
•170 PRINT "[HOME]"SPC(14)SPC(14)"[5" "
][s T]O RUN [s S]HADEY[s D]UMP ENTER:[6"
]" ME
•180 PRINT SPC(5) "SYS 49152" OL
•190 END IC
•200 DATA032,104,192,162,000,134 PJ
•210 DATA091,162,001,134,093,032 NJ
•220 DATA203,192,162,000,134,094 BD
•230 DATA032,216,192,173,048,194 NP
•240 DATA240,003,162,024,044,162 MJ
•250 DATA000,134,095,032,035,193 AI
•260 DATA173,048,194,240,003,162 GB
•270 DATA007,044,162,000,134,096 ID
•280 DATA032,178,193,173,048,194 BN
•290 DATA240,012,166,096,202,016 AK
•300 DATA241,166,095,202,016,221 EG
•310 DATA048,014,166,096,232,224 GC
•320 DATA008,208,227,166,095,232 PF
    
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 .900 DATA194,024,101,105,133,105
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CD .1450 DATA133,020,169,020,076,095
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 IC .1470 DATA072,032,253,174,032,212
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 MA .1490 DATA000,133,010,076,117,225
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 BG .1510 DATA194,141,042,194,142,043
 AL .1520 DATA194,032,198,194,141,040
 IH .1530 DATA194,142,041,194,169,255
 HH .1540 DATA141,039,194,096,032,198
 EE .1540 DATA141,039,194,096,032,198
 JA .1540 DATA141,039,194,096,032,198
 BE .1550 DATA194,141,042,194,142,043
 KG .1560 DATA194,032,198,194,141,040
 IN .1560 DATA194,032,198,194,141,040
 JE .1570 DATA194,142,041,194,032,198
 NP .1580 DATA194,141,044,194,142,045
 FM .1590 DATA194,032,198,194,141,046
 DK .1600 DATA194,142,047,194,169,000
 DP .1610 DATA141,039,194,096

.1610 DATA141,039,194,096
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 .180 DATA106,202,208,249,173,042
 .170 DATA106,202,208,249,173,042
 .160 DATA106,202,208,249,173,042
 .150 DATA106,202,208,249,173,042
 .140 DATA106,202,208,249,173,042
 .130 DATA106,202,208,249,173,042
 .120 DATA106,202,208,249,173,042
 .110 DATA106,202,208,249,173,042
 .100 DATA106,202,208,249,173,042
 .90 DATA106,202,208,249,173,042
 .80 DATA106,202,208,249,173,042
 .70 DATA106,202,208,249,173,042
 .60 DATA106,202,208,249,173,042
 .50 DATA106,202,208,249,173,042
 .40 DATA106,202,208,249,173,042
 .30 DATA106,202,208,249,173,042
 .20 DATA106,202,208,249,173,042
 .10 DATA106,202,208,249,173,042
 DATA106,202,208,249,173,042

1541 DISK DRIVE CLEANING UTILITY

FROM PAGE 59

IMPORTANT! Letters on white background are Bug Repellent line codes. Do not enter them! Pages 17 and 118 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages before entering any programs!

| | | | |
|---|----|--|----|
| AD DATA FROM DISK?(Y/N)" | FA | •550 PRINT " ENTER NEW TRACK (1-35)";:IN | |
| •130 GOSUB 2500 | FA | PUT TR | HP |
| •140 GOSUB 1200 | FA | •560 IF TR<1 THEN PRINT "[4"[UP]]":GOTO | |
| •150 IF AN\$="N" THEN 340 | LF | 540 | FH |
| •200 REM READ DATA FROM DISK DRIVE | JC | •570 IF TR>35 THEN PRINT "[4"[UP]]":GOTO | |
| •210 PRINT "[3"[DOWN]]"[11" "]INSERT DATA | | 540 | FJ |
| DISK" | AO | •590 PRINT "[DOWN] CURRENT CLEANING TIME | |
| •220 PRINT "[8"[DOWN]]"[7" "]PRESS ANY KE | | IS ";SC | NA |
| Y TO READ DATA" | KB | •600 PRINT " ENTER NEW TIME (< 300)";:IN | |
| •230 GET AN\$:IF AN\$="" THEN 230 | EP | PUT SC | FH |
| •240 OPEN15,8,15:OPEN2,8,2,"CLEANDATA,S,R | | •610 IF SC>300 THEN PRINT "[4"[UP]]":GOT | |
| " | OJ | 0 590 | JH |
| •250 GOSUB 1300 | FB | •620 IF SC<1 THEN PRINT "[4"[UP]]":GOTO | |
| •260 IF A <> 0 THEN 300 | JA | 590 | BM |
| •270 INPUT#2,DT\$,TR,SC,NC,NM | KM | •630 PRINT "[DOWN] NUMBER OF TIMES DISK U | |
| •280 GOSUB 1300 | FB | SED IS ";NC | EK |
| •290 IF A = 0 THEN 390 | AG | •640 PRINT " ENTER NEW NUMBER ";:INPUT N | |
| •300 PRINT "[DOWN][DOWN][5" "]DATA NOT RE | | C | FP |
| AD FROM DISK" | FE | •650 PRINT "[DOWN] MAXIMUM CLEANINGS PER | |
| •310 PRINT "[DOWN][DOWN][5" "]TRY AGAIN ? | | DISK IS";NM | JM |
| (Y/N)" | MP | •660 PRINT " ENTER NEW MAXIMUM ";:INPUT | |
| •320 GOSUB 2500 | FA | NM | OC |
| •330 IF AN\$="Y" THEN CLOSE 2:GOSUB 1200:G | | •670 PRINT "[4"[DOWN]]"[3" "]DO YOU WANT | |
| OTO 200 | BN | TO CHANGE DATA? (Y/N)" | LC |
| •340 GOSUB 1200:DT\$=D\$:TR=2:SC=30:NC=0:NM | | •680 GOSUB 2500 | FA |
| =15 | EP | •690 IF AN\$="Y" THEN 500 | OO |
| •350 PRINT "[9" "]DATA NOT READ FROM DISK | | •700 PRINT "[DOWN][3" "]SAVE THIS DATA ON | |
| " | PH | DISK (Y/N)" | BA |
| •360 PRINT "[DOWN][11" "]DEFAULT VALUES U | | •710 GOSUB 2500 | FA |
| SED" | JG | •720 IF AN\$="Y" THEN GOSUB 1400 | KK |
| •370 PRINT "[9"[DOWN]]"[9" "]PRESS ANY KE | | •800 REM AUTO CLEANING | BB |
| Y TO CONTINUE" | LA | •805 GOSUB 1200:GOSUB 1000 | PH |
| •380 GET AN\$:IF AN\$="" THEN 380 | EJ | •810 NL=NM-NC | CM |
| •390 CLOSE 2:CLOSE 15 | BI | •815 IF NL>0 THEN 870 | HJ |
| •400 REM DISPLAY AUTO DATA | CB | •820 PRINT "[DOWN][12" "] [5"*"]WARNING[5" | |
| •410 PRINT "[CLEAR]" | HH | *"]" | LP |
| •420 PRINT "[3"[DOWN]]"[6" "]CURRENT DATE | | •825 PRINT "[DOWN][7" "]CLEANING DISK IS | |
| IS [RVSON]";D\$;"[RVSOFF]" | AN | USED UP" | LH |
| •430 PRINT "[DOWN][DOWN] LAST DATE CLEANED | | •830 PRINT "[7" "] (";NL;" CLEANINGS LEFT | |
| IS: ";DT\$ | HO | ON DISK)" | PG |
| •440 PRINT "[DOWN] CURRENT TRACK IS: ";TR | NK | •835 PRINT "[DOWN] DO YOU WANT TO CONTINU | |
| •450 PRINT "[DOWN] CURRENT CLEANING TIME | | E CLEANING? (Y/N)" | LG |
| IS (SEC): ";SC | GA | •840 GOSUB 2500 | FA |
| •460 PRINT "[DOWN] NUMBER OF TIMES DISK U | | •845 IF AN\$="Y" THEN GOSUB 1200:GOSUB 100 | |
| SED IS: ";NC | GE | 0:GOTO 870 | JC |
| •470 PRINT "[DOWN] MAXIMUM CLEANINGS PER | | •850 PRINT "[DOWN][4" "]DO YOU WANT TO CH | |
| DISK IS: ";NM | KA | ANGE DATA? (Y/N)" | II |
| •480 PRINT "[DOWN][DOWN] [RVSON]NUMBER OF | | •855 GOSUB 2500 | FA |
| CLEANINGS LEFT IS: ";NM-NC;"[RVSOFF]" | AA | •860 IF AN\$="Y" THEN 500 | OO |
| •490 PRINT "[5"[DOWN]]"[4" "]DO YOU WANT | | •865 GOTO 955 | DF |
| TO CHANGE DATA? (Y/N)" | DA | •870 GOSUB 2200:GOSUB 1200:GOSUB 1000 | FH |
| •495 GOSUB 2500:IF AN\$="N" THEN 800 | DN | •875 PRINT "[DOWN][DOWN][6" "]INSERT CLEA | |
| •500 REM CHANGE AUTO DATA | IJ | NING DISK IN DRIVE" | DA |
| •510 PRINT "[CLEAR]" | HH | •880 PRINT "[9"[DOWN]]"[5" "]PRESS ANY KE | |
| •520 PRINT "[DOWN] LAST DATE CLEANED IS " | | Y TO START CLEANING" | MA |
| ;DT\$ | AL | •885 GET AN\$:IF AN\$="" THEN 885 | FF |
| •530 PRINT " ENTER NEW DATE";:INPUT DT\$ | KH | •890 GOSUB 1200:GOSUB 1000 | PH |
| •540 PRINT "[DOWN] CURRENT TRACK IS ";TR | HK | •895 PRINT "[DOWN][DOWN][4" "] [RVSON]CLEA | |

| | | | |
|---|----|---|----|
| NING[RVSOFF]" | HE | * ";B\$ | KG |
| •900 PRINT "[DOWN][DOWN][4" "]PRESS ANY KEY TO MANUALLY STOP" | GP | •1360 CLOSE 15 | AB |
| •905 IF ET>SC THEN 920 | KP | •1370 RETURN | IM |
| •910 GOSUB 1700 | FN | •1400 REM SUBROUTINE-SAVE AUTO DATA | PH |
| •915 GET AN\$:IF AN\$="" THEN 905 | DK | •1410 GOSUB 1200:GOSUB 1000 | PH |
| •920 GOSUB 2000:GOSUB 1200:GOSUB 1000 | GF | •1420 PRINT "[DOWN][11" "]INSERT DATA DISK" | KB |
| •925 PRINT "[DOWN] UPDATE DATA DISK? (Y/N)" | OO | •1430 PRINT "[9"[DOWN]]][4" "]PRESS ANY KEY TO SAVE AUTO DATA " | PE |
| •930 GOSUB 2500 | FA | •1440 GET AN\$:IF AN\$="" THEN 1440 | GM |
| •935 IF AN\$="N" THEN 955 | LH | •1450 OPEN 15,8,15:OPEN2,8,2,"@0:CLEANDATA,S,W" | ID |
| •940 NC=NC+1:TR=TR+2:DT\$=D\$ | PH | •1460 GOSUB 1300:IF A <> 0 THEN 1500 | GH |
| •945 IF TR>35 THEN TR=1 | ID | •1470 PRINT#2,DT\$;" ";TR;" ";SC;" ";NC;" ";NM | MA |
| •950 GOSUB 1400 | FK | •1480 GOSUB 1300:IF A <> 0 THEN 1500 | GH |
| •955 PRINT "[CLEAR][DOWN][DOWN] PROGRAM ENDED":END | DK | •1490 CLOSE2:CLOSE15:RETURN | ON |
| •1000 REM SUBROUTINE-UPDATE STATUS LINE | CA | •1500 PRINT "[3"[DOWN]]][5" "]DATA NOT SAVED!" | GO |
| •1010 IF MF=1 THEN 1040 | IP | •1520 PRINT "[3"[DOWN]]][5" "]TRY AGAIN? (Y/N)" | JK |
| •1020 POKE 1266,143:POKE 1267,134:POKE 1268,134 | KP | •1530 GOSUB 2500:CLOSE 2:CLOSE 15 | LJ |
| •1030 GOTO 1050 | FN | •1540 IF AN\$="N" THEN RETURN | LF |
| •1040 POKE 1266,143:POKE 1267,142:POKE 1268,32 | BE | •1550 GOTO 1400 | FO |
| •1050 T=TR/10:IF T<1 THEN T2=-144:T1=TR:GOTO 1070 | CP | •1700 REM SUBROUTINE-MOTOR ON | EL |
| •1060 T1=INT(T):T2=TR-10*T1 | AP | •1710 IF MF=1 THEN 1730 | HF |
| •1070 POKE 1277,T1+176:POKE 1278,T2+176 | IE | •1720 Z=54272:TT=TI:FOR L=Z TO Z+24:POKE L,0:NEXT L | DE |
| •1075 S=SC/100:IF S<1 THEN S0=0:GOTO 1077 | KA | •1730 POKE Z+5,9:POKE Z+6,0:POKE Z+24,15:POKE Z+4,33 | BE |
| •1076 S0=INT(S) | IF | •1740 ET=INT((TI-TT)/60) | LE |
| •1077 SA=SC-S0*100 | EC | •1750 IF SW=1 THEN 1770 | KK |
| •1080 S=SA/10:IF S<1 THEN S2=SA:S1=0:GOTO 1100 | DI | •1760 POKE Z+1,25:POKE Z,170:SW=1:GOTO 1780 | GG |
| •1090 S1=INT(S):S2=SA-10*S1 | AN | •1770 POKE Z+1,20:POKE Z,150:SW=0 | CA |
| •1100 POKE 1287,S0+176:POKE 1288,S1+176:POKE 1289,S2+176 | OM | •1780 GOSUB 1000:POKE Z+4,32 | PO |
| •1105 E=ET/100:IF E<1 THEN E0=0:GOTO 1107 | CJ | •1790 IF MF=1 THEN RETURN | DB |
| •1106 E0=INT(E) | HB | •1800 OPEN15,8,15 | AM |
| •1107 EA=ET-E0*100 | DP | •1810 PRINT#15,"M-R"CHR\$(0)CHR\$(28) | EC |
| •1110 E=EA/10:IF E<1 THEN E2=EA:E1=0:GOTO 1130 | LF | •1820 GET#15,X\$:X=ASC(X\$+CHR\$(0)) | ME |
| •1120 E1=INT(E):E2=EA-10*E1 | KH | •1830 BI=XOR4 | IL |
| •1130 POKE 1298,E0+176:POKE 1299,E1+176:POKE 1300,E2+176 | JC | •1840 PRINT#15,"M-W"CHR\$(0)CHR\$(28)CHR\$(1)CHR\$(BI) | CE |
| •1140 RETURN | IM | •1850 MF=1:CLOSE 15 | LN |
| •1200 REM SUBROUTINE-SET UP SCREEN | HO | •1860 RETURN | IM |
| •1210 PRINT "[CLEAR][DOWN]"SPC(4)"1541 DISK DRIVE CLEANING UTILITY" | JM | •2000 REM SUBROUTINE-MOTOR OFF | JP |
| •1220 PRINT "[DOWN][DOWN] DRIVE[4" "]HEAD AT[5" "]TOTAL[5" "]ELAPSED" | FJ | •2010 Z=54272:FOR L=Z TO Z+24:POKE L,0:NEXT L | IC |
| •1230 PRINT " MOTOR[5" "]TRACK[5" "]SECONDS[4" "]SECONDS" | HE | •2020 OPEN15,8,15 | AM |
| •1240 PRINT "[3"[DOWN]]][40"[s C]]" | JN | •2030 BI=X | JK |
| •1250 RETURN | IM | •2040 PRINT#15,"M-W"CHR\$(0)CHR\$(28)CHR\$(1)CHR\$(BI) | CE |
| •1300 REM SUBROUTINE-READ ERROR CHANNEL | KI | •2050 MF=0:CLOSE 15 | KO |
| •1310 INPUT#15,A,B\$,C,D | OD | •2060 RETURN | IM |
| •1320 IF A=0 THEN RETURN | ON | •2200 REM SUBROUTINE-MOVE HEAD TO TRACK | AC |
| •1340 GOSUB 1200:GOSUB 1000 | PH | •2220 PRINT "[DOWN][8" "]INSERT ANY FORMATTED DISK" | JG |
| •1350 PRINT "[3"[DOWN]]][5" "]DISK ERROR | | •2230 PRINT "[9"[DOWN]]][8" "]PRESS ANY KEY | |

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 117 and 118 explain these codes and provide other essential information on entering **Ahoy!** programs. Refer to these pages **before** entering any programs!

```

BY TO MOVE HEAD"
•2240 GET AN$:IF AN$="" THEN 2240
•2250 OPEN 15,8,15:OPEN 2,8,2,"#"
•2260 PRINT#15,"U1 2 0";TR;"0"
•2270 GOSUB 1300
•2280 IF A=0 THEN CLOSE 2:CLOSE 15:RETURN
•2290 PRINT "[DOWN][5" "]"MOVE HEAD FAILED
"
•2300 PRINT "[DOWN][5" "]"HEAD NOT ON PROP
ER TRACK"
•2400 PRINT "[4"[DOWN]""] [8" "]"TRY AGAIN?
(Y/N)"
•2410 GOSUB 2500:CLOSE 2:CLOSE 15
•2420 IF AN$="Y" THEN GOSUB 1200:GOSUB 10
00:GOTO 2220
•2430 RETURN
•2500 REM SUBROUTINE - GET (Y/N) ANSWER
•2510 GET AN$:IF AN$="" THEN 2510
•2520 IF AN$="Y" THEN RETURN
•2530 IF AN$="N" THEN RETURN
•2540 GOTO 2510

```

```

DG C0F0: 8E AE 02 4C 00 C1 38 C9 40
HH C0F8: FA B0 05 A2 FA 8E AE 02 86
EI C100: AD 00 D0 18 6D A9 02 38 E7
GF C108: C9 18 B0 05 A2 02 8E A9 7C
FB C110: 02 8D 00 D0 AD 01 D0 18 08
EJ C118: 6D AE 02 38 C9 32 B0 05 20
JC C120: A0 02 8C AE 02 8D 01 D0 5F
C128: EE B3 02 D0 08 A9 F6 8D D3
C130: B3 02 EE AE 02 AE 04 DC 15
HF C138: 8E 26 D0 AD B2 02 85 A2 48
C140: A5 A2 D0 FC 20 B8 C1 20 11
BF C148: 92 C3 AD 15 D0 A8 29 01 05
LJ C150: F0 0B 98 29 FE D0 03 20 01
C158: 64 C5 4C 0B C0 A9 00 85 C9
LP C160: C6 20 E4 FF C9 85 D0 F9 46
IM C168: 4C 08 C0 8A 0A A8 BD B8 31
BH C170: 02 99 00 D0 BD E8 07 C8 53
IN C178: 99 00 D0 8A 48 20 97 E0 4E
OG C180: 68 AA BD E8 07 38 C9 DB 1F
LF C188: 90 16 BD B8 02 38 C9 98 42
FL C190: 90 03 4C 9A C1 38 C9 66 35
C198: B0 06 20 84 C2 4C B7 C1 7C
C1A0: A5 8D 10 0B BD A9 02 49 A1
C1A8: FF 9D A9 02 4C B7 C1 BD 75
C1B0: AE 02 49 FF 9D AE 02 60 59
C1B8: AD 11 D0 10 FB AE AD 02 B2
C1C0: BD 4B C6 2D 1F D0 F0 03 A1
C1C8: 20 6B C1 20 10 C3 B9 00 C3
C1D0: D0 9D B8 02 C8 B9 00 D0 4D
C1D8: 9D E8 07 88 8A 48 98 48 A2
C1E0: 20 97 E0 68 A8 68 AA A5 43
C1E8: 8D 30 12 BD B8 02 38 CD 37
C1F0: B8 02 B0 06 FE A9 02 4C 59
C1F8: FD C1 DE A9 02 BD E8 07 F0
C200: 38 CD E8 07 B0 06 FE AE 5A
C208: 02 4C 0F C2 DE AE 02 BD 75
C210: A9 02 10 0D 38 C9 FC B0 88
C218: 12 A9 FC 9D A9 02 4C 2B 91
C220: C2 38 C9 03 90 05 A9 03 2A
C228: 9D A9 02 BD AE 02 10 0D FC
C230: 38 C9 FC B0 12 A9 FC 9D 36
C238: AE 02 4C 47 C2 38 C9 03 44
C240: 90 05 A9 03 9D AE 02 B9 8A
C248: 00 D0 18 7D A9 02 99 00 F3
C250: D0 C8 B9 00 D0 18 7D AE B8
C258: 02 99 00 D0 BD B8 02 38 75
C260: C9 18 B0 05 A9 02 9D A9 EA
C268: 02 BD E8 07 38 C9 32 B0 FC
C270: 05 A9 02 9D AE 02 E8 8E E6
C278: AD 02 E0 04 D0 05 A9 01 8D
C280: 8D AD 02 60 A0 18 A9 00 80
C288: 99 00 D4 88 10 FA A9 F0 25
C290: 8D 06 D4 A9 0F 8D 18 D4 2C
C298: A9 81 8D 04 D4 A9 0F 9D 80
C2A0: F8 07 A0 14 AD 04 DC 9D 81
C2A8: 27 D0 A9 0A 8D 01 D4 A9 61

```

GRAVINAUTS*

FROM PAGE 32

Starting address in hex: C000 SYS to Start: 49152

Ending address in hex: C83A

```

C000: A9 00 8D EE 07 8D EF 07 B1
C008: 20 FD C3 AD 11 D0 10 FB 85
C010: AD 1F D0 29 01 F0 05 A2 70
C018: 00 20 6B C1 AD 00 D0 8D 71
C020: B8 02 AD 01 D0 8D E8 07 D7
C028: AD 00 DC 29 1D A8 29 10 DA
C030: F0 0D A2 0B 8E F8 07 A9 14
C038: 80 8D 0B D4 4C 63 C0 A2 39
C040: 0D 8E F8 07 AD E8 07 8D 07
C048: 08 D4 A9 14 8D 07 D4 A9 F5
C050: 00 8D 0C D4 A9 F0 8D 0D F3
C058: D4 A9 81 8D 0B D4 A9 04 73
C060: 8D 18 D4 98 CD B5 02 F0 E9
C068: 05 A2 FE 8E B4 02 C9 09 27
C070: D0 1A EE B4 02 D0 15 CE B5
C078: A9 02 CE AE 02 CE EC 07 66
C080: D0 05 A2 00 20 84 C2 A2 03
C088: FE 8E B4 02 C9 05 D0 1A 86
C090: EE B4 02 D0 15 EE A9 02 B6
C098: CE AE 02 CE EC 07 D0 05 B0
C0A0: A2 00 20 84 C2 A2 FE 8E DA
C0A8: B4 02 C9 0D D0 17 EE B4 C1
C0B0: 02 D0 12 CE AE 02 CE EC D0
C0B8: 07 D0 05 A2 00 20 84 C2 9F
C0C0: A2 FE 8E B4 02 8D B5 02 EC
C0C8: AD A9 02 30 0D 38 C9 05 66
C0D0: 90 12 A2 05 8E A9 02 4C A1
C0D8: E4 C0 38 C9 FA B0 05 A2 D3
C0E0: FA 8E A9 02 AD AE 02 30 A4
C0E8: 0D 38 C9 05 90 12 A2 05 47

```

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C100: 00 00 00 00 00 00 00 00
C108: 00 00 00 00 00 00 00 00
C110: 00 00 00 00 00 00 00 00
C118: 00 00 00 00 00 00 00 00
C120: 00 00 00 00 00 00 00 00
C128: 00 00 00 00 00 00 00 00
C130: 00 00 00 00 00 00 00 00
C138: 00 00 00 00 00 00 00 00
C140: 00 00 00 00 00 00 00 00
C148: 00 00 00 00 00 00 00 00
C150: 00 00 00 00 00 00 00 00
C158: 00 00 00 00 00 00 00 00
C160: 00 00 00 00 00 00 00 00
C168: 00 00 00 00 00 00 00 00
C170: 00 00 00 00 00 00 00 00
C178: 00 00 00 00 00 00 00 00
C180: 00 00 00 00 00 00 00 00
C188: 00 00 00 00 00 00 00 00
C190: 00 00 00 00 00 00 00 00
C198: 00 00 00 00 00 00 00 00
C1A0: 00 00 00 00 00 00 00 00
C1A8: 00 00 00 00 00 00 00 00
C1B0: 00 00 00 00 00 00 00 00
C1B8: 00 00 00 00 00 00 00 00
C1C0: 00 00 00 00 00 00 00 00
C1C8: 00 00 00 00 00 00 00 00
C1D0: 00 00 00 00 00 00 00 00
C1D8: 00 00 00 00 00 00 00 00
C1E0: 00 00 00 00 00 00 00 00
C1E8: 00 00 00 00 00 00 00 00
C1F0: 00 00 00 00 00 00 00 00
C1F8: 00 00 00 00 00 00 00 00
C200: 00 00 00 00 00 00 00 00
C208: 00 00 00 00 00 00 00 00
C210: 00 00 00 00 00 00 00 00
C218: 00 00 00 00 00 00 00 00
C220: 00 00 00 00 00 00 00 00
C228: 00 00 00 00 00 00 00 00
C230: 00 00 00 00 00 00 00 00
C238: 00 00 00 00 00 00 00 00
C240: 00 00 00 00 00 00 00 00
C248: 00 00 00 00 00 00 00 00
C250: 00 00 00 00 00 00 00 00
C258: 00 00 00 00 00 00 00 00
C260: 00 00 00 00 00 00 00 00
C268: 00 00 00 00 00 00 00 00
C270: 00 00 00 00 00 00 00 00
C278: 00 00 00 00 00 00 00 00
C280: 00 00 00 00 00 00 00 00
C288: 00 00 00 00 00 00 00 00
C290: 00 00 00 00 00 00 00 00
C298: 00 00 00 00 00 00 00 00
C2A0: 00 00 00 00 00 00 00 00
C2A8: 00 00 00 00 00 00 00 00

```

C2B0: FE 85 A2 A5 A2 D0 FC AD 9B
 C2B8: 04 DC 8D 25 D0 A9 01 8D 55
 C2C0: 00 D4 A9 FE 85 A2 A5 A2 AE
 C2C8: D0 FC AD 04 DC 8D 26 D0 A9
 C2D0: 98 8D 18 D4 A9 FE 85 A2 B4
 C2D8: A5 A2 D0 FC 88 D0 C5 8C 9A
 C2E0: 25 D0 8C 18 D4 A9 80 8D 08
 C2E8: 04 D4 BD 4B C6 49 FF 2D 08
 C2F0: 15 D0 8D 15 D0 E0 00 F0 1C
 C2F8: 0E AD A7 02 18 69 FA 8D 68
 C300: A7 02 90 03 EE A8 02 AD 84
 C308: 1E D0 A9 0D 9D F8 07 60 AB
 C310: AD 11 D0 10 FB AD 1E D0 48
 C318: 8D B6 02 8E B7 02 A2 03 4C
 C320: BD 4B C6 48 2D B6 02 F0 0F
 C328: 03 20 6B C1 68 A8 C8 98 EA
 C330: CD B6 02 D0 1D BD E8 07 52
 C338: 38 CD E8 07 08 20 6B C1 83
 C340: 28 90 06 20 84 C2 4C 52 05
 C348: C3 8A 48 A2 00 20 84 C2 E8
 C350: 68 AA CA 10 CB A2 07 BD 71
 C358: 4B C6 A8 C8 98 CD B6 02 FA
 C360: D0 24 A9 07 9D 27 D0 20 BB
 C368: FC C5 BD 4B C6 49 FF 2D 71
 C370: 15 D0 8D 15 D0 AD EC 07 6B
 C378: 18 7D 4F C6 8D EC 07 90 36
 C380: 05 A9 FF 8D EC 07 CA E0 5C
 C388: 03 D0 CC AE B7 02 8A 0A 26
 C390: A8 60 AD A8 02 38 CD EE E6
 C398: 07 F0 04 90 19 B0 0B AD A7
 C3A0: A7 02 38 CD EF 07 F0 02 3A
 C3A8: 90 0C AD A8 02 8D EE 07 21
 C3B0: AD A7 02 8D EF 07 A2 04 33
 C3B8: A0 20 18 20 F0 FF A9 9F EB
 C3C0: 20 D2 FF AD EE 07 AE EF F5
 C3C8: 07 20 CD BD A9 05 20 D2 1D
 C3D0: FF A2 0A A0 20 18 20 F0 67
 C3D8: FF AD A8 02 AE A7 02 20 A9
 C3E0: CD BD A2 12 A0 20 18 20 1A
 C3E8: F0 FF A9 00 AE EC 07 20 46
 C3F0: CD BD A9 20 20 D2 FF A9 E2
 C3F8: 20 20 D2 FF 60 A9 0B 8D AE
 C400: 20 D0 AD 11 D0 29 EF 8D 27
 C408: 11 D0 A9 93 20 D2 FF A2 BC
 C410: 03 A0 07 18 20 F0 FF A2 86
 C418: 00 BD CD C6 20 D2 FF E8 46
 C420: E0 19 D0 F5 A2 07 A0 10 3B
 C428: 18 20 F0 FF A2 00 BD 57 09
 C430: C6 20 D2 FF E8 E0 4A D0 CE
 C438: F5 A2 0F A0 09 18 20 F0 B2
 C440: FF A2 00 BD A1 C6 20 D2 FB
 C448: FF E8 E0 2C D0 F5 A2 11 B8
 C450: A0 16 18 20 F0 FF A2 00 D2
 C458: BD CD C6 20 D2 FF E8 E0 67
 C460: 19 D0 F5 A2 18 A0 00 18 B3
 C468: 20 F0 FF A2 00 8E ED 07 9F
 C470: BD E6 C6 20 D2 FF E8 E0 98
 C478: 24 D0 F5 A2 00 A0 1D 8A 4E

C480: 48 98 48 18 20 F0 FF A9 7C
 C488: DA 20 D2 FF 68 A8 68 AA 7A
 C490: E8 E0 19 D0 EA A2 00 A0 72
 C498: 1E 8A 48 98 48 18 20 F0 93
 C4A0: FF 20 F7 C4 68 A8 68 AA A1
 C4A8: E8 E0 18 D0 EC A2 02 A0 8D
 C4B0: 1E 18 20 F0 FF A2 00 BD 58
 C4B8: 16 C7 20 D2 FF E8 E0 0C 5F
 C4C0: D0 F5 A2 08 A0 1E 18 20 29
 C4C8: F0 FF A2 00 BD 22 C7 20 24
 C4D0: D2 FF E8 E0 0C D0 F5 A2 E2
 C4D8: 10 A0 1E 18 20 F0 FF A2 73
 C4E0: 00 BD 2E C7 20 D2 FF E8 70
 C4E8: E0 0C D0 F5 AD 11 D0 09 35
 C4F0: 10 8D 11 D0 4C 05 C5 A2 2A
 C4F8: 00 BD 0A C7 20 D2 FF E8 64
 C500: E0 0C D0 F5 60 A9 00 8D 4B
 C508: 25 D0 8D A8 02 8D A7 02 6D
 C510: A2 0B 8E F8 07 A2 01 8E 7E
 C518: AD 02 8E 86 02 A9 0D 9D 33
 C520: F8 07 E8 E0 04 D0 F6 A9 5F
 C528: 0E 9D F8 07 E8 E0 08 D0 76
 C530: F6 A9 FF 8D 1C D0 A2 00 ED
 C538: BD 3A C7 9D C0 02 BD 7A 90
 C540: C7 9D 40 03 BD FA C7 9D 07
 C548: 80 03 BD BA C7 9D C0 03 6D
 C550: E8 E0 40 D0 E3 A9 F9 8D 40
 C558: B2 02 A9 32 8D EC 07 A9 14
 C560: F6 8D B3 02 A9 00 8D AE 80
 C568: 02 8D A9 02 A9 B3 8D 08 96
 C570: D0 A9 AF 8D 09 D0 A9 A0 4C
 C578: 8D 0B D0 A9 A5 8D 0C D0 9B
 C580: A9 42 8D 0E D0 A9 3F 8D 4F
 C588: 0F D0 A9 41 8D 0A D0 A9 65
 C590: 5F 8D 0D D0 A9 14 8D 03 A9
 C598: D0 8D 05 D0 8D 07 D0 A9 DB
 C5A0: 46 8D 02 D0 A9 82 8D 04 05
 C5A8: D0 A9 BE 8D 06 D0 A9 01 F0
 C5B0: 8D 2B D0 A9 0B 8D 2C D0 79
 C5B8: A9 0C 8D 2D D0 8D 2E D0 86
 C5C0: A9 0E 8D 28 D0 8D 29 D0 86
 C5C8: 8D 2A D0 A9 7E 8D 00 D0 D7
 C5D0: A9 DF 8D 01 D0 A9 0F 8D FF
 C5D8: 27 D0 A9 FF 8D 15 D0 AD 9B
 C5E0: 1E D0 AD 1F D0 AD B2 02 CF
 C5E8: C9 FF F0 0F EE B2 02 EE 45
 C5F0: ED 07 AC ED 07 B9 44 C6 4C
 C5F8: 8D 21 D0 60 48 8A 48 98 8C
 C600: 48 A0 18 A9 00 99 00 D4 19
 C608: 88 10 FA A9 0A 8D 03 D4 B4
 C610: A9 C8 8D 02 D4 8E 01 D4 4B
 C618: 8A 0A 8D 00 D4 A9 F0 8D 37
 C620: 06 D4 A9 41 8D 04 D4 A9 F5
 C628: 0F 8D 18 D4 A9 FA 85 A2 7E
 C630: A5 A2 D0 FC A9 00 8D 18 95
 C638: D4 A9 40 8D 04 D4 68 A8 6E
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 C698: A9 A9 11 9D 9D 9D 9D DF 53
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 C6A8: 9D 9D A9 20 20 20 20 20 2E
 C6B0: 20 20 DF 11 9D 9D 9D 9D 58
 C6B8: 9D 9D 9D 9D 92 DF DF 12 93
 C6C0: 20 20 20 20 92 A9 11 9D 2C
 C6C8: 9D 9D 9D DF A9 9F 12 A9 86
 C6D0: 11 9D 9D 9D 9D A9 20 20 42
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 C6E0: 9D 92 DF DF A9 A9 12 1C 52
 C6E8: DC DC DC DC DC DC DC DC CF
 C6F0: DC DC DC 90 AB 92 A2 AF A8
 C6F8: AF AF A2 12 B3 1C DC DC 96
 C700: DC DC DC DC DC DC DC DC E6
 C708: DC 90 12 90 DB DB DB DB 87
 C710: DB DB DB DB DB DB 05 47 83
 C718: 52 41 56 49 4E 41 55 54 84
 C720: 53 9F 05 20 20 53 43 4F 3E
 C728: 52 45 20 20 20 9F 05 20 E4
 C730: 20 46 20 55 20 45 20 4C DD
 C738: 20 9F 00 28 00 00 55 00 75
 C740: 00 96 00 01 96 40 01 AA 5A

C748: 40 09 AA 60 0A 69 A0 08 B8
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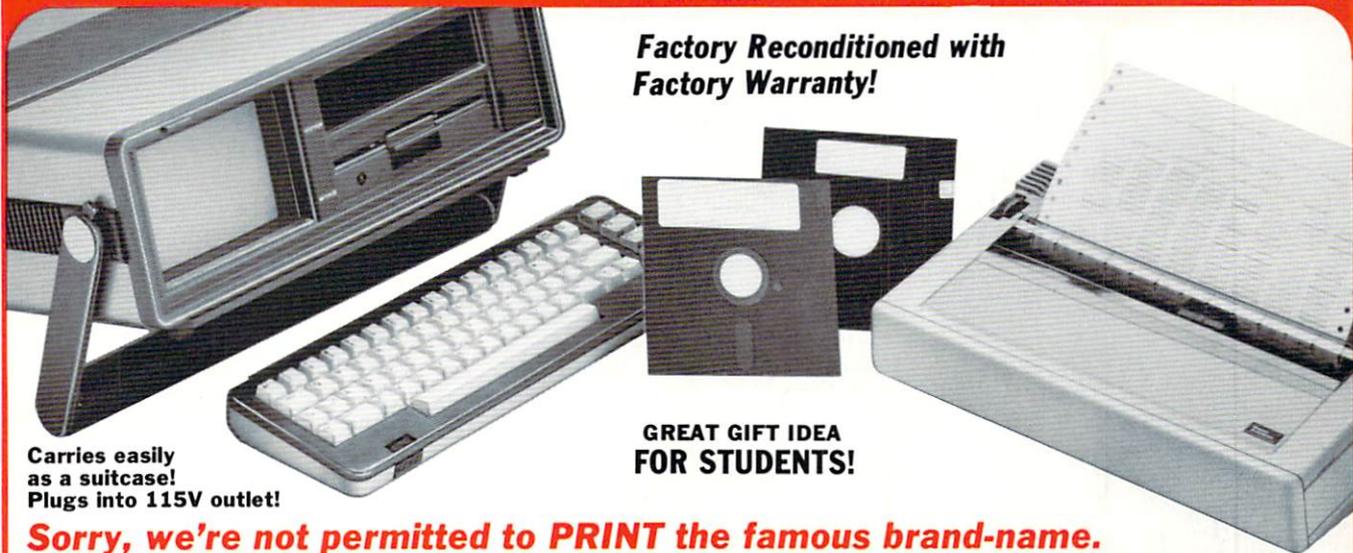
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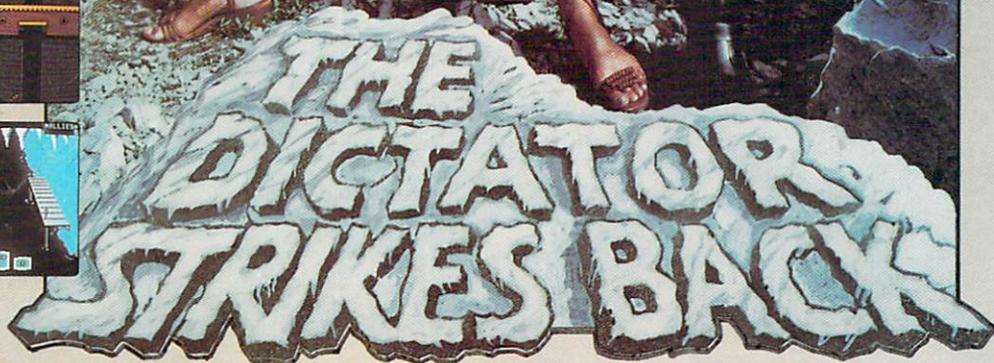
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