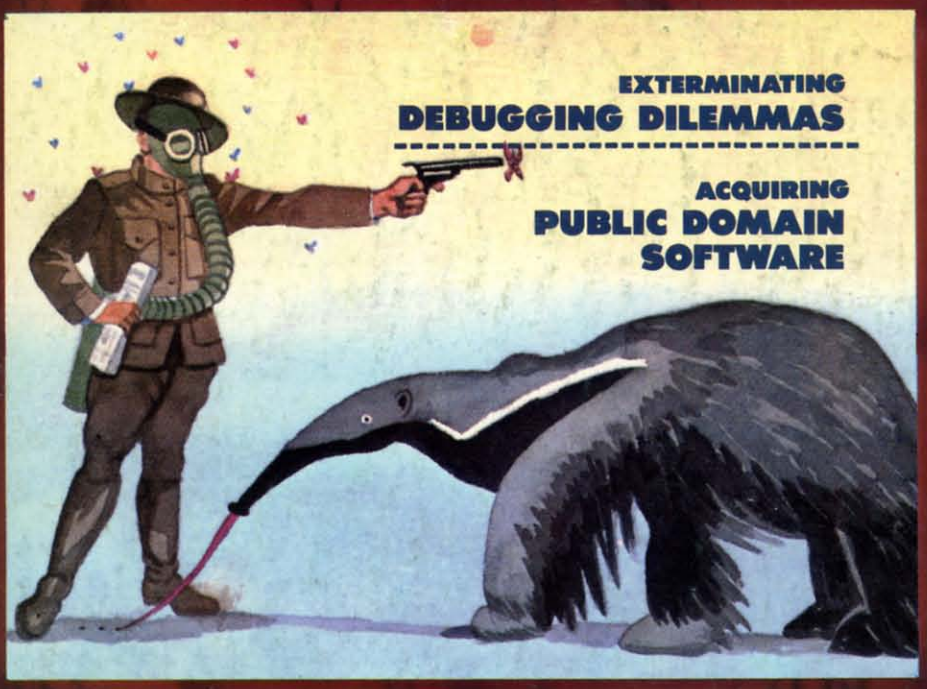
COMMODORE USERS

48355

Ahoy!

$2.75/ CAN. $3.25 JUNE 1986

. . . THE NUMBER ONE COMMODORE RESOURCE . . .



EXTERMINATING
DEBUGGING DILEMMAS

ACQUIRING
PUBLIC DOMAIN SOFTWARE

LAZYBASIC
FOR SHIFTLESS TYPISTS

TRACKDOWN
AUTOMATIC VIC AND 64 SEARCHES

GAMES GALORE!
- STAR STRIKE
- SHAKER
- QUEEN'S AND BISHOP'S TOURS
- GOT A MATCH?



HOW TO WIN AT ULTIMA

PLUS 5 GAME REVIEWS

PLUS
- PROGRAMMING TIPS
- ASSEMBLY LANGUAGE
- COMMODARES
- ART GALLERY

AND MORE

CAD FOR THE 64
FOUR REVIEWS





0 71896 48355 06

Now, a "Sidekick"
for your Commodore 64!

HIDDEN ASSETS



HIDDEN ASSETS makes the C-64 respond to your every thought. Just like Sidekick™, the most popular IBM/PC software in history, HIDDEN ASSETS puts many powerful utilities at your fingertips. HIDDEN ASSETS is totally transparent, so it responds instantly to your command — almost as an extension of your very thoughts!

Whenever you need to make a note, find a phone number, or remember an appointment, HIDDEN ASSETS responds immediately . . . no matter what program's in your computer. Need to schedule a meeting, or do a calculation? HIDDEN ASSETS is at your service! And it has a high-resolution screen dump, with on-line programming utilities and disk utilities!

At your command, HIDDEN ASSETS returns to the computer's main program, exactly where you left off.

The Wizards from the Land of Oz have done it again!

CARDCO, Inc. / 300 S. Topeka / Wichita, KS 67202

Sidekick is a registered trademark of Borland International, Inc.

Reader Service No. 258

Ahoy!

CONTENTS

DEPARTMENTS

A View from the Bridge...*of the June issue of* Ahoy! 7

Scuttlebutt...*banks float Commodore a $135 million loan.* 8

Errata...*the key to keying in* Hidden Cavern *and* Air Rescue. 24

Art Gallery...*so good we should charge admission.* 32

S.O.S....*how to dump VIC 20 cartridges to disk.* 35

Tips Ahoy!...*premium rates paid for programming gems!* 36

Reviews...*an introduction to Computer Aided Design.* 57

Commodares...*for programming experts, and those who want to be.* 71

Program Listings...*the best software between two covers.* 83

FEATURES

Rupert Report: Debugging Dilemmas *by Dale Rupert* 20

Entertainment Software Section *(contents on page 47)* 47

Commodore Roots: Now Hear This *by Mark Andrews** 67

Cadet's Column: Public Domain Software *by Cheryl Peterson* 77

*Includes program: MUSIC.S (for the C-64)

PROGRAMS

LazyBASIC *for the C-64 by Michael Bennett* 26

Got A Match? *for the C-64 by Walter E. Meyers* 30

Star Strike *for the C-64 by Bob Eaton* 34

Queen's and Bishop's Tours *for the C-128 by Daniel L. Miller* 41

Shaker *for the C-64 by John Fedor* 45

Trackdown *for the C-64 and VIC 20 by Buck Childress* 80

Bug Repellents *for the 64 and 128 by Kleinert and Barron* 84

Flankspeed *for the C-64 by Gordon F. Wheat* 85

Cover art by James Regan and Amanda Wilson

Publisher
Michael Schneider

Editor
David Allikas

Art Director
JoAnn Case

Managing Editor
Michael R. Davila

Senior Editor
Tim Moriarty

Technical Editors
David Barron
Bob Lloret

Assistant Editor
Tim Little

Consulting Editors
Ben Bova
Morton Kevelson
Dale Rupert

Entertainment Editor
Arnie Katz

Production Director
Laura Pallini

Art Production
Christopher Carter
Mark Kammerer
Victoria Green

Bulletin Board SYSOP
B.W. Behling

Circulation Director
W. Charles Squires

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. 30 JUNE 1986

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 $21.95, 24 issues for $41.75 (Canada $29.25 and $54.25 respectively). Second class postage paid at New York, NY 10001 and additional mailing offices.

© 1986 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.

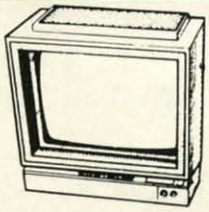
COMPUTER CENTERS OF AMERICA

Means Low Distributor Selection of Computer

commodore



commodore
128
PERSONAL COMPUTER
$259.95
•Including: Shipping, Handling and Insurance—No Extra Charges



commodore
1902 MONITOR
CALL FOR PRICE

WICO JOYSTICKS

The Boss $12.88
3-Way $19.88
AND MORE!

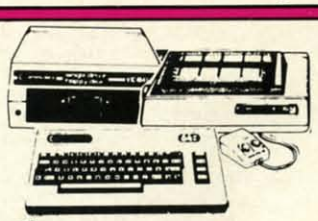
JOYSTICKS

GIM Professional Joystick
•2 Fire Buttons •Contoured Handle
•Lifetime Guarantee •Comparable to 3-Way
$9.95

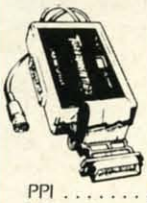




commodore
1571 DISC DRIVE
$249.95
•Including: Shipping, Handling and Insurance—No Extra Charges

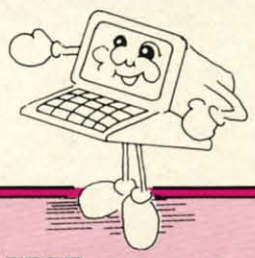


commodore
64c PACKAGE
INCLUDES:
•Commodore 64 Computer
•Commodore 1541 Disc Drive
• A Color Monitor with Cables
CALL FOR PRICE



INTERFACES

Teleys Turbopoint GT Prints Enhanced Graphics	$59.95
Cardco G +	Call for Price
Microworld	Call for Price
PPI	$44.95
Xelec - Super Graphics Sr.	$69.95
Xelec - Super Graphics Jr.	$49.95

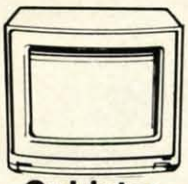


PRINTER SPECIALS FROM CCA

STAR POWER TYPE
•Letter Quality
•18 CPS
•13" Carriage with Comm. Interface.
$259.95
BEST BUY SPECIAL

GEMINI STAR 10X
$149

commodore
1670 MODEM
• 1200 Baud
$159.95



Goldstar
13" COLOR COMPOSITE MONITOR
•Cables included •1 Yr. Mfr. Warranty
$124.95

CMS FOR 128 Commodore PERSONAL COMPUTER SPREAD SHEET BOOK PACKAGE
$139.95



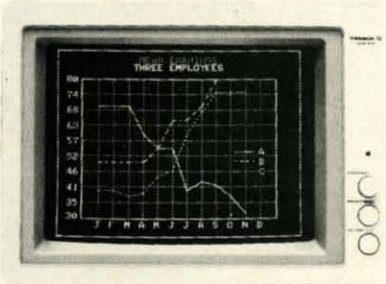
IN NEW YORK STATE CALL TOLL FREE
1-800-221-2760 or 516-349-1020
OR WRITE: COMPUTER CENTERS OF AMERICA,
81 TERMINAL DRIVE, PLAINVIEW, NY 11803
Reader Service No. 255

1-800-631-1003
1-800-548-0009

Prices On A Vast Accessories



14" COLOR RGB MONITOR
THOMSON
A sight for sore eyes.



RGB AND COLOR COMPOSITE
$249.95
SPECIAL INTRODUCTORY PRICE

SP-1000
- Built-in Commodore Interface
- 2-Year Warranty
- Near Letter Quality Mode



$189.95
SEIKOSHA

LIMITED TIME ONLY
SPECIAL INTRODUCTORY PRICE

COSMI
WHERE THE ACTION IS!
For Commodore 64/128
TALLADEGA
FORBIDDEN FOREST
$12.95
DELIVERED PRICE

SUPER HUEY



DISKETTES



Nashua	$8.95
Scotch	$11.95
Maxell	$11.95
Memorex	$8.95*
BASF	$8.95

*After $3 Rebate

Paperback Writer 128



Professional Word Processor for the Commodore 128
$24.95

MEMOREX SPECIAL WORK STATION



Regular Price 29.95
Factory Rebate 5.00
YOUR COST **$24.95**
•20 Disks •Disk Case

EPYX
BUSINESS SOFTWARE FOR 128 COMMODORE COMPUTER

39.95 MICROSOFT MULTI PLANNER
29.95 PROGRAMMER'S BASIC TOOL KIT

CALL FOR PRICES

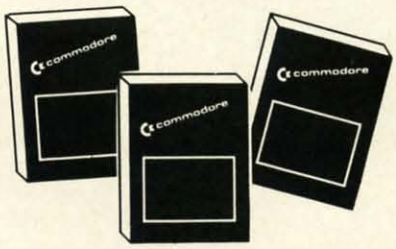
EPYX
YOUR CHOICE



$24.95

Kronis Rift - Lucas Games	Temple of Asphai
Eidolon - Lucas Games	Trilogy
Ballblazer - Lucas Games	Jet Combat
Rescue Fractalus - Lucas Games	Simulator
Fastload	GI Joe
Wintergames	Summer Games I or II
Hot Wheels	Barbie
	Baseball

commodore



Assembler D	$27.95
Easy Finance I, II, III, IV-D	$19.95
Easy Calc-D	$64.95
Easy Script-D	$39.95
Easy Spell-D	$19.95
Logo-D	$49.95
The Manager-D	$37.95
General Ledger	$37.95
Accts. Rec.-D	$37.95
Accts. Pay -D	$37.95
Magic Desk-D	$52.95
Silent Butler	$24.95
Sky Travel	$27.00

PROFESSIONAL
Fleet System 2
The Largest Spell Checker Available For Your Computer
90,000 Words on C-64/128
70,000 Words on Atari
$59.95

Fleet System 3 NEW
FOR COMMODORE 128
$64.95

penguin software™



Quest	$19.99
Transylvania	$19.99
Sword of Kadash	$19.99
Zyphus	$19.99
Graphics Magician Picture Painter	$21.99

WE'RE PROUD OF OUR PRICES— SATISFACTION GUARANTEED **1-800-548-0009**

Check, Money Order, MC or VISA accepted. No additional charge for MasterCard and Visa. Call for shipping and handling information / NYS residents add applicable sales tax / Prices and availability are subject to change without notice / All factory fresh merchandise with manufacturer's warranty. Dealers Welcome. Call for recent price reductions and new rebate information. Plus shipping and handling. No returns without return authorization number.

COMPUTER
COMPUTER CENTERS OF AMERICA
81 TERMINAL DRIVE,
PLAINVIEW, NY 11803

CSM Software, Inc.

(219) 663-4335

P.O. BOX 563, CROWN POINT, IN 46307

Shipping - $3.50 most items
(Foreign shipping extra)

Visa & MasterCard Accepted
Dealer Inquiries Invited

SNAPSHOT 64

SNAPSHOT 64 is a unique and exciting utility that virtually takes a picture of your computer's memory. SNAPSHOT 64 then saves that 'snapshot' to disk and automatically creates an auto-boot loader for the program. Once saved to disk the program may be restarted at the exact same point at which it was interrupted!!!

MOST EFFECTIVE UTILITY OF ITS KIND - EVEN MORE EFFECTIVE THAN THOSE UTILITIES THAT CLAIM TO "COPY ALL MEMORY-RESIDENT SOFTWARE"

INVISIBLE TO SOFTWARE - CANNOT BE DETECTED

SNAPSHOT FILES RUN BY THEMSELVES - THE BACKUP COPY WILL RUN AS-IS, WITHOUT THE SNAPSHOT CARTRIDGE

WORKS MUCH FASTER THAN OTHER SIMILAR UTILITIES

EASY TO USE - NO COMPLICATED INSTRUCTIONS - EVEN A CHILD CAN DO IT

SNAPSHOT FILES ARE COMPATIBLE WITH FAST LOAD UTILITIES

SNAPSHOT FILES WILL LOAD FROM ALL COMMODORE COMPATIBLE DISK DRIVES

STORE MANY DIFFERENT SNAPSHOTed FILES ON A SINGLE DISK

FULLY SELF-CONTAINED ON CARTRIDGE - NO DISK TO HASSLE WITH

COMPLETE AND THOROUGH MANUAL IS INCLUDED

COMPATIBLE WITH C64 & C128 (IN C64 MODE)

SOLD FOR ARCHIVAL PURPOSES ONLY

$49.95 plus shipping

EPROM PROGRAMMERS HANDBOOK

The EPROM PROGRAMMERS HANDBOOK was written with the average user in mind. Important concepts are covered in a readable, informative manner. But the HANDBOOK is much more than theory. Many useful programs are included on the accompanying diskette. Topics include:

PROGRAMMING EPROMS - EXAMPLES AND TIPS
CARTRIDGE TYPES - ALL STANDARD TYPES COVERED
PROTECTING CARTRIDGES - MANY VALUABLE TECHNIQUES
C128 CARTRIDGES - THEORY PLUS EXAMPLE
MENU MAKER - PUT 10 PROGRAMS ON A CARTRIDGE WITH MENU
MODIFYING THE KERNAL - ADD THE DOS WEDGE AND MORE
MODIFYING THE DOS - ADD COMMANDS, DISABLE "BUMP"
APPENDICES AND DATA SHEETS - USEFUL TABLES

OVER 150 PAGES - DISKETTE INCLUDED

Only $32.95 plus shipping

PROMENADE EPROM PROGRAMMER

$99.50 plus shipping

We have a full line of EPROMS and cartridge supplies

Reader Service No. 256

1541 DISK DRIVE ALIGNMENT PROGRAM VERSION 2.0

Still the best! No special tools or knowledge are required to properly align the 1541 disk drive (although average mechanical ability is required). Thousands already in use!

See the review in the Oct. 1984 *Compute!'s Gazette*. Also reviewed in *Ahoy* and *Run*.

$44.95 plus shipping

Updates available to prior purchasers

$20.00 plus shipping

THE SOURCE GENERATOR

The Source Generator is an advanced programming utility that will produce code from programs in memory or directly from a disk. Imagine being able to take any ML program and convert it to true source code, complete with lables and cross reference table.

DISASSEMBLES ALL UNDOCUMENTED OPCODES
DISASSEMBLES 6502, 6510, 65C02, 6511 & 8502 OPCODES
HANDLES EXTENDED ZERO PAGE ADDRESSING PROPERLY
PRODUCES FILES COMPATIBLE WITH CBM, PAL AND MAE ASSEMBLERS
ALLOWS USER TO DEFINE LABELS AND SYMBOL TABLE OR USE STANDARD KERNAL LABELS
WORKS FROM DISK OR MEMORY
NOT COPY PROTECTED
DESIGNED FOR SERIOUS USERS
A TRUE SYMBOLIC DISASSEMBLER WRITTEN IN ML
FAST AND EASY TO USE, NO COMPLICATED INSTRUCTIONS
COMPATIBLE WITH DOS WEDGE AND MOST ML MONITORS

$34.95 plus shipping

PROGRAM PROTECTION MANUAL FOR THE C-64 VOLUME I

This is the original protection manual. Covers bad blocks, BASIC and ML protection schemes, reset and cartridge switches and much more. Program disk is included, with many helpful programs. If you are just getting into program protection, this volume is required reading!!

$29.95 plus shipping

PROGRAM PROTECTION MANUAL FOR THE C-64 VOLUME II

Not just a third edition — a new and up-to-date manual covering the latest advances in program protection. Over 275 pages of valuable information. The most advanced manual written on program protection for the C-64. A disk is included to help explain the concepts.

$34.95 plus shipping

CARTRIDGE BACKER II

Just updated! New auto-parameter version archives many more cartridges and disks. Saves cartridges to disk with an autoboot. Cartridge backups run AS-IS — NO EXTERNAL BOARD OR CARTRIDGE REQUIRED TO RUN THE BACKUP!

$54.95 plus shipping

Updates for all prior purchasers

$14.00 plus shipping

VIEW FROM THE BRIDGE

We hate to waste space, as is evidenced by our custom of cramming every page of *Ahoy!* fuller than a Libyan lifeboat. But our monthly disks, alas, usually ship half empty. Not this month, though! The COMAL Users Group has allowed us to fill the disk space left over by our usual lineup of programs with some of their best short COMAL programs—including games, a graphics utility, a sprite animator, a turtle graphics tutor, and the operating system needed to run these and the programs included in COMAL's ads in each issue of *Ahoy!* In this way, Len Lindsay and his fellow apostles of the COMAL creed get to introduce you to their language, and you get more working programs for your money. Details on ordering the *Ahoy!* disk can be found on page 38.

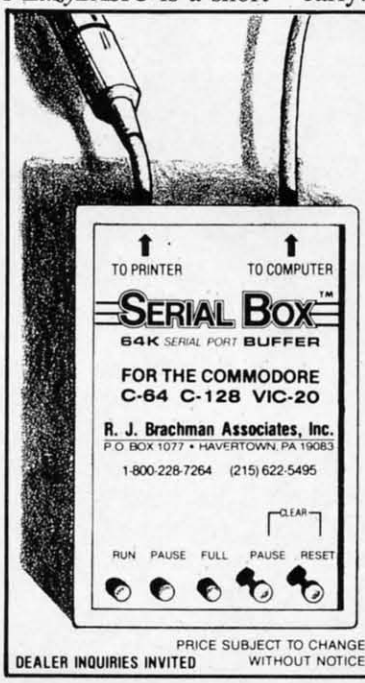
As for the BASIC and ML programs found both on our monthly disk and in the magazine:

- Never have *Ahoy!'s* editors been so close to unanimous in agreement. But nearly everyone from the publisher to the guys at the disk duplication service agrees that *Star Strike* is the best all-around game ever to grace these pages! You'll understand why Bob Eaton took over a year to program this outer space arcade game. (Turn to page 34.)
- *Got A Match?* strikes that rare balance between entertainment and education, melding the two to the detriment of neither. (Turn to page 30.)
- An issue of *Ahoy!* without a Buck Childress utility? Don't even suggest it! *Trackdown* allows C-64 and VIC 20 users to automatically search their programs for any character or combination of characters. (Turn to page 80.)
- But Buck's position as *Ahoy!'s* ace utilitarian may be in danger! Michael Bennett's *LazyBASIC* is a shorthand program so useful that the most slothful among you will run, not shuffle to your 64's to type it in! (Turn to page 26.)
- There's no sense in losing your week's pay playing the old 'shell game' on the street corner ...not when *Shaker* will clean your clock for nothing! (Turn to page 45.)
- If chess baffles you, why not tackle the game a piece at a time? Like *The Knight's Tour* in November, *Queen's and Bishop's Tours* challenges you to cover the board with each piece, ending on the same square where you began. (Turn to page 41.)
- As always, we're more than just the best programs available on a magazine rack. Much of this month's "more" is provided, as usual, by Morton Kevelson, who has undertaken an ambitious introduction to Computer Aided Design (CAD) on the C-64, incorporating reviews of *CAD-PAK-64, Flexidraw 5.0, CAD GEM,* and *CAD-3D.* (Turn to page 57.)
- Dale Rupert eases C-128 users over potential *Debugging Dilemmas* with a rundown on the troubleshooting features incorporated into BASIC 7.0. (Turn to page 20.)
- Cheryl Peterson's *Cadet's Column* treats a topic of certain interest to beginners and experts alike—how to acquire public domain software. (Turn to page 77.)
- Included in this month's *Entertainment Software Section* is a guide to succeeding at one of the most popular series of games ever to perplex a C-64 owner: *Ultima*. Additionally, we provide an introduction to statistical baseball games, as well as reviews of *The Bard's Tale, Hero of the Golden Talisman, Quake Minus One, The Goonies,* and *Sword of Kadash.* (Turn to page 47.)
- Mark Andrews concludes his two-part *Commodore Roots* series on programming the SID chip in assembly language. Next month, the author of *C-64/128 Assembly Language Programming* (Howard W. Sams & Co.) shifts into C-128 mode! (Turn to page 67.)

Also inside is our *Art Gallery* of reader-rendered computer graphics; *Tips Ahoy!*, wherein we pick the brains of the best programmers and hardware hackers in our reading audience; *Commodares*, programming puzzlers known to drive many a man to drink; and more.

Next month will see the publication of the hardware portion of our long-awaited review of the Amiga (do we have to *tell* you by whom?). Line up at your newsstand early!

—David Allikas



PRICE SUBJECT TO CHANGE WITHOUT NOTICE

DEALER INQUIRIES INVITED

SERIAL BOX

is an intelligent 64K Serial Port Print buffer that works with ALL Commodore printers & ALL serial printer interfaces!

. . . and for ONLY $79.95 + Shipping

The **Serial Box™** lets you compute while your printer prints.

Imagine downloading a bit-mapped screen such as Flexi-draw or Koala Painter in 24 seconds!

You can dump 15 pages of text or a 35-page BASIC listing in 2½ minutes.

Oh yes, The **Serial Box™** can even skip over perforations.

SEE YOUR DEALER OR CALL: 1-800-228-7264 FOR ORDERS AND INFORMATION
IN PENNSYLVANIA CALL (215) 622-5495 OR WRITE:

R. J. Brachman Associates, Inc.

P.O. BOX 1077 • HAVERTOWN, PA 19083

Please add $3.00 for shipping and handling (USA and Canada) VISA, MC, Check or Money Orders accepted. C.O.D. add $2.50. PA residents add 6% (PLEASE ALLOW 4 TO 6 WEEKS FOR DELIVERY)

*Flexi-draw is a registered trademark of Inkwell Systems. Koala Painter is a registered trademark of Koala Technologies Corp. *C-64, C-128 & VIC-20 are registered trademarks of Commodore Business Machines, Ltd.

Reader Service No. 289

SCUTTLEBUTT

DATA ENCRYPTER • DEVELOPMENT SYSTEM • DVORAK ROM • COLOR PRINTERS • GRAPHICS DISPLAY PANEL • BUFFER AND DATA SWITCH • AMIGA MEMORY EXPANDER • GAMES FROM ACTIVISION, SUBLOGIC, AVALON HILL • C-128 CHEATSHEETS • ASSEMBLER • DATABASE • COMMODORE REFINANCING

STILL AFLOAT

A happy postscript to April's *Scuttlebutt,* wherein we expressed our dubiousness concerning Commodore International's ability to remain in business long into 1986: the bank loans which the company came very close to defaulting on have been extended to the tune of $135 million. If that sounds like a fortune, remember that Commodore in 1985 put together several consecutive quarters of $90 million-plus losses. More record book mismanagement, combined with a continuing industry shakeout, could still scuttle the ship.

But we're not worried. Commodore's current management team, after all, managed to grub $135 million despite one of the worst track records in the modern history of American business. Such a management team, we feel, can do anything.

Now for the bad news: Commodore has sold off its liquid crystal display operation. This puts an end to whatever faint hope still existed of ever seeing the release of the LCD laptop computer announced concurrently with the 128—at least bearing a Commodore logo.

Commodore International, 215-431-9100 (see address list, page 82).

VIEWTRON CLOSES

Knight-Ridder Newspapers, parent company of the Viewtron bulletin board system frequently mentioned in these pages, announced on March 17 that the service would be permanently shut down within three weeks. The SYSOPs of Viewtron's Commodore SIG have asked us to inform users that the entire section may be absorbed by another bulletin board system. More details will be provided next issue.

Knight-Ridder Newspapers, Inc., 305-376-3838 (see address list, page 82).



The latest **Cheatsheets** *cover the Commodore 128, and several programs.*
READER SERVICE NO. 276

128 CHEATSHEETS

You knew that the increased surface area offered by the C-128 would be too much of a temptation for Leroy to resist. The first seven of *Leroy's Cheatsheets* for the Commodore 128 include *BASIC 7.0, Disk 1571, Easy Script, Fleet System 2 and 3, Paper Clip 128, WordPro 128,* and *Blanks* (set of three), with more to come. Each Cheatsheet is die-cut and plastic laminated, and includes a keyboard extender that makes it possible to use C-64 Cheatsheets as reference cards. Price is $7.95 each plus $1.00 shipping per order.

Cheatsheet Products Inc., 412-781-1551 (see address list, page 82).

DISPLAY PANEL

PSIDAC's Ani-Master Animated Graphics Display Panel ($119.95), an eight inch square LED display, plugs into the user port of the C-64 or C-128 to provide light show effects. Animated graphics and messages can be designed with a joystick. Pattern editing and saving features enable creations of sequences up to 30 minutes long. The display can be controlled from user-written programs with the included software. A 40-page user's guide provides examples.

Also available is a portable unit ($179.95) which can burn its pattern sequences into the panel and then display them (without a computer) by using batteries or an automobile cig-



Hey! Do you  know about **PrintMaster™** &

Art Gallery I™ from **Unison World Inc.**  **PrintMaster™**

lets you make Greeting Cards , Signs , Calenders ,

Stationery , and . **PrintMaster™** is a

very easy-to-use graphics program  which runs on your IBM,

, and CP/M  and works with many 

(listed ). Whether at  or , or just anywhere ,

use **PrintMaster™** for , , , , ,

 or even  and . Call  or write  for more

information about **PrintMaster™** 

· Most of the above graphics from PrintMaster and Art Gallery I.

Printers supported on the IBM PC version:
Blue Chip; Citizen MSP-10, and MSP-20; C.Itoh Prowriter 8510, and Prowriter Jr.; Data Products SPG 8010-2, 8012, 8021, 8022, 8051, 8052, 8071 and 8072; EPSON FX, JX, LX, RX, LQ-1500, and MX with Graftrax; HP Think Jet; IBM Color Dot Matrix, Compact Thermal, Graphics Printer and ProPrinter; IDS Prism; Mannesmann Tally MT 85 and 86; NEC P2/P3 Pinwriter, 8023A and 8027; MPI Sprinter; Okidata 82A/83A with Okigraph 1, 84 (Step II), 92, 93, 182, 183, 192, 193, and Okimate 10 and 20; Panasonic KX-P 1090, 1091, 1092, and EP-1505; Star Gemini 10 and 15; Tandy CGP 220, DMP 105, 130, 200, 400 420, 430, 500, 2100, 2100P and 2200; TI 855; Toshiba 1340, 1350, 1351 and P351; Smith Corona D300.

Printers supported on the Apple version:
Apple Imagewriter and Scribe; C Itoh Prowriter 8510; EPSON FX-80/100, RX-80/100, and MX-80 with Graftrax; Okidata 92 and 93; Star Gemini 10 and 15.

Printers supported on the Atari version:
C.Itoh Prowriter 8510; EPSON FX, RX, LQ-1500, and MX with Graftrax; IBM Graphics Printer; Okidata 82A/83A with Okigraph 1, 84 (Step II), 92 and 93; Star Gemini 10 and 15; Toshiba 1340, 1350, 1351, and P351.

Printers supported on the Commodore version:
C.Itoh Prowriter 8510 and Prowriter Jr.; Commodore VIC-1525 and MPS-801; EPSON FX, RX, and MX with Graftrax; Okidata 92, 93, 192, and Okimate 10; Star Gemini 10 and 15.

Printers supported on the CP/M version:
C.Itoh Prowriter 8510 and Prowriter Jr.; EPSON FX, RX, LQ-1500, and MX with Graftrax; IBM Graphics Printer; Okidata 82/83A with Okigraph 1, 92 and 93; Star Gemini 10 and 15; Tandy DMP 105, 130, 430, 2100, 2100P, and 2200; Toshiba 1340, 1350, 1351, and P351.

PrintMaster ©1985 Unison World Inc. 2150 Shattuck Avenue, Suite 902, Berkeley, CA 94704 ☎ Phone (415) 848-6666

Comparison Chart

Programs / Features	PrintMaster (All versions)	The Print Shop Apple Commodore	The Print Shop IBM
Mixing fonts on one page	✓	NO	NO
Upper and lower case	✓	NO	✓
Preview of Design layout	✓	NO	✓
Calendar	✓	NO	NO
Hercules card (IBM only)	✓	NO	NO

Order Form

PrintMaster - IBM PC, PCjr and compatibles	$59.95
PrintMaster - Apple II+, IIe and IIc	$39.95
PrintMaster - Commodore 64 and 128	$34.95
PrintMaster - Atari 520ST	$39.95
PrintMaster - CP/M	$49.95
Art Gallery I - IBM PC, PCjr and compatibles	$39.95
Art Gallery I - Apple II+, IIe and IIc	$39.95
Art Gallery I - Commodore 64 and 128	$24.95
Art Gallery I - Atari 520ST	$29.95
Art Gallery I - CP/M	$39.95

Price includes shipping inside the U.S. Make check or money order payable to Unison World, Inc.

Foreign orders add $10.00 per product. Make payments by bank draft, payable in U.S. dollars drawn on a U.S. bank. COD's and purchase orders will not be accepted with this offer.

Amount (CA resident add 6.5% tax)_____

PAYMENT: Visa MC Check Money Order Bank Draft

Card# | | | | | | | | | | | | | | | | Expiration Date:____/____

Name: Telephone: ( )

Shipping address:

City: State: Zip:

Reader Service No. 257

MUST LIQUIDATE
Letter Quality, Daisy Wheel
COMPUTER PRINTER
AT BELOW DEALER COST!

FACTORY NEW! FIRST QUALITY!



- Letter Quality, Daisy Wheel
- Can be interfaced with virtually all computer systems including IBM, Apple and Commodore, with the addition of a printer interface (not included).

Manufacturer's closeout of excess inventory is the reason for this liquidation. Add this **letter quality** printer to your present computer system at a fraction of normal cost. This printer uses standard 96 character printwheel and easy-load ribbon cartridge. Quiet operation. Uni- and bi-directional printing of fully formed upper and lower case letters, numerals, symbols at 18 cps. ASCII character codes. 10, 12 or 15 characters per inch or proportional spacing. Line feed spacing of 1/48" minimum. Friction feed. Takes 13" maximum paper width. Prints 12" wide. Four-position impression control. Produces original and four lightweight copies. Approx. 21 lbs. 19½" x 14½" x 5". 110V AC.

One Year Limited Factory Warranty!

Mfr. List Price **$550.00**

Liquidation Price Now At **$169**

Item H-1243-4919-007 Ship, handling: $9.00

Credit card customers can order by phone, 24 hours a day, 7 days a week.

Toll-Free: 1-800-328-0609

Your check is welcome! No delays in orders paid by check.

Sales outside continental U.S. are subject to special conditions. Please call or write to inquire.

C.O.M.B. Direct Marketing Corp. **Item H-1243**
14605 28th Ave. N./Minneapolis, MN 55441-3397

Send ___ **TOWA Letter Quality Printer(s)** Item H-1243-4919-007 at $169 each plus $9 each for shipping, handling. (Minnesota residents add 6% sales tax. Allow 3-4 weeks for delivery. Sorry, no C.O.D. orders.)

☐ My check or money order is enclosed. (No delays in processing orders paid by check, thanks to TeleCheck.)

Charge to my: ☐ MasterCard® ☐ VISA®

Acct. No. _____ Exp. ____/____

PLEASE PRINT CLEARLY

Name _____

Address _____

City _____

State _____ ZIP _____

Phone (___) _____

Sign Here _____

C.O.M.B. Direct Marketing Corp.
Authorized Liquidator
14605 28th Avenue North
Minneapolis, Minnesota 55441-3397

arette lighter.

PSIDAC, 503-289-6254 (see address list, page 82).

ASSEMBLER

The *Rebel* assembler ($29.95) for both the C-64 and the C-128 allows total access to either computer's BASIC at all times while providing such extra facilities as a file lister, list freezer, and search and replace functions. In the 128's 80-column mode it provides an onscreen help menu and true split screen editing. The 64 version, because of BASIC 2.0's limitations, adds such options as renumber, page flipping, decimal to hex to ASCII conversions, and list scrolling.

Nu-Age Software, 813-323-8389 (see address list, page 82).

AMIGA MEMORY EXPANDER

A lower-priced alternative to the $195.00 Commodore-Amiga 1050 card memory expander, Starpoint Software's functionally identical 256K display RAM card ($120.00) installs in seconds behind the front panel, expanding available memory for programs and graphics to a full half megabyte. Standard system architecture is used to insure hardware and software compatibility. Included is a one-yeara warranty, manual, and schematics.

Starpoint Software, 916-842-6183 (see address list, page 82).

128 DATABASE

Data Master 128 ($29.95) allows users to develop multivolume data sets of up to 26,000 records, do searches, create mailing labels, and generate reports. Wild cards may be used within these conditions, increasing the program's search capability. An online help facility can be activated from any point in the program.

Bouncing Dog Software, 612-729-7662 (see address list, page 82).

AMIGA UTILITIES

Brown-Wagh has released three new productivity tools for the Amiga:

Modeled after *Lotus 1-2-3, Analyze!* ($99.95) takes advantage of the Amiga's special capabilities (pull-down menus, mouse, workbench, etc.) to produce spreadsheets up to 256 columns by 8156 rows.

The *OnLine!* ($69.95) telecommunications program comes equipped with user-definable macro keys that can be used to transmit often-used commands and script files for automated operation.

BBS-PC ($99.95), which turns an Amiga into an online information network, can interface to a hard disk and utilize a 2400 baud modem. The program will work in the background, answering the phone and taking messages while the computer is used for other purposes.

Brown-Wagh Publishing, 408-395-3838 (see address list, page 82).

COPY PROGRAM

Super Kit/1541 claims a normal copy time of 32.68 seconds and a nibble copy time of 34.92 seconds per disk. Included is a track and sector editor providing full editing in hex, decimal, ASCII, and binary, a monitor/disassembler with printout commands, and a sector by sector GCR editor with bit density scan. Price is $29.95 plus $3.00 shipping.

Prism Software, 817-757-4031 (see address list, page 82).

DATA ENCRYPTION

PCSecure ($49.50) provides Commodore 128 users with data file protection via a key-driven code. You encode a file by typing a key, then decode it the same way. Multistage encryption provides further security by preventing nonauthorized users who are as close as one digit away from cracking the encryption password from knowing how well they're doing.

SourceView Software International, 415-228-6220 (see address list, page 82).

CLINICAL INTERVIEWER

Written by a professor of psychology, the *Clinical Interview* series allows members of the helping professions to develop their skills in interviewing patients or clients. The first disk in the series, *The Mental Health Setting,* portrays five patients who tell their stories while the interviewer practices using active listening skills and asking appropriate questions.

NEWS



The Juki 5510-Color provides 96 italic characters and 11 international character sets. READER SERVICE NO. 261

The next release, *The General Hospital Setting,* will be of primary interest to students of nursing, physical therapy, and other hospital-based helping professions.

Clinical Interviews, 607-869-5955 (see address list, page 82).

DEVELOPMENT SYSTEM

The *Total Software Development System (TSDS)* consists of a macro assembler and editor, sprite editor, matte and character set editor, and sound effects editor. 38 new commands are provided for simplifying disk operations and other functions.

NoSync Development Corp., 604-464-2983 (see address list, page 82).

SPRITE EDITOR

Though it may sound like an alternative title for a certain Oscar-winning movie, *MOB Master II* ($12.00) is actually a sprite editor which allows the C-64 user to draw hi-res or multicolor sprites with a joystick, move or expand them horizontally and vertically, reverse and clear single sprites or entire sections of memory, select colors, incorporate sprites into programs, and take memory snapshots.

Tidal Bore Software (see address list, page 82).

C-128 TRANSLATIONS

Free Spirit Software has updated two C-64 programs to operate on the C-128:

BASICally Simple 128 ($19.95) provides instruction in BASIC programming, including the additional commands available on the C-128.

The *Postmaster128* ($9.95) mailing list program can be used to store, retrieve, and sort names, addresses, zip codes, and phone numbers.

Free Spirit Software, Inc., 312-476-3640 (see address list, page 82).

COLOR PRINTER NEWS

The Juki 5510-Color is their standard 5510 dot matrix printer with the available color option already installed, enabling the user to produce seven colors from a four color ribbon. Maximum speeds are 180 characters per second in draft mode and 30 in near letter quality. Price is under $650.

Juki Office Machine Corp., 800-325-6134; in CA 800-435-6315 (see address list, page 82).

For three months beginning March 30 and ending June 30, 1986, purchasers of the Okimate 10 printer will receive a $15 cash rebate from the manufacturer. It will be necessary to complete and return to Okidata a rebate coupon, available where the printers are sold or by calling 1-800-OKIDATA.

Okidata, 609-235-2600 (see address list, page 82).

LISZT THESE

The first release in Tidal Bore's *Miniature Melodies* series for the C-128, *32 Catchy Classics* ($12) contains 32 classical music selections by Bach, Beethoven, Handel, Schumann, and others that can be listened to or incorporated into user-written programs.

Tidal Bore Software, 902-895-4563 (see address list, page 82).

Music of the Masters ($9.95) contains over 20 works by Mozart, Bach, Beethoven, and others, totaling about 45 minutes of listening. Onscreen commentary is provided for each composer as his music is played.

COMPARE

x = included
- = not included

C64 COMAL 2.0	C64 COMAL 0.14	C64 BASIC 2.0	
			=EDITING==========
x	x		AUTO - automatic line numbers
x	x		RENUM - renumber lines
x	x		MERGE from disk
x	x		Syntax checking on entry
x	x		Delete blocks of lines
x	-		FIND and CHANGE commands
x	x		Pause a program listing
x	-		TRACE - to debug your program
x	-		'Quote mode' disable / enable
x	-		Understands UPPER and lower case
x	-		Erase to end of line - CONTROL K
x	-		Ooops key - CONTROL A
			==FILES==========
x	x		Binary sequential/random files
x	x	x	ASCII sequential/random files
x	x		Easy one command random file use
x	-	x	GET from disk
x	-		Built in true ASCII conversion
			==DISK COMMANDS=======
x	x		CAT - catalog of files on disk
x	-		Pause catalog-send it to printer
x	x		STATUS - status of the disk drive
x	-		COPY - copy files command
x	x		DELETE - scratch files from disk
x	-		MOUNT - initialize a disk
x	-		RENAME a disk file
x	x		Knows when End Of File is reached
x	x		CHAIN one program to another
			==NUMBERS==========
x	-		Accepts Hex and Binary numbers
x	-	x	Includes Logical AND and OR
x	-		Includes Logical XOR
x	x	x	Includes Trig functions
x	x		Understands TRUE and FALSE
x	x		DIV and MOD operators
x	x		Arrays with any minimum index
x	x	x	Integer numbers
x	x		Produce random integer in a range
			==INPUT-OUTPUT-PRINTER==
x	x		TAB works on printer as on screen
x	x		Variable size print zones
x	x		Print zone-same on printer/screen
x	-		Set up default printer types
x	-		Built in graphic screen dump
x	-		Built in text screen dump
x	x		PRINT USING formatted output
x	x		Select output: printer or screen
x	-		Select input: keyboard/batch file
x	-		INPUT AT and PRINT AT
x	-		Automatic protected input fields
x	x		Allows null reply to input
x	x		Allows STOP key during input
x	x		Allows comma as part of input
x	-		User definable character fonts
			==STRUCTURES==========
x	x	x	FOR loop
x	x		Integer FOR loop
x	x		REPEAT...UNTIL loop
x	x		WHILE...ENDWHILE loop
x	-		LOOP...EXIT loop
x	x		CASE structure
x	x		IF THEN ELSE - multiple lines
x	x		Call routines by name
x	-		External procedures and functions
x	x		Multiple line procedure/function
x	x		Parameters with procs / funcs
x	x		LOCAL or GLOBAL variables
x	-		ERROR HANDLER - trap errors
x	x		Automatic indenting of structures

COMAL Users Group USA
6041 Monona Drive, Room 111
Madison, WI 53716
phone: 608-222-4432

The Universal MacInker(s)™ are here

Re-ink any Fabric ribbon automatically for less than

5¢

Now one **Universal Cartridge MacInker (UC)** re-inks all fabric cartridges and one **Universal Spool MacInker (US)** re-inks all spools. We have **MacInker(s)** dedicated to specialized cartridges, zip pack, harmonica etc. Over 1000 printer brands supported. Use your **MacInker** to re-ink your dry, fabric cartridges (for less than 5 cents in ink) and watch the improvement in print-out quality. Our new, residue-less, lubricated, dot matrix ink yields a darker print than most new ribbons. Or get any of our basic ink colors: brown, blue, red, green, yellow, purple and use **MacInker** to **create and/or Re-ink your own colored cartridges.** We have uninked or colored cartridges for the popular printers and ribbon re-loads for any printer. Operation is extremely simple & automatic with new, twin drive electric motor that supports CW and CCW rotating cartridges. A good quality fabric ribbon of average length can be re-inked almost indefinitely. In our tests one re-inked Epson* 80 ribbon has outlived the estimated life of the print-head!! We receive consistent & similar feedback from our customers. As of August 85 we have over 40,000 MAC INKER(s) in the field, in 5 continents (220 V motors available). **MacInker (UC) is $60.00.** Cartridge drivers are **$8.50/ea.** We still have our first generation, dedicated **MacInker(s)** for most popular printers. Prices start at **$54.95** with most units below $60.00. **MacInker** has been reviewed, approved and flattered in most magazines and even in the NEW YORK TIMES and the CHICAGO SUN TIMES.



Universal Cartridge Mac Inker

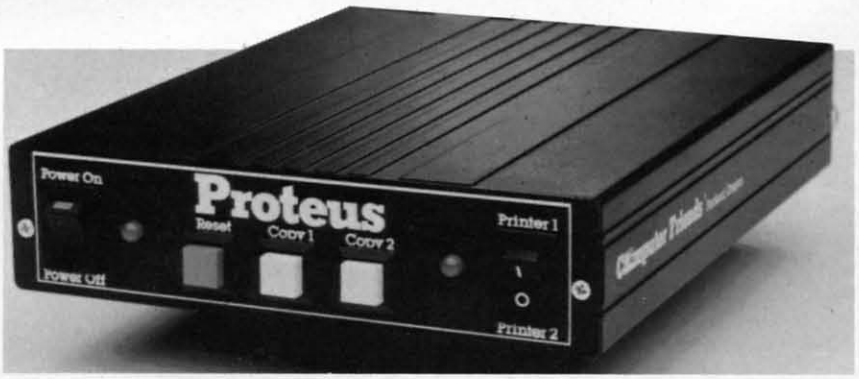
Computer Friends

6415 S.W. Canyon Ct.
Portland, OR 97221
(503) 297-2321

Order toll free 1-800-547-3303
or ask for free detailed brochure.
Dealers inquiries welcome.

*EPSON is a trademark of EPSON CORP.

Reader Service No. 259



Proteus buffer/data switch: connect two peripherals to any computer.
READER SERVICE NO. 272

Free Spirit Software, Inc., 312-476-3640 (see address list, page 82).

AMIGA MASTERTYPE

The new Amiga version of *MasterType* ($39.95), available for the 64 for three years, features graphically enhanced finger positioning charts, more sentence typing practice, and rhythm instruction at a greater range of speed. Also included are new lessons on numbers, symbols, and numeric keypad, and common programming terms.

Scarborough Systems, Inc., 914-332-4545 (see address list, page 82).

ARITHMETIC QUIZ

Math Pop Quiz ($19.95) for the C-64 teaches arithmetic to learners at various levels. Correct, prompt answers earn points and darts for popping balloons. The program automatically allows more response time for those who need practice and trims it for kids scoring 80% or better.

SourceView Software International, 415-228-6220 (see address list, page 82).

DISK LIBRARY PROGRAM

Disk Library will allow the Amiga user to list, catalog, and cross reference every file on every disk in his collection. It will also search for files and update itself automatically. Space is provided for comments and remarks. Price is under $50.

Classic Image, Inc., 201-389-3633 (see address list, page 82).

BUFFER/DATA SWITCH

The *Proteus* double buffer and data switch contains two parallel ports, making it possible to connect two printers or other parallel peripherals to any computer. Possible applications include running drafts on one dot matrix printer and final copies on a letter quality printer, or loading one printer with letter size paper and the other with labels for mail merge operations. The two buffers have flexible capacity, meaning that each is automatically allocated as much memory as is available, up to the buffer's maximum capacity. Price is $199 for the 64K version and $299 for the 256K version.

Computer Friends, 503-297-2321 (see address list, page 82).

MW-350 UPDATE

The MW-350 MicroGrafix Parallel Printer Interface reviewed in the February '85 *Ahoy!* has had its operating system revised to better accommodate the specific needs of the C-128 in CP/M mode, with the addition of an ASCII translation mode in which only the printable Commodore text characters are converted to standard ASCII and all other printer control codes pass through the interface unchanged. More details will be provided in next month's full-length review.

Also newly available from Micro R & D is the Model MW-401 C-128 Cable, which adapts the computer's three composite outlets into one outlet at the flip of a switch. Three modes are 40 column color, 40 column monochrome, and 80 column monochrome. A sound output is also provided.

Micro R & D, Inc., 303-985-4077 (see address list, page 82).

FREE HEAD CLEANER KIT

3M is including a free head cleaning diskette and three packets of cleaning solution with specially marked packages of 5¼" diskettes. Also included is a $2 rebate form for 3M's regular head cleaning kit.

3M, 612-736-2335 (see address list, page 82).

CHECKBOOK PROGRAM

PC Home Checkbook ($39.95) lets C-64 owners keep track of their checking accounts by week, month, or year. Four basic types of transactions can be recorded and edited: checks written, deposits, automated teller activity, and bank charges. Space is provided for each transaction's check number, date, amount, tax-deductible status, recipient, purpose, and expense category. Up to 20 expense categories can be created. A statement can be provided covering all transactions within a certain category or a certain time period.

SourceView Software International, 415-228-6220 (see address list, page 82).

PARTNER 128

Partner 128 ($59.95), a collection of desktop organization programs, is designed to operate concurrently with other C-128 software. Included are a business calculator, memo pad, appointment calculator, address and phone books, envelope addresser, a one-key screen dump, and a "typewriter" program that simplifies small typing jobs like labels and forms.

Timeworks, 312-948-9200 (see address list, page 82).

BOOKS

Practical Interfacing Projects with the Commodore Computers supplies hardware and software information for turning a Commodore into a controller for science, engineering, or home and hobby electronic applications. Over 80 programs are provided, as well as an introduction to using machine language for controlling I/O projects. Among the projects included are a digital to analog convertor circuit for the user port of the VIC, 64, or 128, a waveform recording system, and an I/O system for the Plus/4 or C-16 utilizing a card cage method. Price is $16.45 paperback, $24.95 hardbound.

Tab Books Inc., 717-794-2191 (see address list, page 82).

The One-Hour Commodore 64 ($5.95) guides the user through his first 60 minutes with the computer, covering setup, the keyboard, loading and saving programs on cassette or disk, sound, and printer use. The 128-page paperback includes a bibliography and glossary.

InfoBooks, 213-470-6786 (see address list, page 82).

Howard W. Sams & Co. will add volumes covering the Commodore 128, the 1571, and the 1984 version of the C-64 to its line of Computerfacts manuals, each containing standard notation schematics created by a computer-aided design system, reproductions of waveform photos, preliminary service checks, troubleshooting tips, replacement parts lists, and semiconductor cross-references. Previously released volumes cover the C-16, VIC 20 (early and later versions), Plus/4, 64, 1525, 1541, and 1701. Prices range from $19.95 to $39.95.



For novice or expert programmers.
READER SERVICE NO. 273

Also new from Sams is *88000, 68010, 68020 Primer* ($21.95), an introduction for novice or experienced programmers to the instruction set and addressing modes common to the 68000 family. Included is information

COMPARE

C64 COMAL 2.0 / C64 COMAL 0.14 / C64 BASIC 2.0

x = included
- = not included

```
=SPRITES============
x x - Keywords for defining sprites
x x - Keywords for setting sprite color
x x - Keyword for moving sprites
x x - Built in collision detection
x - - STAMP sprite image onto screen
x - - Animate sprites, interrupt driven
x - - Attach sprite shapes to programs
      ==GRAPHICS===========
x x - Turtle graphics and X/Y graphics
x x - Hi-res or multicolor graphics
x x - Split screen (text/graphics)
x x - Background/border color keywords
x x - Mix text and graphics on screen
x - - Graphics text in any size
x - - Graphics text sideways
x - - Save a graphics screen to disk
x - - Window capabilities
x x - Line clipping within frame
x - - ARC and CIRCLE commands
x x - FILL command
x x - PLOT a point
      ==SOUND=============
x - - BELL command
x - - Built in sound commands
x - - Control sound envelope
x - - Interrupt driven music built in
      ==MACHINE LANGUAGE===
x x x Call machine code routines
x - - Call machine code by name
x - - Link machine code to programs
x - - M/L routines parameter passing
      ==OTHER=============
x - - Modem communications built in
x x - Function keys defined
x - - Function keys alterable by user
x x - Stop key disable / enable
x - - Cursor command
x x - No "garbage collection"
x - - Joystick/paddle/lightpen keywords
x x - Built in string search - IN
x - - Store a text screen for later use
x x - Long variable names
x - - Can sense SRQ interrupt
x x - Can change part of a string
x - - Built in clear screen command
x x x PEEK, POKE, SYS, GOTO
```

Compare. Even more comparisons are on the opposite page! Check the reviews. COMAL got a straight A rating from the Book of Commodore Software 1985, got the highest 5 star rating from Info Magazine, and got the highest rating of 10 from the Best Vic/ C64 Software review book. Send us a SASE - we'll send you a 24 page COMAL Info booklet.

But why wait! The C64 COMAL 0.14 Programmers Paradise Pak Deluxe is only $24.95 complete with 4 disks FULL of programs, fast loader, disk copier, and over 400 pages of information (add $2 shipping). The top of the line, C64 COMAL 2.0 Cartridge Pak is $98.95 for cartridge, 2 manuals, and 1 disk (add $4 shipping). Canada add $1 extra shipping. US Dollars only. Choose COMAL, the language of choice. Send check, M.O. or VISA/MC numbers to:

COMAL Users Group USA
6041 Monona Drive, Room 111
Madison, WI 53716
phone: 608-222-4432

on the architecture of the chips, programming in assembly language, code mapping, how to use various instructions and registers, and uses of the chips in multiuser systems.

Finally from Sams, the *Commodore 1541 Troubleshooting & Repair Guide* ($19.95) provides schematics, step-by-step troubleshooting flow charts, disassembly/reassembly instructions, callibration and alignment procedures, block diagrams, parts layouts, and mechanical and electrical theory of operation.

Howard W. Sams & Co., 317-298-5400 (see address list, page 82).

The Mystical Machine: Issues and Ideas in Computing ($21.95), in addition to providing an introduction to programming and computer architecture, considers the computer in terms of its social ramifications, its potential benefit or danger to mankind, and possible applications.

Addison-Wesley Publishing Company, 617-944-3700 (see address list, page 82).



Schematics, flow charts, layouts, etc.
READER SERVICE NO. 277

DVORAK ROM KIT

Produced under license from Commodore, Prelco's *DV Switcher* ROM kernal kit allows C-64 users to shuttle back and forth between standard QWERTY and Dvorak keyboard layouts. Included is a modified ROM kernal, a switch to allow selection of the new ROM or original QWERTY ROM, and key covers with Dvorak and QWERTY markings. The $39.95 price does not include cost of installation by a competent technician.

Also available from Prelco is the *DV Typer* Dvorak typing tutor for the 64 and 128.

Prelco, 714-544-3041 (see address list, page 82).

GAMES

For the past 12-18 months, Activision's output in the adventure game field has steadily increased while that of the longtime leader, Infocom, has dwindled down to almost nothing. Still, in the best John D. Rockefeller tradition, Activision has insured an even larger market share in the future by purchasing Infocom, exchanging 2 million shares of Activision common stock for all outstanding shares of Infocom stock. The total transaction was valued at approximately $7.5 million. Infocom devotees will be pleased to know that Infocom will retain its own product development and marketing operations in Cambridge.

The first installment in Activision/Gamestar's *Championship Golf: The Great Courses of the World* series, titled *Volume One: Pebble Beach*, will see release this fall for the C-128 and Amiga. The game (not to be confused with Sportsware's *Championship Golf at Pebble Beach*, announced in last month's *Scuttlebutt*) recreates an actual course layout down to sand traps, roughs, and trees. Up to four players can view all 18 holes from multiple perspectives, as well as control club selection, stance, and type of swing for each shot. A caddy will suggest a club for any shot should a player request assistance.

Activision, Inc., 415-960-0410 (see address list, page 82).

Previously available for Apple, IBM, and the C-128, the *Gato* submarine simulation has been released in a scaled-down version for the C-64 that includes 8 missions, 5 difficulty levels, and 3 ships. The player's job as captain of a World War II "Gato" class submarine is to avoid using sunk by an enemy that is programmed to think strategically. Price is $29.95.

Spectrum HoloByte, Inc., 303-444-7737 (see address list, page 82).

The Great War ($19.95) for the C-128 maneuvers several hundred units of infantry, cavalry, and artillery, representing the armies of 16 nations, over a map of 1914 Europe. The player's military strategy must take into account terrain, political considerations, troop strength, weaponry, supply lines, and weather as he commands either the Central Powers or the Allies against the computer or another player.

Free Spirit Software, Inc., 312-476-3640 (see address list, page 82).

SubLOGIC's *Football* for the C-64 is intended as a physical rather than a statistical simulation of the sport. One or two players direct offense and defense, choosing their quarterbacks, receivers, and running backs and taking into account weight, speed, and abilities. The movement of 22 players is simulated in a 3-D perspective.

SubLOGIC Corporation, 217-359-8482 (see address list, page 82).

Four new C-64 releases from Avalon Hill:

Spitfire '40 ($35.00) recreates the experience of piloting a Mark I Supermarine Spitfire, right down to the

Continued on page 106

Uni-Kool
DISK DRIVE FAN FOR COMMODORE



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

115 vac



Money Order, Checks or C.O.D. Only

6-month warranty

Uni-Kool (503) 476-1660
909 Williamson Loop, Grants Pass, OR 97526

(Commodore is a registered trademark of Commodore Business Systems)

Reader Service No. 283

Famous Smith Corona National Brand

10" PRINTER SALE

Below Wholesale Cost Prices!!!

• ONE YEAR IMMEDIATE REPLACEMENT WARRANTY

- **Speed: 120 or 160 characters per second**
- **Friction Feed/Tractor Feed — Standard**
- **80 character print line at 10 CPI**
- **1 Line Buffer, 2K Buffer on 160 CPS Plus LQM**
- **Six pitches**
- **Graphics capability**
- **Centronics compatible parallel interface**
- **Features Bidirectional Print, Shortline Seek, Vertical And Horizontal Tabs**



SUPER GRAPHICS

This is a sample of our **emphasized** near-letter-quality print.

italic print. There is standard data processing quality print

Check These Features & Prices

120 CPS 10" Printer

List $429.00

SALE $159

160 CPS + Letter Quality Mode 10" Printer

List $499.00

SALE $199

SPECIFICATIONS

(IBM — Commodore)

Size/Weight
Height 5.04" Width 16.7"
Depth 13.4" Weight 18.7 lbs.
Internal Char. Coding
ASCII Plus ISO
Print Buffer Size
120 CPS: 132 Bytes (1 line)
120/160 CPS Plus LQM: 2K
No. of Char. In Char. Set
96 ASCII Plus International
Graphics Capability
Standard 60, 72, 120 DPI
Horizontal 72 DPI Vertical
Pitch
10, 12, 16.7, 5, 6, 8.3, Proportional Spacing
Printing Method
Impact Dot Matrix

Char. Matrix Size
9H x 9V (Standard) to 10H x 9V (Emphasized & Elongate)
Printing Features
Bi-directional, Short line seeking, Vertical Tabs, Horizontal Tabs
Forms Type
Fanfold, Cut Sheet, Roll (optional)
Max Paper Width
11"
Feeding Method
Friction Feed Std.; Tractor Feed Std.
Ribbon
Cassette — Fabric inked ribbon
Ribbon Life
4 million characters

(Apple — Atari — Etc.)

Interfaces
Parallel 8 bit Centronics compatible
120/160 CPS Plus NLQ: RS232 Serial inc.
Character Mode
10 x 8 Emphasized; 9 x 8 Standard; 10 x 8 Elongated; 9 x 8 Super/Sub Script (1 pass)
Character Set
96 ASCII
11 x 7 International Char.
Line Spacing
6/8/12/72/144 LPI
Character Spacing
10 cpi normal; 5 cpi elongated normal; 12 cpi compressed; 6 cpi elongated compressed; 16.7 cpi condensed; 8.3 cpi elongated condensed; 5.12.5 cpi elongated proportional

Cartridge Ribbon — List $19.95. **Sale $12.95.**

Interfaces

IBM $89.00 **Apple $59.00** **Atari $59.00** **Commodore $39.95**

Add $14.50 for shipping, handling and insurance. Illinois residents please add 6¼% tax. Add $29.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES, EXCEPT CANADA. Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days delivery. 2 to 7 days for phone orders. 1 day express mail! Prices & Availability subject to change without notice.
VISA — MASTERCARD — C.O.D. No C.O.D. to Canada or APO-FPO

Reader Service No. 253

PROTECTO

We Love Our Customers

22292 N. Pepper Rd., Barrington, Illinois 60010

312/382-5244 to order

COMMODORE 64 COMPUTER

(Order Now)

$139.95

- **C128 Disks 79¢ ea.***
- **Paperbock Writer 64 $39.95**
- **10" Comstar 10X Printer $148.00**
- **14" Color Monitor $149.95**

CALL BEFORE YOU ORDER

COMMODORE 64 SYSTEM SALE

Commodore 64 Plus $30.00 S&H
Com. 1541 Disk Drive
14" Color Monitor

$457

PLUS FREE $49.95 Oil Barons Adventure Program

C128 COMMODORE COMPUTER

NEW

(Order Now)

*$229.05

(SEE BELOW)

With $59.95 Timeworks Wordwriter Wordprocessor savings applied

- **340K 1571 Disk Drive $259.00**
- **Voice Synthesizer $39.95**
- **12" Monitor $79.95**

PRICES MAY BE LOWER

SPECIAL SOFTWARE COUPON

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

(Examples)

PROFESSIONAL SOFTWARE
COMMODORE 64

Name	List	Sale	Coupon
PaperClip	$89.95	$34.95	$29.95
Consultant	$99.95	$49.95	$39.95
Leader Board	$39.95	$24.95	$22.95
The Print Shop	$44.95	$27.95	$26.95
Halley's Project	$39.95	$22.95	$19.95
Practicalc (spread sheet)	$59.95	$19.95	$14.95
Voice Command Module	$79.95	$39.95	$34.95
Nine Princes in Amber	$32.95	$24.95	$21.95
Super Bowl Sunday	$35.00	$22.95	$19.95
Flip and File Disk Filer	$24.95	$14.95	$12.95
Pro Joy Stick	$19.95	$12.95	$10.00
PartyWare	$19.95	$14.95	$11.95
Dust Cover	$ 8.95	$ 6.95	$ 4.60
Financial Planner Sylvia Porter	$59.95	$38.95	$35.95
Hardball	$29.95	$18.95	$16.95
C64 Troubleshoot & Repair Guide	$24.95	$15.95	$12.95

(See over 100 coupon items in our catalog)

Write or call for Sample SPECIAL SOFTWARE COUPON!

COMMODORE 64 COMPUTER $139.95

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

*** C128 DOUBLE SIDED DISKS 79¢ EA.**

Get these 5¼" Double Sided Floppy Disks specially designed for the Commodore 128 Computer (1571 Disk Drive). 100% Certified. ***Lifetime Warranty***. Automatic Lint Cleaning Liner included. 1 Box of 10 - $9.90 (99¢ ea.), 5 Boxes of 10 - $44.50 (89¢ ea.), 10 Boxes of 10 -$79.00 (79¢ ea.).

14" COLOR MONITOR $149.95

You pay only $149.95 when you order this 14" COLOR MONITOR. LESS the value of the SPECIAL SOFTWARE DISCOUNT COUPON we pack with your monitor that allows you to save over $250 off software sale prices!! With only $100 of savings applied, your net color monitor cost is only $49.95. (16 Colors).

Premium Quality 120-140 CPS Comstar 10X Printer $148.00

The COMSTAR 10X gives you a 10" carriage, 120-140 CPS, 9 x 9 dot matrix with double strike capability for 18 x 18 dot matrix (near letter quality), high resolution bit image (120 x 144 dot matrix), underlining, back spacing, left and right margin setting, true lower decenders with super and subscripts, prints standard, italic, block graphics and special characters. It gives you print quality and features found on printers costing twice as much!! (Centronics Parallel Interface) List $399.00 **Sale $148.00**.

4 SLOT EXPANDER & 80 COLUMN BOARD $49.95

Now you program 80 COLUMNS on the screen at one time! Converts your Commodore 64 to 80 COLUMNS when you plug in the 80 COLUMN EXPANSION BOARD!! PLUS 4 slot expander! ***Limited Quantities.*** **Sale $49.95.** *Coupon $39.95*

80 COLUMNS IN COLOR PAPERBOCK WRITER 64 WORD PROCESSOR $39.95

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

ATTENTION
Computer Clubs
We Offer Big Volume Discounts
CALL TODAY!

PROTECTO WARRANTY

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

*** C128 COMMODORE COMPUTER $289.00**

You pay only $289.00 for the C128 computer and we include the C128 Wordwriter Wordprocessor by Timeworks (Sale $59.95). Thus, your net cost for the C128 computer is only $229.05. List $349.00. **SALE $289.00**.

340K 1571 COMMODORE DISK DRIVE $259.00

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

SUPER AUTO DIAL MODEM $29.95

Easy to use. Just plug into your Commodore 64 computer and you're ready to transmit and receive messages. Easier to use than dialing your telephone, just push one key on your computer! Includes exclusive easy to use program for up and down loading to printer and disk drives. ***Best in U.S.A.*** List $99.00. **SALE $29.95.** *Coupon $24.95.*

VOICE SYNTHESIZER $39.95

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

12" MAGNAVOX (NAP) 80 COLUMN MONITOR WITH SOUND $79.95

Super High Resolution green screen monitor. 80 columns x 24 lines, easy to read, plus speaker for audio sound included. Fantastic value. List $129.00. **Sale $79.95.** (C128 cable $19.95. C64, Atari cable $9.95)

PRINTER/TYPEWRITER COMBINATION $229.95

"JUKI" Superb letter quality, daisy wheel printer/typewriter combination. Two machines in one — just a flick of the switch. 12" extra large carriage, typewriter keyboard, automatic margin control and relocate key, drop in cassette ribbon! (90 day warranty) centronics parallel or RS232 serial port built in (Specify). List $349.00. **SALE $229.95.** ***(Ltd. Qty.)***

14" RGB & COMPOSITE COLOR MONITOR $259.95

Must be used to get 80 columns in color with 80 column computers (C128 - IBM - Apple). (RGB Cable $19.95) Add $14.50 shipping. List $399.00. **SALE $259.95.**

- **LOWEST PRICES • 15 DAY FREE TRIAL**
- **BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL**

PHONE ORDERS
8 a.m. - 8 p.m. C.S.T. Weekdays
9 a.m. - 12 noon C.S.T. Saturdays

- **90 DAY FREE REPLACEMENT WARRANTY**
- **OVER 500 PROGRAMS • FREE CATALOGS**

Add $10.00 for shipping, handling and insurance. Illinois residents please add 6¼% 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. Enclose Cashier Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Prices & Availability subject to change without notice.
VISA — MASTER CARD — C.O.D. No. C.O.D. to Canada, APO-FPO

PROTECTO

We Love Our Customers

22292 N. Pepper Rd., Barrington, Illinois 60010

312/382-5244 to order

Reader Service No. 253

COLOR MONITOR SALE!!!

Sale

16 COLORS

(Premium Quality)

- Built in Speaker & Audio
- For Video Recorders
- For Small Business Computers
- Apple - Commodore -Atari - Aplus 3000 -etc.
- One Year Free Immediate Replacement Warranty



(Premium Quality)

- Beautiful Color Contrast
- High Resolution
- Sharp Clear Text
- Anti-Glare Screen
- 40 Columns x 24 Lines
- Front Panel Controls
- Black Stripe Tube

List $329.00

80 Columns **RGB** Super High Resolution

14" Color Computer Monitor

*C64/Atari composite cable $9.95

* C128 RGB/Composite 80 column cable $19.95.

Sale $149.95*

Add $14.50 Shipping

14" RGB & COMPOSITE COLOR MONITOR

Allows use of C-128 and C64 mode - composite and 80 column RGB mode. Must be used to get 80 columns in color with 80 column computers. Specially designed for use with the C128's special composite video output, plus green screen only option switch. (add $14.50 shipping)

List $399.00 **Sale $259.95***

14" MAGNAVOX Higher Resolution RGB & Composite Monitor

(Add $14.50 Shipping)

Sale $279.95*

12" 80 COLUMN GREEN/AMBER MONITOR

Super high resolution composite green or amber screen monitor. 80 columns x 24 lines, easy to read. Fantastic value. Limited Quantities.

List $129.00 **Sale $79.95***

Turn Your Monitor into a TV Set Without Moving Your Computer

Elegant TV Tuner with dual UHF/VHF selector switches goes between your computer and monitor. Includes mute, automatic fine tuning and computer-TV selector switches. Inputs included for 300 ohm, 75 ohm, and UHF. Can be used with cable TV and VCR's. Fantastic Value. Limited Quantities. (Includes loop antenna for UHF & RCA connecting cables)

List $129.95 **Sale $49.95**

15 Day Free Trial - 90 Day Immediate Replacement Warranty

• LOWEST PRICES • BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL • OVER 500 PROGRAMS • FREE CATALOGS

Add $10.00 for shipping, handling and insurance. Illinois residents please add 6¼% tax. Monitors must be shipped to Continental U.S. Only.
WE DO NOT EXPORT TO OTHER COUNTRIES. Enclose Cashier Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Prices & Availability subject to change without notice.
VISA — MASTER CARD — C.O.D.

PROTECTO

We Love Our Customers

22292 N. Pepper Rd., Barrington, Illinois 60010

312/382-5244 to order

Reader Service No. 253

FLOPPY DISKS SALE *59¢ ea.

Economy Model or C-128 Cadillac Quality

We have the lowest prices!

***ECONOMY DISKS** For use with Commodore 64, Atari, Apple.

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

Bulk Pac	100 Qty.	59¢ ea.	Total Price	$59.00
Box w/ sleeves	10 Qty.	79¢ ea.	Total Price	7.90

☆ C-128 Computer Disks ☆

CADILLAC QUALITY (Double Sided, Double Density) ***Specifically designed for use with C-128***

• Each disk certified • Free replacement lifetime warranty • Automatic dust remover • Works with IBM PC

For those who want cadillac quality we have the C-128 Floppy Disk. Used by professionals because they can rely on C-128 Disks to store important data and programs without fear of loss! Each C-128 disk is 100% certified (an exclusive process) plus each disk carries an exclusive FREE REPLACEMENT LIFETIME WARRANTY. With C-128 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 C-128 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 C-128 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 C-128 disk.

AUTOMATIC DUST REMOVER

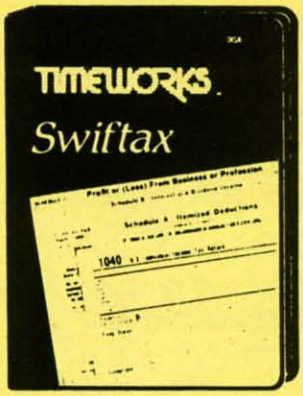
Just like a record needle, disk drive heads must travel hundreds of miles over disk surfaces. Unlike other floppy disks the C-128 smooth surface finish saves disk drive head wear during the life of the disk. (A rough surface will grind your disk drive head like sandpaper). The lint free automatic CLEANING LINER makes sure the disk-killers (dust & dirt) are being constantly cleaned while the disk is being operated.

C-128 Disks are definitely the Cadillac disk in the world

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

1 Box of 10 — $9.90 (99¢ ea.) 5 Boxes of 10 — $44.50 (89¢ ea.) 10 Boxes of 10 — $79.00 (79¢ ea.)

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



Make Your 1985 Income Tax Report Easy!

This program includes:

- An easy to use menu-driven program that will enable you to prepare and complete your Federal income tax returns, yet requires no prior knowledge of computers or accounting.
- A CPA-tested manual, written in easy-to-understand, people-friendly English, abundantly illustrated to help make tax preparation and tax law understandable.
- Full prompting — you will be guided through the tax preparation process by thoughtful, easily-understood instructions (prompts) from your computer display screen.
- Password protection — To prevent unauthorized access to your confidential data.
- A Special Backup Feature — which quickly generates extra backup copies of your recorded information to guard against the loss of important data.

List $49.00 **Sale $29.95**

Add $3.00 for shipping, handling and insurance. Illinois residents please add 6¼% tax. Add $6.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES, EXCEPT CANADA. Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Prices & availability subject to change without notice.
VISA — MASTER CARD — C.O.D. No. C.O.D. to Canada, APO-FPO

PROTECTO

We Love Our Customers

22292 N. Pepper Rd., Barrington, Illinois 60010

312/382-5244 to order

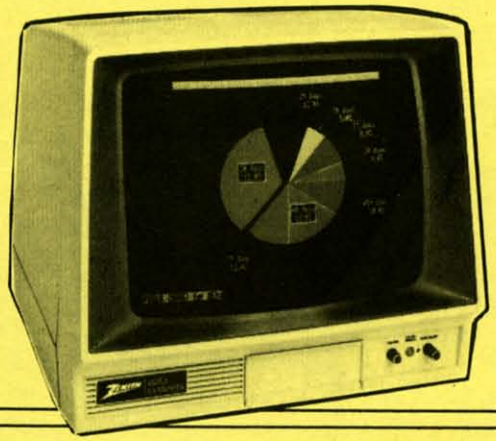
Reader Service No. 253

Computer Cleaners

Your Choice Reg. $19.95 Sale $9.95

½ PRICE SALE

Your Choice Reg. $19.95 Sale $9.95



TV/MONITOR SCREEN RESTORER & CLEANING KIT Sale $9.95

Reduce eye fatigue by increasing the clarity of your TV or monitor screen. This kit contains a hard wax formulation to cover surface imperfections on TV screens and monitors. This restores maximum optical clarity, making what you see more distinct. Plus high absorbency cloths and an auto static spray cleaner allows you to clean your screen on a regular basis to keep your screen looking better than new. (This is a must for those who watch monitors or TVs for extended lengths of time.) List $19.95. **Sale $9.95.**

DISK DRIVE CLEANER Reg. $19.95. Sale $9.95

- 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 & all micro patricles.
- Systematic operator performed maintenance is the best way of ensuring error free use of your computer system.

This unique twin slot jacket design gives twice as many "wet-dry" cleanings per rotation as other leading brands. Non abrasive, 100% lint free, random fiber cleaners capture dust, smoke particles and disk oxide build up which insures you against disk and data loss from dirty disk drive heads just like you must clean your albums and tape players you must clean your disk drive heads to keep your disk drive working well. (24 cleanings per kit.) List $19.95. **Sale $9.95.**





ANTI-STATIC KEYBOARD CLEANER Sale $9.95

Now you can clean your computer keyboard fast, efficiently, and safely. The keyboard cleaning solution is exclusively formulated to remove skin oils, dust, and dirt that can destroy your equipment. Plus this non residue solution with anto-static properties will not build up like ordinary household cleaners so you can clean as much as you like without worry. Plus the lint free, high absorbency, non-abrasive cloths will not scratch or mar your equipment as they pick up dirt and grime in a matter of seconds. List $19.95. **Sale $9.95.**

Add $3.00 for shipping, handling and insurance. Illinois residents please add 6¼% tax. Add $6.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES, EXCEPT CANADA. Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Prices & availability subject to change without notice.
VISA — MASTER CARD — C.O.D. No. C.O.D. to Canada, APO-FPO

PROTECTO

We Love Our Customers

22292 N. Pepper Rd., Barrington, Illinois 60010

312/382-5244 to order

Reader Service No. 253

DEBUGGING

EASING THOSE TROUBLESHOOTING TRIBULATIONS

Eliminating the bugs in a BASIC program can certainly be a frustrating experience. The debugging tools built into BASIC on the VIC 20 and C-64 are minimal at best. Among the many virtues of BASIC 7.0 on the Commodore 128 is a powerful collection of features to help with program development and troubleshooting.

This month we will discuss various commands and techniques which are helpful for tracking down and eliminating program faults on the C-128. They may not make the task of debugging enjoyable, but these methods should at least ease the burden of eradicating *Insectus programma* (pardon the Latin).

One of the major advantages of the BASIC language, besides its ease of being learned, is its interactive nature. BASIC provides a programming environment which allows the programmer to write, run, modify, and rerun a program without leaving BASIC. Someone who deals with compiled languages such as FORTRAN, C, and PASCAL generally pays the price of cumbersome "environment swapping" and a lack of immediacy.

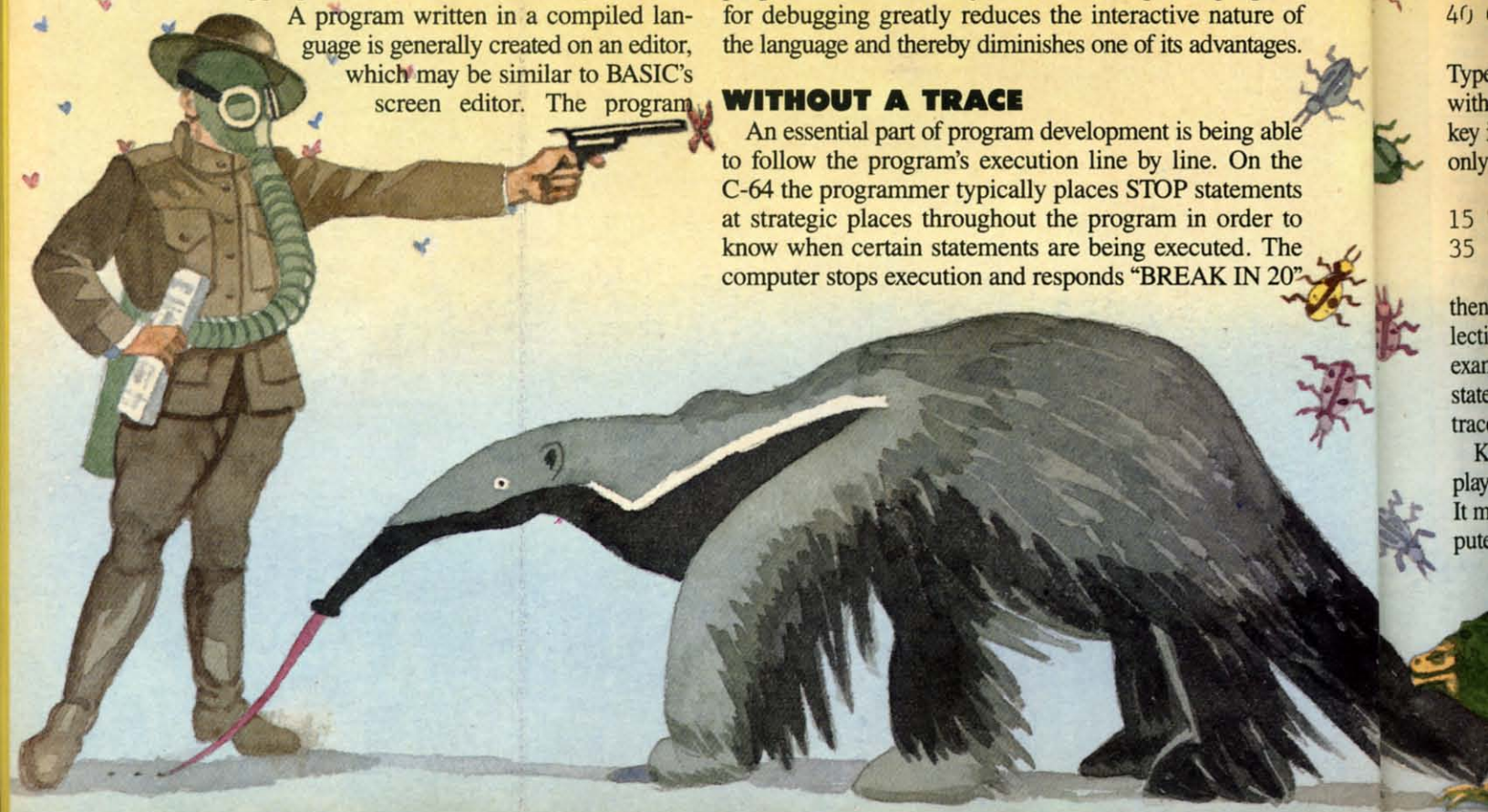
A program written in a compiled language is generally created on an editor, which may be similar to BASIC's screen editor. The program source file, as it is called, must be compiled to create the object file. Typically the object file must be massaged and merged with various library files by sending it through a "linker" program. Then the program is in a form to be executed. If it doesn't run properly, the entire process of editing, compiling, linking, and executing must be repeated.

In contrast, the cycle for an interpreted language such as BASIC is simply edit and execute. If it doesn't run correctly, edit it and run it again. Execution speed is one of the main disadvantages of using an interpreted language. Ease of making changes and testing them is one of the main assets.

Even though a BASIC program can be quickly modified and rerun, knowing what to modify can be difficult if the particular implementation of BASIC provides only limited debugging tools. BASIC 2.0 on the C-64 is very limited. Various utilities have been written and published which simplify the analysis and troubleshooting of C-64 programs. Unfortunately the use of a separate program for debugging greatly reduces the interactive nature of the language and thereby diminishes one of its advantages.

WITHOUT A TRACE

An essential part of program development is being able to follow the program's execution line by line. On the C-64 the programmer typically places STOP statements at strategic places throughout the program in order to know when certain statements are being executed. The computer stops execution and responds "BREAK IN 20"



DILEMMAS

BY DALE RUPERT

when a STOP statement in line 20 is reached. The programmer may then type CONT, and the program will continue up to the next STOP statement. There is no convenient way to trace the program flow.

The C-128 provides a "trace" mode of operation in which the currently executed line number is displayed on the screen as the program is run. To follow the entire program sequence, we may type TRON (meaning "trace mode on") before typing RUN. The line number of each executed statement is displayed in square brackets. The line number is repeated if there is more than one statement on the line. The TROFF statement disables the trace mode.

It is frequently desirable to trace only portions of a program. We may add TRON and TROFF statements to the program surrounding those portions. For example, enter this program:

```
10 GET A$ : IF A$="" THEN 10
20 IF A$="Y" THEN A$="YES"
30 PRINT A$
40 GOTO 10
```

Type TRON then type RUN. The screen is quickly filled with [10]'s as the program loops at line 10. Whenever a key is pressed, lines 20, 30, and 40 are executed. To trace only the interesting parts of this program, add these lines:

```
15 TRON
35 TROFF
```

then type TROFF and RUN. Now the trace function is selectively enabled and disabled. This is obviously a trivial example. (A better program would use the GETKEY A$ statement in line 10, anyway.) But the ability to turn the trace on and off within a program is clearly very useful.

Keep in mind that the NoScroll key will freeze the display and allow you to study the trace output on the screen. It may also be easier to follow the program with the computer in the SLOW mode rather than in the FAST mode. Simply type SLOW or FAST before running. Occasionally we might add the SLOW and FAST statements to the program itself to give a better handle on what the program is doing.

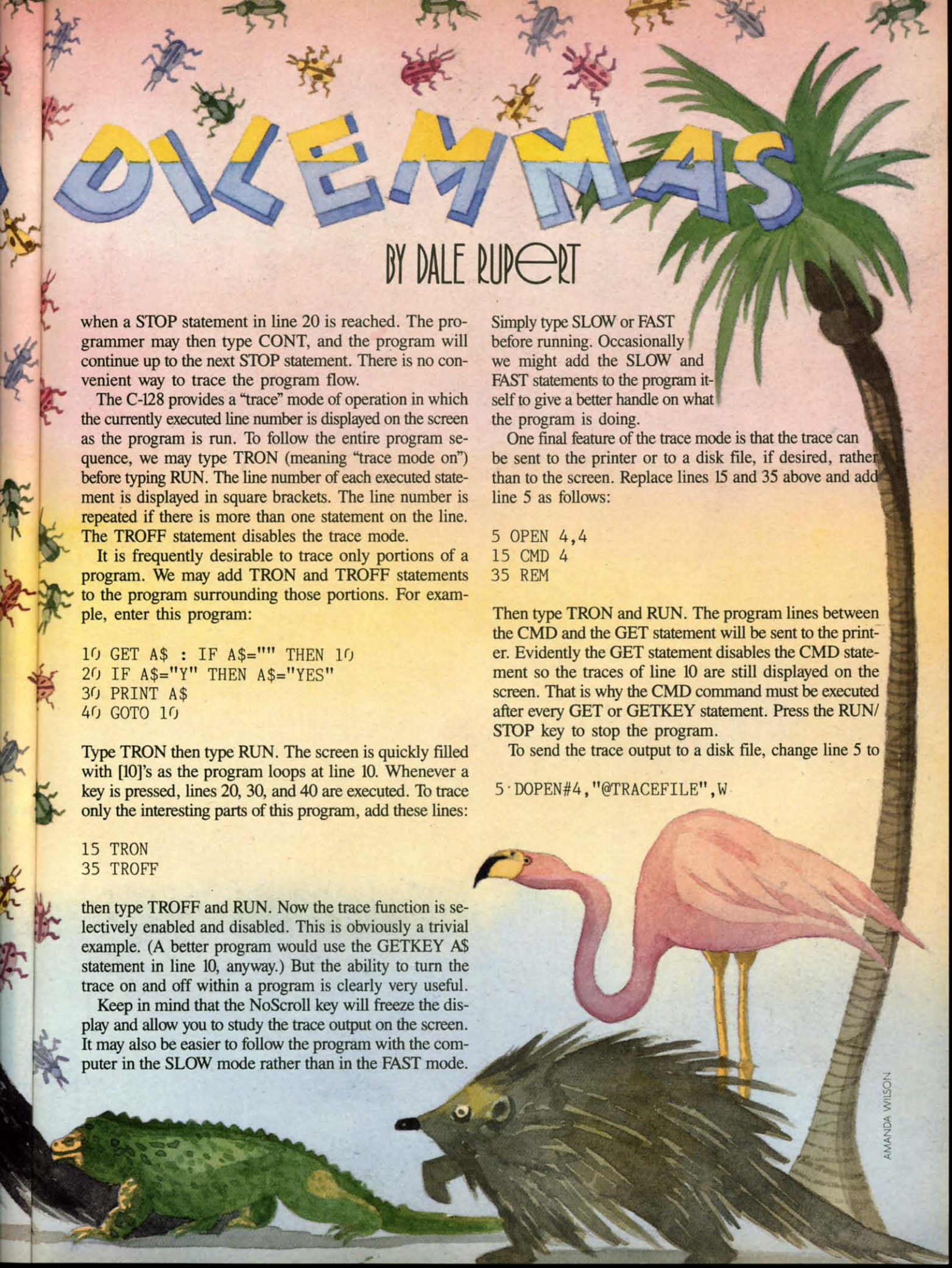
One final feature of the trace mode is that the trace can be sent to the printer or to a disk file, if desired, rather than to the screen. Replace lines 15 and 35 above and add line 5 as follows:

```
5 OPEN 4,4
15 CMD 4
35 REM
```

Then type TRON and RUN. The program lines between the CMD and the GET statement will be sent to the printer. Evidently the GET statement disables the CMD statement so the traces of line 10 are still displayed on the screen. That is why the CMD command must be executed after every GET or GETKEY statement. Press the RUN/STOP key to stop the program.

To send the trace output to a disk file, change line 5 to

```
5 DOPEN#4,"@TRACEFILE",W
```



AMANDA WILSON



Back Issues

Try this experiment! Flip through any issue of *Ahoy!* that you've finished reading. Add up the hours of programming toil our feature articles and tutorials saved you—the hours of shopping our expansive news section saved you—and the money our unbiased reviews saved you—and see if the magazine didn't pay for itself! Then ask yourself: can you afford to be without a single time- and money-saving back issue?

If you're serious about programming, you can't be serious about continuing without a complete collection of *Ahoy!*

SORRY... ISSUES #1, 2, AND 4 SOLD OUT!

ISSUE #22—OCT. '85 $4.00
Create cartoon characters! Infinitesimal intrigue! Inside copy protection! And ready to enter: Shotgun! Maestro! Solitaire! Mystery at Mycroft Mews! Gravinauts! 1541 Cleaning Utility! ShadeyDump!

ISSUE #23—NOV. '85 $4.00
Adventure gaming! ML sprite manipulation! BASIC for beginners! And ready to enter: Lightning Loader! Knight's Tour! Chopper Flight! Rhythmic Bits! Instant Bug Repellent! File Scout! Slither!

ISSUE #3—MAR. '84 $4.00
Anatomy of the 64! Printer interfacing for VIC & 64! Educational software series begins! And ready to enter: Address Book! Space Lanes! Random Files on the 64! Dynamic Power!

ISSUE #10—OCT. '84 $4.00
C-64 graphics programs! Bit-mapped graphics! Joystick programming! And ready to enter: VIC 40 Column Operating System! BAM Read & Print! Emerald Elephant! Lawn Job!

ISSUE #16—APR. '85 $4.00
Assembly language column begins! Programming the joystick! 1541 disk drive alternatives! And ready to enter: Hop Around! Faster 64! Booter! Elecheck! BASIC Trace! Space Hunt!

ISSUE #24—DEC. '85 $4.00
Speech synthesizers! The IBM Connection! The year's 25 best entertainments! And ready to enter: Gypsy Starship! Directory Manipulator! Cloak! Gameloader! Jewel Quest! Lineout! Santa's Busy Day!

ISSUE #5—MAY '84 $4.00
Future of Commodore! Inside BASIC storage! Memory management on the VIC & 64! Guide to spreadsheets! And ready to enter: Math Master! Air Assault! Biorhythms! VIC Calculator!

ISSUE #11—NOV. '84 $4.00
Music programs & keyboards for the 64! Graphics feature continues! And ready to enter: PTE word processor! Block Editor! Alternate Character Set for the 64! The Tunnel of Tomachon!

ISSUE #17—MAY '85 $4.00
Disk drive enhancements! Install a reset switch! Assembler escapades! And ready to enter: Super Duper! Two-Column Directory! DSKDU! Raid! DOS Plus! Font Editor! Tile Time!

ISSUE #25—JAN. '86 $4.00
Build a speech synthesizer! Survey of sports games! And ready to enter: The Martian Monsters! Streamer Font! Microsim! The Haunted Castle! Knockout! Infraraid! Alarm Clock! Memory Check!

ISSUE #6—JUNE '84 $4.00
Game programming column begins! Program generators! Rupert on inputting! Memory management continues! And ready to enter: Post Time for the 64 & VIC! Alpiner! Sound Concept!

ISSUE #12—DEC. '84 $4.00
Buyer's guide to printers! 1525 printer tutorial! Custom characters! User Guide to KMMM Pascal! Diving into BASIC! And ready to enter: Construction Co.! Space Patrol! Cross Ref!

ISSUE #18—JUNE '85 $4.00
Music & graphics entry systems! How modems work! Inside the 6510! And ready to enter: Quad-print! Mapping 4.4! Towers of Hanoi! Speedy! Duck Shoot! The 6510 Simulator!

ISSUE #26—FEB. '86 $4.00
Windows! Build an auto-exec cartridge! Align your 1541! Survey of flight simulators! Structured programming! And ready to enter: Arena! Head to Head! Crabfight! Treasure Wheel! Character Dump!

ISSUE #7—JULY '84 $4.00
MSD dual disk drive! Database buyer's guide! Training your cursor! Screen displays! File Sleuth! Users Groups! And ready to enter: Renumbering! Checklist! Math Defender! Brisk!

ISSUE #13—JAN. '85 $4.00
VIC/64 OS exposed! Sprites! 1541 device # disconnect switch! Ghostbusters! And ready to enter: Ultra Mail! Music Tutor! Alice in Adventureland! Midprint! To the Top! Tape/Disk Transfer!

ISSUE #19—JULY '85 $4.00
PROM programming! 3-part harmonies on VIC/64! Speeding pixels! And ready to enter: Auto-Append! Script Analysis! Wizard of Im! Lucky Lottery! Brainframe! Etch! Printat!

ISSUE #27—MAR. '86 $4.00
Programming educational games! Memory dumpers! Choosing a copy program! Custom characters! And ready to enter: Ahoy! Term 128! Trivia Game Maker! Brickbusters! Easy Lister! Programmer's Aid!

ISSUE #8—AUG. '84 $4.00
Choosing a word processor! Computational wizardry! Creating your own word games! Sound on the 64! And ready to enter: Micro-Minder! Directory Assistance! The Terrible Twins!

ISSUE #14—FEB. '85 $4.00
Printer interfacing! Multicolor sprites! Modems! Bulletin boards! Theory of game design! And ready to enter: Futurewar! Fontasia! VIC Eraser! Insurance Agent! Flankspeed! Telelink 64!

ISSUE #20—AUG. '85 $4.00
Inside the 128! Read-world simulations! Sound effects! And ready to enter: Windows! Formatter! Sound-a-Rama! Screen Dump! Selectachrome! Disintegrator! Fidgits! Gators N Snakes!

ISSUE #28—APR. '86 $4.00
Comet catching! Survey of action and strategy games! Screen dumping! And ready to enter: Chrono-Wedge! Mr. Mysto! Air Rescue! Notemaker! Screen Window! JCALC! Hidden Cavern! Swoop!

ISSUE #9—SEPT. '84 $4.00
Program your own text adventure! Build a C-64 cassette interface! Video RAM! And ready to enter: Salvage Diver! DOS! Sound Explorer! The Castle of Darkness! Base Conversions!

ISSUE #15—MAR. '85 $4.00
Making multiscreen gameboards! Inside the Plus/4! Commodore DOS! And ready to enter: Old Routine! Programmable Functions! Automatic Line Nos.! Home Budget! Salmon Run!

ISSUE #21—SEP. '85 $4.00
Inside the 1571 drive and 128 keyboard! Sprite programming! And ready to enter: Fastnew! Go-Lister! File Lock! Dragon Type! Superhero! Auto-Gen! Moxey's Porch! Fish Math!

ISSUE #29—MAY '86 $4.00
128 graphic bit map! Epyx strategy guide! 128 commands! ML music programming! And ready to enter: Bigprint! Star Search! Failsafe! English Darts! Ski Folly! Free RAM Check! Alchemist's Apprentice!

Use coupon or facsimile. If ordering more than three issues, list choices on separate sheet.

If you have a modem and want more complete information on any of the back issues listed, call *Ahoy!*'s Bulletin Board Service at 718-383-8909.

Ahoy!
BACK ISSUES
ION
INTERNATIONAL INC.
45 West 34th Street
Suite 407
New York, NY 10001

Please Send Me The Following:

_____ Copies of issue number _____
_____ Copies of issue number _____
_____ Copies of issue number _____

Enclosed Please Find My Check or Money Order for $_____
(Outside the USA please add $1.00 for every copy)

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP CODE _____

The "@" allows the file to be rewritten. The CMD 4 command in line 15 causes the trace output to be stored in a sequential disk file called "TRACEFILE". Again type TRON and RUN, then press various keys. Press the RUN/STOP key to stop execution. Finally type PRINT#4 : DCLOSE to close the file.

To display this sequential file once it has been created, add this simple three-line routine:

```
100 DOPEN#4,"TRACEFILE",R
110 DO WHILE ST=0 : GET#4,A$ : PRINT A$;
 : LOOP
120 DCLOSE : END
```

Type TROFF then RUN 100 to display the trace file.

MORE BASIC HELP

Another nice feature of BASIC 7.0 is the HELP command. When the interpreter runs into a syntax error or any other error, execution is halted and a message describing the error and the line number is displayed. Normally we would LIST the offending line, identify the problem, and edit the program.

If the fault occurred in a multistatement line, it may not be obvious as to which statement created the error. Pressing the HELP key on the C-128 (or typing HELP) causes the line containing the error to be listed. Furthermore the faulty statement and all succeeding statements on the line are underlined (in 80 column mode) or highlighted (in 40 column mode).

The line may be conveniently corrected and entered, and the program may be rerun. Keep in mind that an error identified in a READ statement may actually be in the associated DATA statement.

Don't forget that the current values of all variables are retained in memory even if an error occurs. Typing PRINT X in direct mode will show the value of the variable X when the program stopped. On the C-64 and VIC 20, be sure NOT to make any changes to the program, however, until you have displayed the values of any relevant variables. Once a line has been edited or a new line has been added on those computers, the values of all variables are lost. More on that in a moment.

One more useful technique is to change the value of a variable in direct mode and to restart the program from some strategic location. The only catch is that you must use the GOTO statement, *not* the RUN statement. For example, type

```
X=2 : GOTO 20
```

to change the value of X and to continue execution at line 20. This works even if the program was halted because of an error. If you type RUN 20, the values of all variables are reset to zero or the null string before execution starts at line 20.

Type this example:

```
10 X = 5 : A$ = "HELLO"
20 PRINT X : PLINT A$ :REM NOTE TYPO ERR
OR
30 PRINT X,A$
```

Type RUN and you will see the value of X followed by ?SYNTAX ERROR IN 20. Press the HELP key to list line 20 with the PLINT and REM statements underlined or highlighted.

If you now enter PRINT A$ in direct mode, its value is displayed. Enter GOTO 30 and you will see that X and A$ still have their proper values.

At this point, the C-128 and the C-64 part company. If you change, add, or delete any lines on the C-64 (or VIC 20), all variables are automatically reset. Change the PLINT to PRINT in line 20 then type GOTO 30. On the C-64, the values of X and A$ are 0 and the null string respectively. On the C-128, X and A$ still retain their last assigned values.

The C-128 has a memory space for the program which is separate from the storage areas for the variables. On the C-64, numeric variables are stored in the memory locations immediately following the program. Any changes to the program could overwrite the variable storage area. Therefore the C-64 simply clears all variables whenever the program is edited. In the C-128, the program cannot infringe upon the variable storage area, hence there is no need to clear the variables after editing.

MONITORING BASIC

The final aspect of debugging and troubleshooting we shall discuss deals with the internal storage of the BASIC program and its variables. Let's look at some of the ways that the C-128's built-in monitor can help analyze the inner workings of our programs.

One of the most frustrating problems to debug involves the internal round-off of variables. For example, this program prints two 5's on the screen but tells us that they are not equal:

```
10 XA=5 : YB=SQR(25)
20 PRINT "XA =" XA
30 PRINT "YB =" YB
40 IF XA <> YB THEN PRINT "XA DOES NOT E
QUAL YB"
```

In the April 1984 *Rupert Report* we discussed this problem in detail. We used BASIC routines to look at the internal storage of variables. With the C-128's monitor and the POINTER function, we can investigate the storage of variables much more easily.

Add this line to the program above, then RUN it again.

```
50 PRINT HEX$(POINTER(XA)),HEX$(POINTER(
YB))
```

The hexadecimal values 0402 and 0409 are displayed. These numbers represent the memory locations in BANK

1 where the values of XA and YB begin.

Enter the MONITOR by pressing SHIFT-f8 or by typing MONITOR. Type M 10400 1040F. Sixteen memory locations beginning at address 10400 are displayed. The leading 1 in the address represents the BANK number. The numeric display looks like this:

```
>10400 58 41 83 20 00 00 00 59 42 83 20
00 00 01
```

where the last two pairs of digits are irrelevant. The 58 41 corresponds to the hexadecimal (hex) values of the characters "XA". ("X" is CHR$(88), and 58 is the hex equivalent of decimal 88. Refer to Appendix E of the *C-128 System Guide* for the ASCII character values in decimal.)

The right side of the screen displays the ASCII characters XA and YB as well as dots for the unprintable characters. We saw that HEX$(POINTER(XA)) gave a value of 0402. The five bytes beginning at 10402 are the internal representation of the value of XA: 83 20 00 00 00. The five bytes beginning at 10409 correspond to the value of YB: 83 20 00 00 01. Clearly XA is stored differently from YB, although both of them are displayed as "5" on the screen.

To see the power the monitor gives us, move the cursor over to the 01 and change it to 00 and then press RETURN. Next type X and RETURN to exit from the monitor. At the READY prompt, enter GOTO 20. Lo and behold, the PRINT statement in line 40 is bypassed! We have modified the stored value of YB so that XA does equal YB.

If you like to explore, make other changes to the stored values with the monitor. Back in BASIC, PRINT the changed variable. For example, change the 83 to 84 at location 10402. In BASIC, type PRINT XA. XA now has the value 10.

Changing variable values with the monitor is not generally useful in troubleshooting. The monitor is more likely to be used just to see how different variables are stored. In the examples above, XA and YB are floating point variables. The storage formats for variables other than floating point variables are different from this.

For example, type NEW then enter the following program:

```
10 XA$="HELLO": PRINT HEX$(POINTER(XA$))
20 XA%=32767  : PRINT HEX$(POINTER(XA%))
30 XA%(2)=32767: PRINT HEX$(POINTER(XA%(
2)))
40 XA=5 : PRINT HEX$(POINTER(XA))
```

RUN the program. The four pointers printed are 0402, 0409, 0419, and 0410. Now enter the monitor. Type M 10400 10420 to see the internal storage of these four variables. The variable type is encoded in the variable name. For example, XA$ is shown as "58 C1" in locations 10400 and 10401. If the second character has a value greater than $80 (hexadecimal 80), it is known to be a string variable. If both the first and second characters have values greater than $80, the variable is an integer.

The variable name XA% is stored as "D8 C1" starting at location 10407. Subtracting $80 from each of these numbers gives "58 41" which corresponds to the characters "XA" that we saw above. The value of XA% is 32767 which is $7FFF in hexadecimal. The two bytes $7F and $FF are shown starting at location 10409, agreeing with the POINTER value printed earlier.

The string variable XA$ begins at 10400. The first two bytes "58 C1" are the encoded variable name. The next byte "05" is the length of the string. The next two bytes "F9 FE" form a pointer to the actual storage location. These bytes are in reverse order from the way they must be typed following the M command. Type M 1FEF9 to see the value of the string. At the right side of the display are the characters "HELLO".

Array variables are stored after the scalar string and numeric variables. The first bytes of XA%( ) are as follows:

```
D8 C1 1D 00 01 00 0B 00 00 00 00 7F FF
```

The variable name "D8 C1" is encoded the same as for other integer variables. The next two bytes "1D 00" indicate the total number of bytes used by this variable, namely $001D or 29. The next byte "01" specifies the number of dimensions in the array. The next two bytes "0B 00" tell that there are $000B, or 11, elements in that one dimension, namely XA%(0) through XA%(10). A DIM statement must be used to allocate more or fewer than eleven elements per dimension.

There are two pairs of "00 00" corresponding to XA%(0) and XA%(1). XA%(2) is stored as "7F FF" which is $7FFF or 32767. In a similar manner, the enthusiastic reader may investigate the storage of arrays with more than one dimension.

There is one other set of diagnostic tools built into BASIC 7.0, the TRAP/RESUME statements and the error message variables. These features can be helpful during troubleshooting and debugging. Their primary use is for making a program foolproof, even when the program is run by an inexperienced operator. We will discuss these concepts in a future column. □

ERRATA

Air Rescue, Hidden Cavern (April)

It may have seemed like a cruel April Fool's joke, but the only fools were we, for omitting portions of the abovenamed programs during printing. Call or write us to receive the missing sections (too lengthy to print) by return mail.

Comet Catcher (April)

Bitmapper's routine for drawing the sun was missing one line. Insert the following:

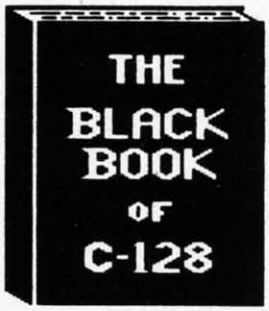
```
50 GOSUB 2000
```

VALUE-SOFT
9513 S.W. Barbur Blvd. B-56
Portland,Oregon 97219



TO ORDER — TOLL FREE
1-800-544-SOFT
Alaska & Hawaii call:
(503) 246-0929
$2.00 S & H, Visa & Master Card gladly

THE REFERENCE HANDBOOK FOR THE C-128



YOU HAVE JUST PURCHASED ONE OF THE FINEST COMPUTERS COMMODORE HAS EVER OFFERED, NOW YOU NEED THE BEST REFERENCE MANUAL ON THE MARKET. YOU MAY NEVER NEED TO BUY ANOTHER MANUAL FOR THE C-128. BLACK BOOK, HAS IT ALL. THE AIM OF THE AUTHOR IS TO GIVE THE USER, AS MUCH INFORMATION, IN AS SMALL OF SPACE AS POSSIBLE. PLUS EVERYTHING IS IN PLAIN ENGLISH. THIS IS NOT THE START OF A SERIES AS SOME PUBLISHERS HAVE DONE, IT'S ALL IN ONE VOLUME.

OVER 75 EASY TO READ CHARTS AND TABLES
OVER 175 PAGES OF SOLID INFORMATION
NOT ONE WASTED PAGE
LAYS FLAT FOR EASY READING
COLOR CODED, ALWAYS FIND WHAT YOU NEED

WHAT BLACK BOOK WON'T TELL YOU.....

HOW TO UN-PACK THE C-128
HOW TO HOOK-UP THE C-128
TEN PAGES ON WHAT THE KEYS ARE FOR
FIFTY PAGES ON BASIC PROGRAM COMMANDS

WE ARE SO CERTAIN YOU WILL LIKE THE BLACK BOOK OF C-128, THAT WE MAKE THIS UNUSUAL OFFER: IF YOU DON'T FEEL THAT IT CONTAINS MORE INFORMATION THAN ANY OTHER REFERENCE BOOK FOR THE C-128, SEND IT BACK IN GOOD CONDITION WITHIN 10 DAYS. WE WILL REFUND THE PURCHASE PRICE WITH A SMILE.

$15.95

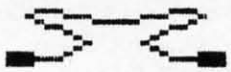
$ — SAVER SWITCH $29.95

USE THE SAVER SWITCH TO CONNECT TWO COMPUTERS TO ONE PRINTER, OR ONE DISK DRIVE. BETTER YET, USE ONLY ONE DRIVE AND ONE PRINTER FOR TWO COMPUTERS. MAYBE YOU WOULD RATHER CONECT TWO PRINTERS TO ONE COMPUTER, JUST THINK NO MORE CHANGING FROM LABELS TO LETTER HEAD ALL THE TIME. A FLIP OF THE SWITCH CHANGES THE DEVICE FROM ONE TO THE OTHER. SAVE BIG BUCKS WHERE MORE THAN ONE COMPUTER NEEDS TO ACCESS THE SAME DEVICE. PLUGS IN - NO ALTERATIONS OR EXTRAS NEEDED. STOP SWITCHING CABLES TODAY.



VIC-20 C-16 PLUS 4 C-64 C-128

9 FOOT CABLE



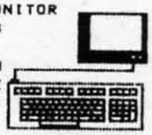
DISK DRIVES & PRINTERS $8.95

PROGRAMMER'S KIT $18.95

OVER 150 SUBROUTINES ON DISK. PREVIEW BEFORE YOU USE. JUST ADD TO YOUR OWN CODE. SORTS, INPUT, GRAPHICS, PRINTER & DISK OPERATION, ALPHABETS, ETC. WHY RE-INVENT THE WHEEL, PROGRAM THE EASY WAY. FOR THE C-64.

C-128 VIDEO CABLE $12.95

NO NEED TO BUY A NEW MONITOR FOR YOUR 128. WITH THIS CABLE YOU CAN USE YOUR 1701/1702 FOR 80 COLUMN MONOCHROME OUTPUT, SAVE DOLLARS, TAKE THE WIFE OUT TO DINNER.



PROTECTION REVEALED $19.95

TAKE COMMAND OF YOUR SOFTWARE. END THE SPIRAL OF BUYING COPY PROGRAMS. THE PROTECTION REVEALED HANDBOOK UNRAVELS THE PUZZLE OF SOFTWARE PROTECTION. FOR AUTHORS AND USERS BECOME A MASTER OF ILLUSION. LEARN HOW TO PROTECT OR UN-PROTECT YOUR SOFTWARE. INCLUDES A LARGE SECTION ON SUCCESSFUL BASIC PROGRAM SECURITY. COVERS THE LATEST EVOLUTION OF COPY PROTECTION TECHNIQUES. TOPICS INCLUDE:

DISK ERRORS	DE-COMPILERS	EXTRA SECTORS
COMPILERS	DENSITY CHANGES	GAP BYTES
HALF TRACKS	NIBBLE BACK-UP	GUARD BAND
NIBBLE COUNTING	DOS PROTECTION	AUTO-LOADERS

REVEALS THE MYSTICAL TRADE SECRETS OF THE C-64 A FREE DISK CONTAINING 21 UTILITY PROGRAMS IS INCLUDED. THIS BOOK IS WRITTEN FOR EVERYONE

VIDEO LOG $19.95

HAVE YOU EVER THOUGHT OF CATALOGING ALL THOSE MOVIES YOU HAVE BEEN SAVING ON VIDEO TAPE?

NOW YOU CAN DO THE JOB ON YOUR C-64 OR C-128. IN TRUE C-128 MODE, VIDEO LOG CAN HANDLE 2,000 FILMS OR 500 TAPES. THE C-64 VERSION ALLOWS FOR 1,000 TITLES OR 250 TAPES. A PRINTER IS NOT REQUIRED, BUT IF YOU HAVE ONE, PRINT COMPLETE CATALOGS OF YOUR LIBRARY OR LABELS FOR YOUR TAPES. LIST BY TAPE NUMBER OR FILM NAME. INFORMATION SAVED, TAPE NUMBER, FILM TITLE, COUNTER START AND END, LENGTH IN MINUTES, PLUS CATEGORY.

PLEASE STATE WHICH COMPUTER (C-64 OR C-128) PROGRAM YOU WANT, AS THIS ONE RUNS IN TRUE 128 MODE ALSO.

FOR THE C-64 & C-128

POSTAL CLERK



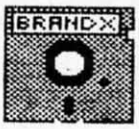
C-64 $19.95

KEEP IN TOUCH WITH CUSTOMERS, FRIENDS AND OTHERS. MAKE FULL USE OF BUSINESS LISTS. TURN MAIL LISTS INTO POWERFUL SELLING TOOLS. PRINTS TELEPHONE LISTS PLUS MAILING LABELS. 2,500 ENTRIES, AND SORTS BY NAME, CITY, STATE, & ZIP OR GROUP.

SUPER HELP C-64 $15.95

THE PROGRAMMER'S BEST FRIEND.....
1. POSTER SIZE (21X25) SCREEN & COLOR MAP. NEVER HUNT FOR THAT POKE AGAIN
2. C-64 MEMORY MAP, ONE OF THE MOST COMPLETE ON THE MARKET.
3. 18 BOUND REFERENCE CARDS. COMMANDS FOR DISK DRIVE, PRINTERS, & COMPUTER AT YOUR FINGER TIPS, GREAT FOR ANY LEVEL OF USER.

BRAND X C-64 $19.95



HAS YOUR DISK LIBRARY GROWN? CAN'T FIND A PROGRAM WHEN YOU WANT? BRAND X THE DISK CATALOGER CAN SOLVE THE PROBLEM. 4,000 ENTRIES/100 DISKS. ADD, SAVE, FORMAT, SCRATCH, ETC. IDENTIFIES 14 FILE TYPES. PRINTS LIST IN ONE, TWO OR THREE COLUMNS, PLUS LABELS. STOP DISK CONFUSION WITH BRAND X.

Reader Service No. 278

LAZYBASIC

Painless Program Entry for Basically 'Shiftless' Typists

By Michael Bennett

This may be the most user-friendly BASIC shorthand program you have ever seen, with many additional features that make it a painless way to enter BASIC programs.

I am a very lazy typist, and the keyboard symbols that require the most work are the ones which can only be accessed by holding down a SHIFT key and stretching your finger. *LazyBASIC* changes that for some of the most useful symbols in BASIC programming, such as the parenthesis and the $ sign. Instead, you access them by hitting one of the shiftless function keys, fl through f7, and then (at your leisure) hitting one of the letter keys. In the same way you are allowed two-stroke access to all the BASIC keywords that are longer than two letters (since two strokes doesn't save you any time with those). The only exception to this rule is CONT, which is left out because it is never used in program mode.

Unlike other shorthand programs, *LazyBASIC* doesn't force you to memorize which keys to hit. It provides you with an onscreen menu that is refreshed every time you hit the RETURN key. The BASIC keywords are listed alphabetically in columns that are headed by the function key you must hit prior to hitting the letters (A-Q) which correspond to the keyword you want.

Since the menu covers the top three quarters of the screen, your writing takes place on the bottom of the screen, and your BASIC program lines scroll upward under the menu. Which brings me to the other lazy feature, automatic line numbers!

To active auto-line numbers, press f6 and you will be asked "Jump Between Lines?(1-255)". After giving your answer and pressing RETURN, press f8. You will be asked "What's Your Line#?" After answering, press RETURN twice, and the first line number will appear. To deactivate auto-line numbers, just hit the RETURN key on a line that only has the line number on it.

The ever-present menu may get in the way at times, such as when you want to list your program. The menu indicates DIE! in the lower right hand corner, and by pressing f7 followed by the letter Q you turn off the *LazyBASIC* and receive a message in reverse video: "OK!! I'm Dead!!—Sys 49152 to revive me!!"

In order to eliminate the letters A-Q while using them to get other things, I stuffed the keyboard buffer with a space and a delete. The only time this becomes a nuisance is when you are in quote mode, which is a nuisance anyway!

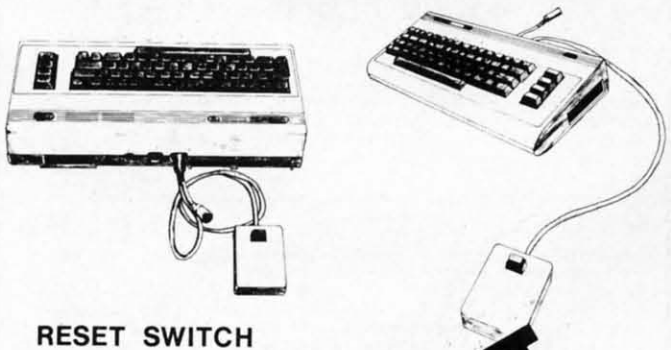
If you use the *LazyBASIC* Quotemark, the ending quote will be preceded by a space and a delete symbol. Since these two cancel each other out, it has little practical significance unless your program line is very lengthy and the space and delete push you over the limit. For that situation and for mere cosmetic considerations, you may want to shove the last quote mark to the left after printing it out. Unlike a used car salesman, I am willing to point out such minor flaws.

Oh, I almost forgot. I couldn't stand to have two function keys left twiddling their thumbs, so f2 and f4 will toggle the colors of your screen and your border until they match the mood of your programming soul.

Finally, if you hit a key other than A through Q, a message will appear beneath the menu that informs you of that mistake. It changes from reverse video to regular lettering with arrows so you know if it has happened more than once within a line. Some finicky computers may generate this at odd times, and POKEing 650,0 to turn off key repeats can help eliminate these quirks. □

SEE PROGRAM LISTING ON PAGE 99

PANIC BUTTON



RESET SWITCH

$19.95

BASIC RECOVER PRO... ...DED
UNLOCKS "FROZEN" P... ...15
PLUGS IN ...SERIAL AND USERPORT
ALL... ...OF BOTH PORTS
...THE LIFE OF YOUR COMPUTER
...ATIBLE WITH COMMODORE 64, 128 AND VIC 20
1 YEAR WARRANTY

SOLD OUT

Mail Check Or Money Order To:
MICROVATIONS
8920 ARCTURUS WAY
SAN DIEGO, CA. 92126

CA Residents Add 6% Sales Tax
Shipping: Add $1.75 for Ground
COD $3.00 2nd Day Air

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

Dealers Welcomed Phone (619) 282-6200

Reader Service No. 285

Software Discounters of America



For Orders Only—1-800-225-7638
PA Orders—1-800-223-7784
Customer Service 412-361-5291

Open Saturday

- Free shipping on orders over $100 in continental USA
- No surcharge for VISA/MasterCard
- Your card is not charged until we ship

ABACUS
Basic 128 CALL
Chart Pak 128 CALL
Power Plan 64 FOR
Super C 128 PRICES
Super Pascal 128
ACCESS
Beach Head 2 (D) $24
Leader Board (D) $25
Mach 5 (R) $23
Mach 128 (R) $33
ACTIVISION
Alter Ego Male (D) $33
Borrowed Time (D) $19
Fast Tracks: Slot Car Const. Kit (D) $21
Garry Kitchen's Gamemaker (D) $25
Great American Cross-Country Road Race (D) $19
Hacker (D) $19
Little Computer People (D) $23
Master of Lamps (D) $19
Mindshadow (D) $19
Space Shuttle (D) $19
ACCOLADE
Dambusters (D) $19
Fight Night (D) $19
Hard Ball (D) $19
Law of the West (D) $19
PSI-5 Trading Co. (D) $19
AMERICAN EDUCATIONAL
Biology (D) $14
French (D) $14
Grammar (D) $14
Science: Grades 3/4(D) $14
Science: Grades 5/6(D) $14
Science: Grades 7/8(D) $14
Spanish (D) $14
U.S. Geography (D) $14
World Geography (D) $14
World History (D) $14
ARTWORX
Bridge 4.0 (D) $16
Int'l Hockey (D) $19
Strip Poker (D) $21
Data Disk #1 female $16
Data Disk #2 male $16
Data Disk #3 female $16
ARTWORX PX
Baker St. Detective (D) $7
Cavefighter (D) $7
Galaxy (D) $7
Hole In One Golf (D) $7
Hotel Alien (D) $7
Jumpin' Jimmy (D) $7
Pro Boxing (D) $7
Zodiac (D) $7
AVALON HILL
Gulf Strike (D) $19
Jupiter Mission 1999(D) $23
Parthian Kings (D) $19
Ripper (D) $19
Super Bowl Sunday (D) $21
SBS 1984 Team Disk $14
S.B.S. Champs Disk $14
Tournament Golf (D) $19
BATTERIES INCLUDED
Consultant (64 or128) $39
Home Pak (D) $33
Paperclip 64 or 128 $39
Paperclip w/Spell 64 or 128 $49
BERKELEY SOFTWORKS
Geos (D) $39
BRODERBUND
Bank St. Filer (D) $33
Bank St. Mailer (D) $33
Bank St. Writer (D) $33
Bank St. Speller (D) $33
Karateka (D) $19
Music Shop (D) $29
Print Shop (D) $26
P.S. Companion (D) $25
P.S. Graphics Library #1, #2, or #3 $16 Ea.
P.S. Paper Refill $14
CARDCO
Calc Now (D) $14
File Now (D) $14
Freeze Frame (R) $33
Graph Now (D) $14
G-wiz Printer Int. $47
Mail Now (D) $14
S'more (R) $47
S'more Basic Compiler (D) $25
Write Now (R) $19
CBS
Argos Expedition (D) $9
Astro Grover (D) $9
Big Bird's Funhouse(R) $9
Dr. Seuss (D) $9
Ernie's Big Splash (D) $9
Grover's Animal Adventures (D) $9
Felony (D) $16
Mastering the SAT (D) $44
Math Mileage (D) $9
Mr. Rogers (D) $9
Murder by the Dozen (D) $16
Railroad Works (D) $9
Rich Scarry's Electronic Word Book (D) $14
Sesame St. Letter-Go-Round (R) $9
Sesame St. Pals Around Town (R) $9
Success w/Algebra Call
Success w/Math Call
Weather Tamers (D) $9
DATASOFT
Alternate Reality (D) $25
Bruce Lee (D) $19
The Goonies (D) $19
Never Ending Story (D) $19
DAVIDSON
Math Blaster (D) $33
Speed Reader 2 (D) $43
Spell It (D) $33
Word Attack (D) $33
DESIGNWARE
Body Transparent (D) $27
Grammar Examiner(D) $27
Mission Algebra (D) $27
Spellicopter (D) $25
States & Traits (D) $27
ELECTRONIC ARTS
Adv. Const. Set (D)
Archon 2: Adept (D)
Bard's Tale (D)
Carriers at War (D)
Europe Ablaze (D)
Heart of Africa (D)
Mail Order Monsters (D)
Movie Maker (D)
Music Const. Set (D)
One-on-One (D)
Pinball Const. Set (D)
Racing Dest. Set (D)
Seven Cities of Gold (D)
Skyfox (D)
Super Boulder Dash (D)
Touchdown Football (D)
Prices too low to advertise!! Call
EPYX
Ballblazer (D) $25
Barbie (D) $9
Breakdance (D) $9
Fast Load (R) $23
Koronis Rift (D) $25
Movie Monster (D) $25
Multiplan 64 or 128 $39
Programmer's Basic Tool Kit 64 or 128 $29
Rescue on Fractalus (D) $25
Summer Games 2 (D) $25
Temple of Apshai Trilogy (D) $25
The Eidolon (D) $25
Vorpal Utility Kit (D) $23
Winter Games (D) $25
World's Greatest Football (D) $25
FIRST STAR
Spy vs. Spy (D) $19
Spy vs. Spy 2 (D) $19
Superman (D) $19
FISHER PRICE
Alpha Build (R) $9
Dance Fantasy (R) $9
Hop Along Counting (R) $9
Linking Logic (R) $9
Memory Manor (R) $9
Number Tumbler (R) $9
Sea Speller (R) $9
Up & Add 'Em (R) $9
GAMESTAR
On-Court Tennis (D) $19
On-Field Football (D) $19
On-Track Racing (D) $17
Star-League Baseball (D) $19
Star Rank Boxing (D) $19
HAYDEN
Sargon 3 (D) $33
HES
Hes Mon $21
Millionaire (D) $16
Omniwriter w/Spell (D) $33
Project Space Station (D) $16
Super Zaxxon (D) $12
INFOCOM
Ballyhoo (D) $25
Cut Throats (D) $23
Deadline (D) $29
Enchanter (D) $23
Hitchhiker's Guide to the Galaxy (D) $23
Infidel (D) $25
Invisiclues $5Ea.
Planetfall (D) $23
Sorcerer (D) $25
Spellbreaker (D) $29
Suspect (D) $25
Wishbringer (D) $23
Witness (D) $25
Zork 1 (D) $23
Zork 2 or 3 (D) $25
KOALA
Light Pen w/Painter (D) $35
Muppet Learning Keys (D) $29.95
Touch Tablet w/Painter(D) $39
Koala Printer (D) $16
LEARNING COMPANY
All Titles Available Call
MASTERTRONIC
Action Biker (D) $7
Ant Attack (D) $7
BMX Racer (D) $7
Captive (D) $7
Finders Keepers (D) $7
Kikstart (D) $7
5-A-Side Soccer (D) $7
Last V-8 (D) $7
Paul McCartney's Broad Street (D) $7
The Slugger (D) $7
Vegas Jackpot (D) $7
MICROLEAGUE
Baseball (D) $25
General Manager (D) $25
1985 Team Data Disk $16
MINDSCAPE
Bank St. Music Writer (D) $25
Bank St. Storybook (D) $19
Color Me: The Computer Coloring Kit (D) $19
Color Me Picture Disks:
Hugga Bunch $7
Rainbow Brite $7
Shirt Tales $7
Tink! Tonk! $7
Dolphins Rune (D) $19
Halley Project (D) $19
Lords of Midnight (D) $16
Luscher Profile (D) $19
Perfect Score SAT (D) $44
Quake Minus One (D) $16
Shadowfire (D) $16
MISC
CSM 1541 Align Kit (D) $29
Central Point Copy 2 (D) $23
Firebird Elite (D) $19
Gato (D) $19
Inside Commodore DOS (Book) $16
Karate Champ (D) $23
Kung Fu—Exploding Fist (D) $19
Kung Fu II (D) $19
Kung Fu Master (D) $23
Snapshot 64 (R) Call
Superbase 64 (D) $47
Superbase 128 (D) $59
Superscript 64 (D) $47
Superscript 128 $59
Vizastar 64 XL8 (D) $79
Vizastar 128 (D) Call
Vizawrite 128 (D) Call
ORIGIN
Ultima 3 (D) $34
Ultima 4 (D) $39
PRACTICORP
Practicalc 64 (D) $14
Practifile (D) $14
PROFESSIONAL SOFTWARE
Fleet System 2—W.P. w/70,000 word spell checker 64 or 128 $39
Fleet System 3 (128) $49
RANDOM HOUSE
Alpine Encounter (D) $19
Charlie Brown's ABC's (D) $19
Snoopy's Reading Machine (D) $19
Typing Is A Ball, Charlie Brown (D) $19
SCARBOROUGH
Boston Computer Diet (D) $33
Build A Book (D) $17
Mastertype (D) $23
Net Worth (D) $44
SIERRA
Champ. Boxing (D) $17
Donald Duck's Playground (D) $17
Grog's Revenge (D) $17
Homeword w/Spell(D) $33
Mickey's Space Adventure (D) $17
Stunt Flyer (D) $17
Ultima 2 (D) $37
Winnie the Pooh (D) $17
SIMON & SCHUSTER
Great International Paper Airplane Construction Set(D) $19
Star Trek-The Kobayashi Alternative (D) $26
Typing Tutor 3 (D) $26
SPINNAKER
Adventure Creator (R) $9
Alphabet Zoo (R) $9
Cosmic Combat (R) $9
Delta Drawing (R) $9
Facemaker (R) $9
Fraction Fever (R) $9
Gold Record Race (R) $9
Homework Helper-Math Word Problems (D) $23
Homework Helper-Writing (D) $23
Kids on Keys (R) $9
Monster Voyage (R) $9
Story Machine (R) $9
SPRINGBOARD
Early Games (D) $21
Easy as ABC (D) $23
Fraction Factory (D) $19
Graphics Expander for Print Shop (D) $25
Newsroom (D) $33
N.R. Clip Art Vol. 1 (D) $19
N.R. Clip Art Vol. 2 (D) $25
Stickers (D) $23
SSI
Battle Group (D) $37
Battle of Antietam(D) $33
Battalion Commander(D) $25
Breakthrough in the Ardennes (D) $37
Colonial Conquest (D) $25
Computer Ambush (D) $37
Computer QB (D) $25
Field of Fire (D) $25
Gemstone Warrior (D) $23
Germany 1985 (D) $37
Imperium Galactum(D) $25
Kampfgruppe (D) $37
Mech Brigade (D) $37
NAM (D) $25
Norway 1985 (D) $23
Phantasie (D) $25
Phantasie 2 (D) $25
Pro Tour Golf (D) $25
Questron (D) $25
Rings of Zilfin (D) $25
Ringside Seat (D) $25
U.S.A.A.F. (D) $37
Wings of War (D) $25
Wizard's Crown (D) $25
SOFTSYNC
Desk Manager 64 or 128 (D) $25
Trio 128 (D) $43
SUBLOGIC
Flight Simulator 2 (D) $32
Flight Simulator Scenery Disks (D) Call
Jet (D) $29
TELARIUM
Nine Princes in Amber (D) $21
Perry Mason: Case of the Mandarin Murder (D) $21
TIMEWORKS
Accts. Payable (D) $39
Accts. Receivable (D) $39
Data Manager 2 (D) $33
Data Manager 128 $43
Electronic Checkbook (D) $16
Evelyn Wood Dynamic Reader (D) $33
General Ledger (D) $39
Inventory Mgmt (D) $39
Money Manager (D) $16
Partner 128 $39
Payroll Mgmt (D) $39
Sideways 64 or 128 $33
Swiftcalc/Sideways (D) $33
Swiftcalc/Sideways (128) $43
Sylvia Porter's Personal Financial Planner(D) $39
Sylvia Porter's Personal Financial Planner 128 $43
Word Writer w/Speller (D) $33
Word Writer w/85000 Word Speller (128) $43
TRONIX
S.A.M. (D) $39
UNISON WORLD
Art Gallery 1 (D) $16
Print Master (D) $23
WEEKLY READER
Stickybear ABC'S (D) $19
Stickybear Math (D) $19
Stickybear Numbers(D) $19
Stickybear Reading (D) $19
Stickybear Shapes (D) $19
WINDHAM CLASSICS
Alice in Wonderland(D) $17
Treasure Island (D) $17
Wizard of Oz (D) $17
ACCESSORIES
Anchor 6470 300/1200 Modem w/Software $159
Bonus SS. DD $6.99Bx
Bonus DS. DD $7.99Bx
Compuserve Starter Kit $19
Datashare Printer Int. w/Graphics $33
Disk Case (Holds 50) $9
Disk Drive Cleaner $9
Disk Notcher $7
Dow Jones News Retrieval Kit (5 hrs.) $16.
Kraft Joystick $9
Panasonic 1080 100cps dot matrix printer **Great Deal**
Sakata 13" Color Composite Monitor for C64 w/cable $149
Teknika MJ22 RGB/comp monitor for C128 Call
Total Auto Answer/Auto Dial Modem w/Software $24.88
Universal Printer Stand $16
Wico Bat Handle $17
Wico Boss $12
Verbatim Bulk 5¼ SS. DD $59/100
Verbatim Bulk 5¼ DS. DD $69/100

MODEM OWNERS:
Have you seen our online catalog of over 700 software titles for Commodore, Atari & Apple Computers? It's on Compuserve's Electronic Mall—Just type GO SDA and shopping for software will never be the same again! P.S. If you don't own a modem or subscribe to Compuserve, call us, do we have a deal for you!

P.O. BOX 111327—DEPT. AY— BLAWNOX, PA 15238

***Ordering and Terms:** Orders with cashier check or money order shipped immediately. Personal/company checks, allow 3 weeks clearance. No C.O.D.'s. **Shipping: Continental U.S.A.**—Orders under $100 add $3; **free shipping on orders over $100.** PA residents add 6% sales tax. **AK, HI, FPO-APO**—add $5 on all orders. Sorry—no International orders. Defective merchandise will be replaced with same merchandise. Other returns subject to a 15% restocking charge—NO CREDITS! Return must have authorization number (412) 361-5291. Prices subject to change without notice.

Lyco Computer Marketing & Consultants

"WE MAKE YOUR COMPUTER FUN TO USE!"

DUST COVERS

Atari

520ST	11.95
130XE	6.99
800XL	6.99
1050	6.99
1025	7.99

Commodore

C128	7.99
1571/1541	6.99
1902	10.95
1702	8.99
C64/Vic20	6.99

Panasonic

1090/1091	8.99
1092	8.99
1093	9.99

Star Micronics

SG/SD10	8.99
SG/SD15	9.99
SR10	9.99
SR15	9.99

Okidata

82/92	8.99
83/93	9.99
193	9.99

COMMODORE SOFT-WARE

PERSONAL PERIPHERALS

Super Sketch C-64	29.95
Printer Utility C-64	14.99
Super Sketch Atari	25.95
Super Sketch Apple/Ibm	55.00

INNOVATIVE CONCEPTS

Flip-n-File 10	3.50
Flip-n-File 15	8.25

REDIFORM PAPER

Qty 1000 9½x11 white lazer	19.95
Qty 3000 9½x11 white lazer	29.95
Qty 1000 9½x11 white lazer	16.95
Qty 200 9½x11 white lazer	5.95
Qty 1000 Mailing labels 1x3	6.95

WICO Joysticks

15-9714 Bat Handle	16.75
50-2030 Boss	11.99
50-2002 Super 3-Way	19.99

COMMODORE

128	CALL
C 1571 Drive	CALL
C 1902-A	CALL
C-64	CALL
C 1541 Drive	CALL
C 1670 Modem	CALL
C-64 Computer	CALL
MPS801 Printer	LOW
C 1350 Mouse	42
C 1700 128K RAM	145
C 1750 512K RAM	269
JANE	35
Perfect Writer	49
Perfect Calc	49
Perfect Filer	49

BRODERBUND

The Print Shop	28.75
Graphics Library I, II, III	18.75
Karateka	19.75
Bank St. Writer	32.75
Lode Runner	21.75
Printshop Companion	***24.75***
Bank St. Speller	32.75
Bank St. Filer	32.75
Bank St. Mailer	32.75
Music Shop	***27.75***
Championship Loderunner	21.75

UNISON WORLD

Print Master (Amiga)	22.75
Print Master (C-128)	22.75
Print Master (C-64)	22.75
Art Gallery	16.75

CONTINENTAL

Home Accountant	39.95
Book of Adventure Games I, II	14.95

EPYX-64

Fastload	24.75
Summer Games	26.75

CARDCO

Numeric Keypad	34.95
CB/5 5-slot Board (64)	49.95
CB/2 2-slot Board (64)	21.95
S'More Basic Rom	49.95
Write Now-64	32.95
Mail Now-64	24.95
Spell Now-64	24.95
File Now-64	24.95
Paint Now-64	24.95
Calc Now-64	24.95
Super Printer Utility	24.95

MICROPROSE (C-64)

Kennedy Approach	21.75
Crusade in Europe	24.75
Decision in Desert	24.75
Solo Flight	20.75
Nato Commander	20.75
Spitfire Ace	18.75
F-15 Strike Eagle	20.75
Acrojet	21.75
Silent Service	21.75
Conflict in Nam	24.75
Gunship	21.75

ACTIVISION (C-64/128)

Alter Ego	28.75
Hackler	18.75
Little People	20.75
Gamemaker	24.75
Borrowed Time	18.75
Space Shuttle	18.75
Music Studio	***24.75***
Mindshadow	18.75
Roadrace	18.75
Fast Tracks	22.75
Count Down	18.75
Ghostbusters	22.75

ACTIVISION (Amiga)

Hackler	26.75
Mind Shadow	26.75
Music Studio	***29.75***
Borrowed Time	26.75

MICROLEAGUE (C-64)

Baseball	24.95
GM disk	24.95
Team disk	14.95

SYNAPSE

Syncalc	29.95
Template	14.95
Loderunner Rescue	19.95
Essex	24.95
Brimstone	24.95
Mindwheel	24.95

BATTERIES INCLUDED

Paper Clip	59.95
Spell Pak	34.95
Consultant	59.95
Paper Clip w/Spell Pak	75.95
Home Pak	34.95
Bus Card	129.95
80 Column Board	109.95

SSI (C-64)

Colonial Conquest	24.75
Wings of War	24.75
Computer Ambush	34.75
Field of Fire	24.75
Fighter Command	36.75
Kampfgruppe	36.75
Mech Brigade	36.75
Market Garden	29.75
Six Gun Shootout	24.75
Computer Baseball	24.75
Computer Quarterback	24.75
Imperium Galactum	24.75
Phantasie	24.75
Cartels & Cutthroats	24.75
50 Mission Crush	24.75
Questron	24.75
Gemstone Warrior	24.75
Pattellion Commander	24.75
Panzer Grenider	24.75
Norway 85	24.75
Battle for Antiem	29.75
U.S.A.F.	36.75
Battlegrouppe	36.75
NAM	24.75
Phantasie II	24.75
Wizard's Crown	24.75
Rings of Zelphin	24.75

SUBLOGIC

Night Mission Pinball	20.75
Flight Simulator	***31.75***
Jet Simulator	25.95
Football	NEW
Scenery Disk	EA. 14.95
Set 1-6	69.95

INNOVATIVE CONCEPTS

Flip-n-File 10	3.50
Flip-n-File 15	8.25
Flip-n-File 25 Lock	17.95
Flip-n-File 50	17.25
Flip-n-File 50 Lock	22.95
Flip-n-File Rom	17.25

XETEC

Font Master II 64 29

DISK DRIVE CLEANING KIT
$8.95

With Software
$17.95

BUY LYCO AND ENJOY

★ THE LOWEST PRICES ★ TOLL FREE ORDER LINE ★
★ Free shipping on prepaid cash orders in U.S. ★ All Merchandise Factory Fresh ★
★ 24 hrs. shipping on in-stock product ★ Access to our Multi Million $ inventory ★
★ No deposit on UPS C.O.D. orders ★ Orders outside PA save state sales tax ★
★ Air freight service available ★ Full Manufacturer's Warrranty apply! ★ Full accessory line in stock
★ Purchase Orders Accepted from educational institutions! ★ We check for stolen credit cards! ★
★ We ship to our servicemen overseas! ★ You'll love our Courteous Sales Staff! ★

NEW HOURS!
Mon-Thur - 9 AM-8 PM
Fri - 9 AM-6 PM
Sat - 10 AM-6 PM

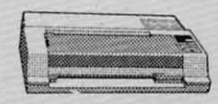
AMERICA'S MAIL ORDER HEADQUARTERS

LYCO COMPUTER

WORLD'S LEADER IN SALES & SERVICE

NEW HOURS!
Mon-Thur - 9 AM-8 PM
Fri - 9 AM-6 PM
Sat - 10 AM-6 PM

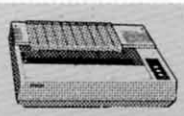
Lyco Computer Marketing & Consultants



1091 . . . . . $228

SAVE ON THESE IN STOCK PRINTERS

INTERFACING AVAILABLE!



SG-10 . . . . $205

PANASONIC
1091	228
3131 (NEW)	264
1092	325
3151	409
1080 (NEW)	209
1592 (NEW)	439

CORONA
LP300	2495
200361 Toner Cartridge	89

LEGEND
808	148
1080	197
1380	224
1385	268

EPSON
LX80	209
FX85	333
JX80	Call
Homewriter 10	193
DX10	207
DX20	297
DX35	597
AP-80	244
HI-80	355
HS-80	298
FX-286 (NEW)	489
LQ-800 (NEW)	529
LQ-1000 (NEW)	659

DIABLO
D25	549
630 API	1599
630 ECS	1759
D 80 1F	2395
P 32 CQ1	699
P 38	1749
C 150	999

OKIDATA
Okimate 10	179
182	214
192	348
193	563

LEGEND
1080	Call
1380	258
1385	289
808	148

JUKI
Juki 6100	344
RS232 Serial Board	55
6100 Tractor	119
6100 Sheet Feeder	209
Juki 6300	757

BROTHER
HR-15XL-P	359
HR-15XL-S	359

TOSHIBA
P1340	469
P351+	1149
P341P	969
P341S	999
351 Sheet Feeder	529

SEIKOSHA
SP-1000 VC (C-64)	185
SP-1000 A Centronics	199
SP-1000 I IBM	199
SP-1000 AS RS-232	199
SP1000 AP Apple IIc	199
BP-5200 I	649
BP sheet feeder	199
SP-1000 ribbon	8.50
BP-5200 ribbon	12.50

SILVER REED
EXP400	249
EXP500	295
EXP550	399
EXP770	749

STAR MICRONICS
SG-10	205
SG-10c	219
SG-15	367
SD-10	319
SD-15	438
SR-10	469
SR-15	578
SB-10	589
Powertype	297
NX-10 (NEW)	CALL
NB-15 (NEW)	CALL

CITIZEN
MSP-10	255
MSP-15	355
MSP-20	337
MSP-25	495
120D	188
Premier 35	429

MONITORS

COMMODORE
1902 Color	CALL
1802 Color	CALL

ZENITH
ZVM 122A Amber	75
ZVM 123G Green	75
ZVM 124 Amber IBM	129
ZVM 131 Color	275
ZVM 133 RGB	389
ZVM 135 Composite	449
ZVM 136 Hi Res Color	589
ZVM 1220	95
ZVM 1230	95
ZVM 1240	149

TEKNIKA
MJ-10 Composite	179
MJ-22 RGB	255

AMDEK
300 Green	118
300 Amber	128
310 Amber IBM	155
Color 300 Audio	234
Color 500 Composite	369
Color 600	397
Color 700	495
Color 710	569

THOMSON
CM36512V1	269
CM36632	159

PANASONIC
DT1300D 13" RGB/Composite	247
DTM140 14" RGB/Composite	329
DTH103 10" RGB Hi Res	395
DTS101 10" Composite	175
DT1000G 10" RGB	166
TX12H3P 12" Color	419
TR120M1PA 12" Green	109
TR120MBPA 12" Amber	109
TR122M9P 12" Green IBM	148
TR122MYP 12" Amber IBM	148

SAKATA
SG 1000 12" Green	99
SA 1000 12" Amber	109
SG 1500 12" Green TTL	119
SA 1500 12" Amber TTL	129
SC 100 13" Color Comp	209
SC 200 13" RGB	389
STS1 Tilt Stand	29

PRINCETON GRAPHICS
MAX-12 Amber	185
HX-12 RGB	465
SR-12 RGB	595

INTERFACING

XETEC
Super Graphix 64	64
Super Graphix JR 64	45

CARDCO
G-WIZ (C-64)	49
Super G (C-64)	54
C/?PS (C-64)	37

ORANGE MICRO
Grappler CD (C-64)	79

TYMAC
Connection (C-64)	55

MODEMS

HAYES
Smartmodem 300	133
Smartmodem 1200	377
Smartmodem 1200B	347
Smartmodem 2400	698

US ROBOTICS
Password 1200M	229
Password 1200F	229
Password 300M	139
Password 300F	139

ANCHOR
Volksmodem	55
Volksmodem 12	186

COMMODORE
1670 Modem	155

SUPRA
1064 Modem (C-64)	49.95

DRIVES

COMTEL
Enhancer 2000 (C-64)	159

INDUS
Indus GT Atari	195
GT Commodore	209

COMMODORE
1571	CALL
1541	CALL

DISKETTES

DENNISON
ELEPHANT 5¼" SSSD	11.99
ELEPHANT 5¼" SSDD	12.99
ELEPHANT 5¼" DSDD	14.99
PREMIUM 5¼" SSDD	5.99
PREMIUM 5¼" DSDD	15.99

VERBATIM
5¼" SSDD	13.99
5¼" DSDD	19.99

BONUS
5¼" SSDD	8.99
5¼" DSDD	12.99

SUNKYONG
SKC 5¼" SSDD	11.99
SKC 5¼" DSDD	13.99

MAXELL
5¼" MD1	13.99

TOLL FREE 1-800-233-8760

TO ORDER

CALL TOLL FREE 1-800-233-8760
In PA **717-494-1030**
Customer Service **717-494-1670**

or send order to
Lyco Computer
P.O. Box 5088
Jersey Shore, PA
17740

RISK FREE POLICY

In-stock items shipped within 24 hours of order. No deposit on C.O.D. orders. Free shipping on prepaid cash orders within the continental U.S. Volume discounts available. PA residents add sales tax. APO. FPO. and international orders add $5.00 plus 3% for priority mail service. Advertised prices show 4% discount for cash, add 4% for MasterCard or Visa. Personal checks require 4 weeks' clearance before shipping. Ask about UPS Blue and Red label shipping. All merchandise carried under manufacturer's warranty. Free catalog with order. All items subject to change without notice.



GOT A MATCH?

For the C-64

By Walter E. Meyers

"Once upon a time in the Old West, two fellers named Buck and Wingo struck it rich. Now most everybody remembers the Gold Rush of '49, but it weren't nothin' alongside the big Jewel Rush of '94. Anyway, these two boys was prospectin' up in the Dismal Seepage Range when they come acrost the biggest strike you ever heard of—not emeralds or rubies, not even diamonds—but real, genyoowine Berzerkons, in every color of the rainbow. Wingo and Buck figgered for sure that they had found the end of the rainbow and here was the pot of gold. They opened up a mine right quick, and started countin' their chickens before they was hatched.

"You don't see Berzerkons much nowadays, but like I said, they come in pretty near any color, and there's four different kinds. You got your Larries, your Moes, your Curlies, and ever so often, your Shemps.

"Now, Buck and Wingo was rakin' it in down in the mine till one day the mountain gave a shrug, and the tunnel caved in. They was sealed up, but the boys didn't stampede; they knew the nearby miners had felt the quake, and by and by, somebody'd be along to dig them out. To pass the time, Wingo opined that he'd like to play a game. Well, Buck suggested for one of them to reach in the bag of Berzerkons in the dark and pull out a handful. The other'd light up a match, and study those stones until the match give out. Then he'd have to name the colors and kinds of the jewels from memory. And that, as I hear tell, is the story of how *Got a Match* got started."

Rudyard Kipling might have another idea, as might any reader familiar with the game played in his novel *Kim*. But even so, *Got a Match* adapts Kim's game to the Commodore 64 and illustrates several graphic and musical features in doing so. In fact, more than half of the program consists of data statements that use such features to add sparkle to what is essentially a very simple game.

A straightforward routine at lines 1400-1460 (refer to listing on page 86) programs the C-64's three voices for music. A single number is broken down in high- and low-frequency components. Three such numbers are read for the three voices, and a fourth provides the duration of the notes. This same routine could be used for any piece of music; both the *Commodore 64 User's Guide* and the *Programmer's Reference Guide* contain tables of the appropriate numbers for each note, and many other works provide the same information.

The next set of data, lines 2100-2140, sets up a short machine language routine to copy the character set into RAM so that it can be modified. The data in lines 2600-2910 performs that modification.

The program has sprites, too, for a bit of motion during the game. Lines 2200-2470 contain the data for the sprites.

Lines 2500-2560 provide another machine language routine to allow a joystick in port 2 to move a sprite left and right across the screen to predetermined settings, and to avoid the problem of sprite motion horizontally across the 64's "seam."

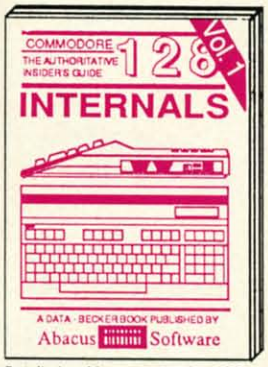
The last block of code, from 5000 to the end, provides an automatic way of checking whether all the data statements have been entered correctly. After you are finished entering the program, save it; then clear the screen, type "RUN 5000," and hit RETURN. The routine will read the data and compare the totals it gets with the checksums in line 5070. If there is an error, the routine will tell you in which group of data lines it occurs. After the checksums match up, lines 5000 to the end can be deleted before saving your final version of the program.

The difficulty of the game can be increased or decreased as you like by shortening or lengthening the amount of time a player gets to study the Berzerkons. Change line 470 to shorten or lengthen the study time. It reads:

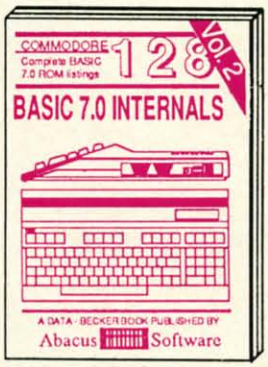
```
470 I=I-48:D(1)=I+3:I=60-(I*5):CY=INT(
2.5*I)
```

As the program is set up now, the study time varies from about a minute (at level 1) to about fifteen seconds (at level 9). For a harder game, change the last of the commands in line 470 by substituting a lower number for "2.5"; try this in small increments, though. You might change the command to "CY=INT(2.3*I)", for example, then see how much study time you have on the hardest setting. □ *SEE PROGRAM LISTING ON PAGE 86*

C-128™ and C-64™ REQUIRED READING



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



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



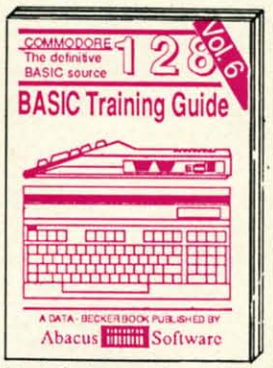
Filled with info for everyone. Covers 80 column hi-res graphics, windowing, memory layout, Kernal routines, sprites, software protection, autostarting. **300pp** $19.95



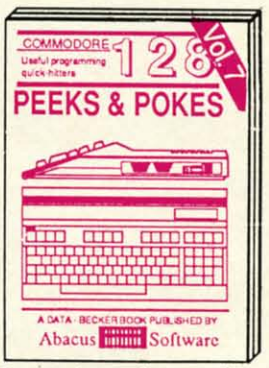
Insiders' guide for novice & advanced users. Covers sequential & relative files, & direct access commands. Describes DOS routines. Commented listings. $19.95



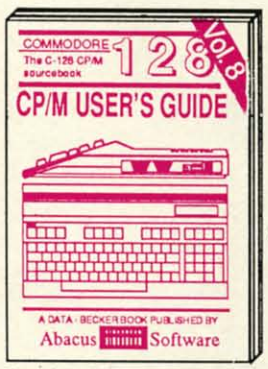
Learn fundamentals of CAD while developing your own system. Design objects on your screen to dump to a printer. Includes listings for '64 with Simon's Basic. **300pp** $19.95



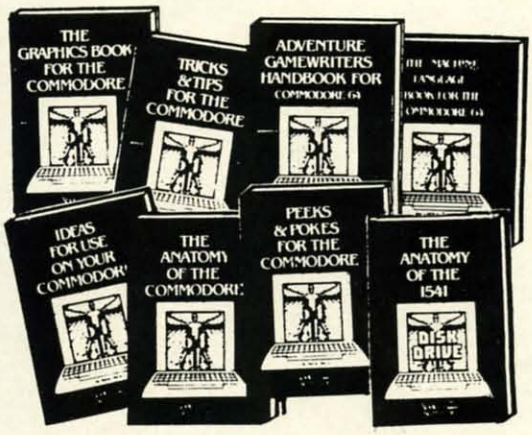
Introduction to programing; problem analysis; thorough description of all BASIC commands with hundreds of examples; monitor commands; utilities; much more. $16.95



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



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



ANATOMY OF C-64 Insider's guide to the '64 internals. Graphics, sound, I/O, kernal, memory maps, more. Complete commented ROM listings. **300pp** $19.95

ANATOMY OF 1541 & DRIVE Best handbook on floppy explains all. Many examples and utilities. Fully commented 1541 ROM listings. REVISED & EXPANDED **500pp** $19.95

MACHINE LANGUAGE C-64 Learn 6510 code write fast programs. Many samples and listings for complete assembler, monitor, & simulator. **200pp** $14.95

GRAPHICS BOOK C-64 - best reference covers basic and advanced graphics. Sprites, animation, Hires, Multicolor, lightpen, 3D-graphics, IRQ, CAD, projections, curves, more. **350pp** $19.95

TRICKS & TIPS FOR C-64 Collection of easy-to-use techniques: advanced graphics, improved data input, enhanced BASIC, CP/M, more. **275pp** $19.95

1541 REPAIR & MAINTENANCE Handbook describes the disk drive hardware. Includes schematics and techniques to keep 1541 running. **200pp** $19.95

ADVANCED MACHINE LANGUAGE Not covered elsewhere: - video controller, interrupts, timers, clocks, I/O, real time, extended BASIC, more. **210pp** $14.95

PRINTER BOOK C-64/VIC-20 Understand Commodore, Epson-compatible printers and 1520 plotter. Packed: utilities; graphics dump; 3D-plot; commented MPS801 ROM listings, more. **330pp** $19.95

SCIENCE/ENGINEERING ON C-64 In depth intro to computers in science. Topics: chemistry, physics, biology, astronomy, electronics, others. **350pp** $19.95

CASSETTE BOOK C-64/VIC-20 Comprehensive guide; many sample programs. High speed operating system fast file loading and saving. **225pp** $14.95

IDEAS FOR USE ON C-64 Themes: auto expenses, calculator, recipe file, stock lists, diet planner, window advertising, others. Includes listings. **200pp** $12.95

COMPILER BOOK C-64/C-128 All you need to know about compilers: how they work; designing and writing your own; generating machine code. With working example compiler. **300pp** $19.95

Adventure Gamewriter's Handbook Step-by-step guide to designing and writing your own adventure games. With automated adventure game generator. **200pp** $14.95

PEEKS & POKES FOR THE C-64 Includes in-depth explanations of PEEK, POKE, USR, and other BASIC commands. Learn the "inside" tricks to get the most out of your '64. **200pp** $14.95

Optional Diskettes for books For your convenience, the programs contained in each of our books are available on diskette to save you time entering them from your keyboard. Specify name of book when ordering. **$14.95 each**

C-128 and C-64 are trademarks of Commodore Business Machines Inc.

Abacus Software

P.O. Box 7219 Grand Rapids, MI 49510 - Telex 709-101 - Phone (616) 241-5510

Call **now** for the name of your nearest dealer. Or to order directly by credit card, MC, AMEX of VISA call **(616) 241-5510**. Other software and books are available–Call and ask for your **free** catalog. Add $4.00 for shipping per order. Foreign orders add $10.00 per book. Dealer inquires welcome–1400+ nationwide.

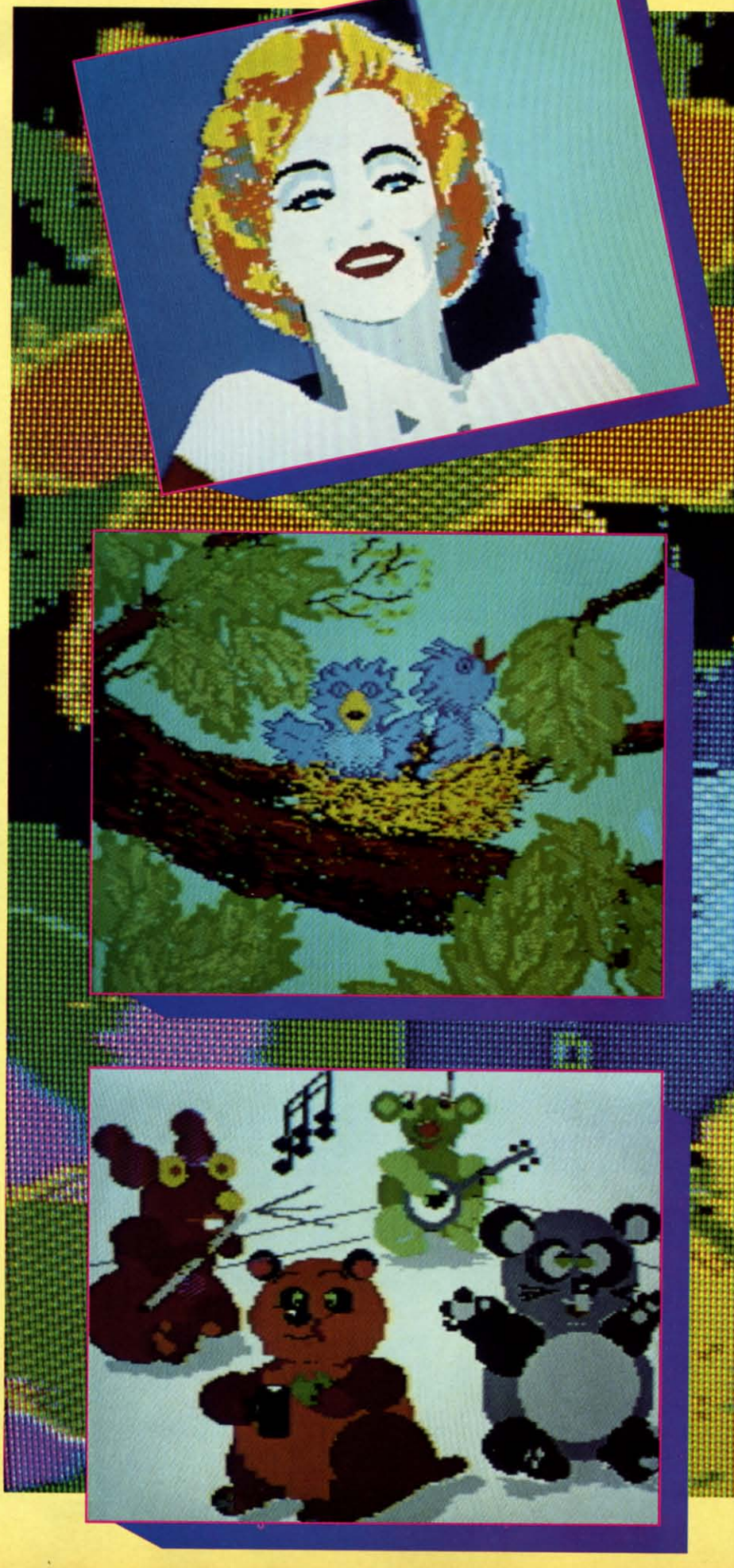


Contributors to *Ahoy!'s Art Gallery* will receive royalties based on the sale of disks. Send your best work on disk, accompanied by a stamped and self-addressed mailer, to Morton Kevelson, P.O. Box 260, Homestead Station, Brooklyn, NY 11229. Indicate the drawing package that was used to create the image. 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.

ART GALLERY DISK SALE

Art Gallery images are available on disk. High resolution bit-mapped images are available in *DOODLE!* format. Multicolor bit-mapped images are available in *Koala* format. Each disk includes a slide show program for easy viewing. *DOODLE!* disks include a bit map screen dump utility for the 1525 or properly interfaced dot matrix printer. *Koala* disks include a set of custom routines for bidirectional conversion to other multicolor formats. The conversion routines were expressly developed for the *Art Gallery* by Michael Beutjer of K.T. Software, author of the *Koala Printer* program and *Quad Print* (June '85 *Ahoy!*). Formats presently supported are *Cadpic, Peripheral Vision, Paint Magic,* and *Flying Colors.* Disks are available for $15 from Morton Kevelson, P.O. Box 260, Homecrest Station, Brooklyn, NY 11229. Send a stamped and self-addressed envelope for a complete listing (or send $10 and receive a sample disk of *DOODLE!* and *Koala* images with slide shows).







As the media exploitation of Marilyn Monroe continues, Jay J. Smith (New York, NY) exploits the capabilities of the C-64 and Koala to produce *Marilyn*, featured at top left. Nested below it is *Birdies* by Dave Moroz-Henry (Downingtown, PA) also created with Koala. Next down is Earl Hamner's (Milpitas, CA) *Jamboree* (or should that be *Jambearee*?). At top right is the latest Koala image by Alberto Valsecchi (Milano, Italy), simply titled *Girl*—enough to keep most any man from ever saying *arivederci Roma*. At lower right is *Birds*, a Koala image by Joe Taylor (Virginia Beach, VA). This month's collection is laid out against a backdrop of the aforementioned Dave Moroz-Henry's *Flowers*, also shown unobscured at lower left.



STAR STRIKE

For the C-64

By Bob Eaton

You are stationed at the edge of the galaxy as the first line of defense against alien invasion. Just when you thought it was going to be a quiet day on patrol, you spot an unidentified ship on your scanners heading straight for you. Unknown to you is the fact that this is just the beginning of the kind of battle that few survive to tell about.

The stream of alien ships seems unending. At first the ships approach singly, later in pairs. Your shield energy is almost depleted. Even if you survive the cruel onslaught, the mother ship looms just out of sensor range.

Star Strike is an arcade style game program that is written mostly in machine language. It features 3-D graphics and four levels of difficulty. A joystick plugged into Port 2 is required.

PLAYING STAR STRIKE

Disk users should LOAD"STAR STRIKE",8 and tape users LOAD"STAR STRIKE". Type RUN and the program will automatically load in the machine language modules and start running. When the title screen appears, pressing a key or the action button on the joystick will bring up the level selection screen. There are four levels, with level 1 the easiest. The higher levels increase the speed of the game and also award more points. The game has three phases. To complete your mission you must survive all three. After you have selected the level of difficulty, press a key or the action button to start the game. Your ship will appear at the bottom of the screen and a crosshair will appear at the center. At the top of the screen is an indicator that displays your ship's shield energy reserves. You start the game with 20 shield energy units. A hit from one of the alient ships costs you one energy unit. After your shield energy is gone, the next hit will destroy your ship and end the game. Use the joystick to control the vertical position of the crosshair and the horizontal position of the crosshair and your ship. Pressing the action button will fire a missile. Because of the game's 3-D effects, accurate firing of the missiles may take a little practice. As when firing a rifle, you must lead your target. Extra points can be earned by shooting the aliens' incoming plasma spheres; however, this can be dangerous. If you miss, you might not have enough time to avoid taking a hit yourself.

Phase I is a one-on-one confrontation. You must destroy a total of 15 invading ships to complete this phase. Phase II increases the challenge. Here two of the invading ships may attack at the same time. To complete this phase, you must destroy 20 more of the ships. If you should survive, Phase III offers the hardest challenge. Your shields are useless against the mother ship's paralyzing ion beam. You must stop the mother ship before it is within firing range by hitting it in its only vulnerable spot: the port from which the deadly ion beam is emitted. The port will appear as a small flashing spot near the center of the ship.

Scoring is based on remaining shield energy, the number of ships destroyed, the number of alien plasma spheres destroyed, and the level of difficulty. A bonus is added to your score for destroying the mother ship.

TYPING IN STAR STRIKE

Star Strike is composed of three separate programs. The first program (filename STAR STRIKE) is in BASIC and automatically checks for the current device number, then loads in the two remaining machine language programs. The two machine language programs require the use of the *Flankspeed* program when entering (see page 85). Be certain that you save all three programs on the same disk.

Tape users will need to be certain that the three programs are saved to tape in the proper order. (STAR STRIKE first, followed by SPRITES, and finally SS). To prevent the possibility of accidentally overwriting a previously saved program, I would strongly suggest that the three programs be saved on different sides of two tapes. Then save the programs in proper order back to another tape.

For proper operation be sure to save the programs with the listed filenames. □

SEE PROGRAM LISTING ON PAGE 89

S.O.S.

Ahoy!'s editors love taking time out from their already overcrowded work schedules to help you with problems regarding programming, hardware, or any other aspect of Commodore home computing. We invite you to send your questions to S.O.S., c/o Ahoy!, Ion International Inc., 45 West 34th Street—Suite 407, New York, NY 10001.

I have a Commodore 128, 64, and VIC 20. I use the 128 and my boy uses the 64. We both started out with the VIC 20 and I've got all the Scott Adams games on cartridge. The problem is that the VIC 20 is in the closet now that we both have upgraded. You mentioned quite briefly about these games being transferable to disk. I've tried everything that I can think of, but still cannot do it. Could you please explain the method of doing this? Any help would be greatly appreciated. —Mike Morse
Grand Prairie, TX

What a sad fate for a VIC 20. Perhaps you could find a deserving young person who might benefit from its use. To transfer your VIC 20 cartridge software to disk you will have to dig out the VIC 20 from your closet at least one more time. Hook up the VIC 20 to your disk drive, insert one of the cartridges, and power up the system. You should now perform the following series of POKEs from the keyboard in immediate mode:

```
POKE 43,0
POKE 45,0
POKE 44,64
POKE 46,128
```

Make sure there is a formatted disk in the drive with at least 65 blocks free. Just perform a SAVE to the disk using an appropriate file name. The resulting 65 block program file will contain the 16 kilobyte contents of the cartridge ROM.

*The series of POKEs above has "fooled" BASIC into thinking that there is a program in memory whose starting and end addresses happen to coincide with the cartridge ROM. Locations 43 and 44 are a pointer pair, or vector, which tells BASIC where the start of the current program is. You can calculate this address by 64*256+0=16384. Locations 45 and 46 are a vector which points to one byte after the end of the current program. This is also the start of BASIC's variable storage space. In this case the address is 128*256+0=32768.*

This procedure can be used to save the contents of any range of the computer's memory. Just reverse the above calculations for the desired start address and address plus one and perform the proper POKEs. Note that 43 and 45 will contain the remainder of the division by 256. This technique works on both the VIC 20 and the C-64. The C-128 has a different set of locations which perform the corresponding functions. However, the complex bank switching implemented on this machine makes this an impractical technique. Fortunately BASIC 7.0 has the BSAVE and BLOAD commands which take care of these things.

When you have SAVEd all the programs you may restore the VIC 20 to the closet till it is needed once again. The following boot program will automatically start up the games for you on your C-64 or C-128. Just enter the appropriate file name in the LOAD command of line 10 before SAVEing.

```
10 IF FL=0 THEN FL=1:LOAD"
file name",8,1
20 POKE 53281,1:REM MAKE
SCREEN WHITE
30 SYS 32592:REM START
GAME
```

While this particular group of cartridge programs will work on the new machines, this is not usually the case. You will also note that the text is still formatted for the VIC 20's 22 column screen and the SAVE game feature still goes to the cassette.

—Morton Kevelson

READER SERVICE INDEX

Page	Company	Svc. No.
31	Abacus Software	262
37	Abacus Software	263
62	Abacus Software	237
C-4	Access Software	274
52	Alsoft	288
61	Alsoft	290
75	American Int'l Computer	270
10	C.O.M.B.	–
C-2	Cardco, Inc.	258
63	Central Point Software	286
8	Cheatsheet Products, Inc.	276
79	Cheatsheet Products, Inc.	–
11	COMAL Users Group USA	–
13	COMAL Users Group USA	–
82	Comark	268
82	Compumed	269
4,5	Computer Centers of America	255
12	Computer Friends	272
12	Computer Friends	259
64	Crown Custom Covers	279
6	CSM Software, Inc.	256
40	CVC Online	239
53	Datasoft	234
73	Electronic One	251
13	Howard W. Sams & Co.	273
14	Howard W. Sams & Co.	277
60	IHT Software	236
64	Inkwell Systems	238
39	IRQ, Inc.	240
69	Jacobsen Software Designs	249
65	Jason-Ranheim	281
11	Juki Office Machines Corp.	261
28,29	Lyco Computer	254
53	Mastertronic International	232
C-3	Mastertronic International	275
70	Micro-W Distributing, Inc.	250
26	Microvations	285
53	Mindscape	233
51	Momentum International	245
78	Ohio Computer Services, Inc.	242
47	Origin Systems	231
47	Origin Systems	230
54	Penguin Software	235
81	Pro-Tech-Tronics	271
15-19	Protecto Enterprizes	253
7	R.J. Brachman	289
76	Ribbon Land	252
68	Roger Wagner Publishing, Inc.	248
46	Skyles Electric Works	266
27	Software Discounters	260
64	Tektonics Plus, Inc.	280
42,43	Tussey Computer Products	264
39	Ultrabyte	241
14	Uni-Kool	283
9	Unison World, Inc.	257
55	The V4CFE Software Co.	265
25	Value-Soft Inc.	278
66	VMC Software	247
79	Wedgwood Rental	243
56	White House Computer	267
41	Wilanta Arts	282
45	Xetec, Inc.	246
22	*Ahoy!* Back Issues	–
38	*Ahoy!* Disk	–
44	*Ahoy!* Subscription	–

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

TIPS AHOY!

Compiled by Michael R. Davila

BRANCHING OUT

It is often advantageous to use the function keys of the C-64 to control the flow of a program. The dilemma is the method by which to branch to the appropriate routine for the key that is pressed. The ASCII codes for the function keys are 133 through 140, arranged f1, f3, f5, f7, f2, f4, f6, f8. As a hypothetical case, assume the program has a menu with eight options. The following two lines will get characters from the keyboard until one of the function keys is pressed.

```
100 GET A$: IF A$="" THEN 100
110 X=ASC(A$):IF X<133 OR X>140 THEN 100
```

The variable X now contains the ASCII code of the function key that was pressed. A simple method for branching to the proper routine would be to use eight IF statements such as these:

```
210 IF X=133 THEN 1000 : rem F1
220 IF X=137 THEN 2000 : rem F2
230 IF X=134 THEN 3000 : rem F3
240 IF X=138 THEN 4000 : rem F4
250 IF X=135 THEN 5000 : rem F5
260 IF X=139 THEN 6000 : rem F6
270 IF X=136 THEN 7000 : rem F7
280 IF X=140 THEN 8000 : rem F8
```

There is a way to accomplish the same thing with only one line. The BASIC commands ON..GOTO and ON.. GOSUB can be used to branch to a series of line numbers based on the value of a variable. If we subtract 132 from the ASCII code in the variable X, we will get a number in the range 1 - 8. The BASIC line numbers should appear in the order of the original ASCII codes. Using the line numbers from the IF statements above, the single line solution would read as follows:

```
200 X=X-132 : ON X GOTO 1000,3000,5000,
7000,2000,4000,6000,8000
```

The command ON..GOSUB can be used exactly the same way. When using this method, it is a good idea to have one of the branches allow an exit from the program.

—Thomas P. Shultz
Clarion, PA

BASIC SCREEN SIZER

To make a program truly compatible on all Commodore machines, you shouldn't use any POKEs, PEEKs, SYS commands, etc. But what do you do about screen size? Commodore thoughtfully put a Kernal routine in their ROMs to do just that... but as an exercise, let's keep things strictly in BASIC (no SYS's, remember?). Here's how it's done:

```
100 A$="":B$=""
110 OPEN3,3:FORSZ=1TO79:GET#3,A$
120 IF A$<>CHR$(13)THEN NEXT
130 PRINT"SCREEN SIZE IS";SZ;"COLUMNS"
140 CLOSE3:END
```

You can then do whatever you want with variable SZ, the screen size in columns. This works because the Commodore computers think of their screens as a device, just like a disk drive, printer, or tape deck. Screen devices are always #3, and can't be changed very easily. Typically the screen is a write only device, but by opening a channel to device 3 (open3,3) and then GETing characters from that device (get#3,a$) we can count the number of characters received until a carriage return (C/R) is encountered. Since C/R signifies the end of a line, that's all there is to it; we've got our screen size. A Commodore 64 will send back 40 characters and then a carriage return, a VIC 20 will send 22 and a C/R, and the C-128 (or an old 8032) will send 80 plus a C/R, assuming that you're in 80-column mode.

—David Paulsen
Renton, WA

ANYBODY ELSE WANNA SIGN?

A postscript to the April '86 tip "AUTOGRAPHED 128'S": apparently there are more than three designers of the C-128. In immediate mode type SYS 32800,123,45, 6 and hit RETURN. At that point the screen will clear and the names of both the hardware and software designers will appear.

—Bob Ossentjuk
Sierra Vista, AZ

CUSTOM CHARACTERS ON THE C-128

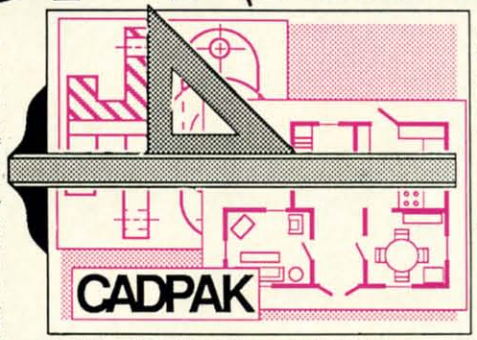
This short piece of machine language moves the 128's character set from ROM to RAM, BANK 0, at address 8192. This area is protected when you implement a hires GRAPHIC command. Use a BANK 0 command and some appropriate POKE's and alter the character set to your heart's delight. The addresses of the start of each subset of characters are: upper case, 8192; upper case reversed, 9216; lower case, 10240; and lower case reversed, 11264. Moving the entire character set using BANK, POKE, and PEEK takes about 50 seconds; in FAST mode this program does the same job in less than two seconds.

—R. Harold Droid
Seattle, WA

'128™ and C-64™ SPECTACULAR SOFTWARE



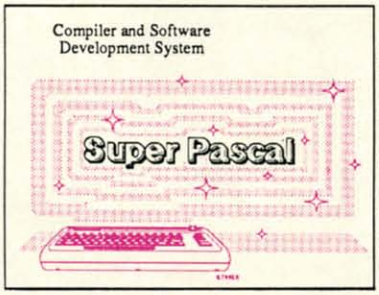
The *complete* compiler and development package. Speed up your programs 5x to 35x. Many options: flexible memory management; choice of compiling to machine code, compact p-code or both. '128 version: 40 or 80 column monitor output and FAST-mode operation. '128 Compiler's extensive 80-page programmer's guide covers compiler directives and options, two levels of optimization, memory usage, I/O handling, 80 column hi-res graphics, faster, higher precision math functions, speed and space saving tips, more. A great package that no software library should be without. **128 Compiler $59.95**
64 Compiler $39.95



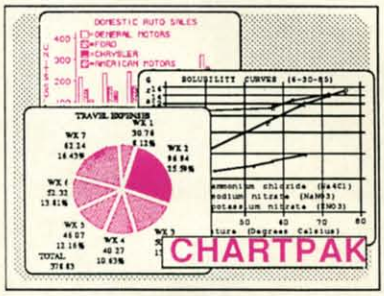
Remarkably easy-to-use interactive drawing package for accurate graphic designs. New dimensioning features to create exact scaled output to all major dot-matrix printers. Enhanced version allows you to input via keyboard or high quality lightpen. Two graphic screens for COPYing from one to the other. DRAW, LINE, BOX, CIRCLE, ARC, ELLIPSE available. FILL objects with preselected PATTERNS; add TEXT; SAVE and RECALL designs to/from disk. Define your own library of symbols/objects with the easy-to-use OBJECT MANAGEMENT SYSTEM–store up to 104 separate objects. **C-128 $59.95**
C-64 $39.95



For school or software development. Learn C on your Commodore with our in-depth tutorial. Compile C programs into *fast* machine language. C-128 version has added features: Unix™-like operating system; 60K RAM disk for fast editing and compiling Linker combines up to 10 modules; Combine M/L and C using CALL; 51K available for object code; Fast loading (8 sec. 1571, 18 sec. 1541); Two standard I/O librarys plus two additional libraries—math functions (sin, cos, sqrt, etc.) & 20+ graphic commands (line, fill, dot, etc.). **C-128 $79.95**
C-64 $79.95



Not just a compiler, but a complete system for developing applications in Pascal with graphics and sound features. Extensive editor with search, replace, auto, renumber, etc. Standard J & W compiler that generates fast machine code. If you want to learn Pascal or to develop software using the best tools available–**SUPER Pascal** is your first choice. **C-128 $59.95**
C-64 $59.95



Easily create professional high quality charts and graphs without programming. You can immediately change the scaling, labeling, axis, bar- filling, etc. to suit your needs. Accepts data from CalcResult and MultiPlan. C-128 version has 3X the resolution of the '64 version. Outputs to most printers. **C-128 $39.95**
C-64 $39.95

PowerPlan

One of the most powerful spreadsheets with integraded graphics. Includes menu or keyword selections, online help screens, field protection, windowing,trig functions and more. PowerGraph, the graphics package, is included to create integrated graphs & charts. **C-64 $39.95**

COBOL Compiler for the C-64	**$39.95**
Ada Compiler for the C-64	**$39.95**
VideoBasic Language for the C-64	**$39.95**

OTHER TITLES AVAILABLE:

Technical Analysis System

Sophisticated charting and technical analysis system for serious investors. Charting and analyzing past history of a stock, TAS can help pinpoint trends & patterns and predict a stock's future. Enter data from the keyboard or from online financial services. **C-64 $59.95**

Personal Portfolio Manager

Complete protfolio management system for the individual or professional investor. Easily manage your portfolios, obtain up-to-the-minute quotes and news, and perform selected analysis. Enter quotes manually or automatically through Warner Computer Systems. **C-64 $39.95**

Xper

XPER is the first "*expert system*" for the C-128 and C-64. While ordinary data base systems are good for reproducing facts, XPER can derive knowledge from a mountain of facts and help you make expert decisions. Large capacity. Complete with editing and reporting. **C-64 $59.95**

C-128 and C-64 are trademarks of Commodore Business Machines Inc.
Unix is a trademark of Bell Laboratories

Abacus Software

P.O. Box 7219 Grand Rapids, MI 49510 - Telex 709-101 - Phone (616) 241-5510

Call **now** for the name of your nearest dealer. Or to order directly by credit card, MC, AMEX of VISA call **(616) 241-5510**. Other software and books are available–Call and ask for your **free** catalog. Add $4.00 for shipping per order. Foreign orders add $12.00 per item. Dealer inquires welcome–1400+ nationwide.

BREAK THROUGH



The TIME BARRIER



with Ahoy!

PROGRAM DISKS AND CASSETTES

BEST OF '84
- Multi Draw 64
- Address Book
- VIC Space Lanes
- 64 Space Lanes
- Name that Star
- Lunar Lander
- Air Assault
- Math Master
- Biorhythm
- Checklist
- The Alpiner
- Post Time
- Salvage Diver
- DOS
- Micro Minder '85
- VIC 40
- Emerald Elephant
- Lawn Job
- Construction Co.
- Space Patrol
- Multi Draw Boot

BEST UTILITIES
- Booter
- BASIC Trace
- Two Column Directory
- Commodore Font Editor
- Screen Magic
- Screen Bit Dump
- Printat
- Auto Append
- Formatter
- Windows
- Start & End File Address
- Fastnew
- Maestro
- 1541 Cleaning Utility
- DOS
- Base Conversions
- Micro Minder '85
- Lucky Lottery

BEST GAMES
- Name That Star
- Post Time
- Alpiner
- Salvage Diver
- Lawn Job
- Emerald Elephant
- Construction Co.
- Space Patrol
- Tile Time
- Duck Shoot
- Script Analysis
- Wizard of Im
- Disintegrator
- Gators N Snakes
- Dragon Type
- Gravinauts
- Mystery at Mycroft Mews

Why waste time typing? All the programs in this issue of *Ahoy!* are available on disk or cassette! Use the coupon below to order a single disk or tape or a subscription... as well as the special disks described at left.



Ahoy! *uses only*
maxell
premium quality disks.

SINGLE ISSUE AND SUBSCRIPTION PRICES

(Postage and Handling Included)

	U.S.A.	CANADA	ELSEWHERE
❑ June '86 *Ahoy!* Disk ❑ June '86 *Ahoy!* Cassette	$ 7.95	$ 12.95	$ 13.95
❑ 12-Month Disk Subscription ❑ 12-Month Cassette Subscription	$ 79.95	$ 99.95	$124.95
❑ 24-Month Disk Subscription ❑ 24-Month Cassette Subscription	$149.95	$179.95	–

$10.95 EACH (disk only): ❑ Best of '84 ❑ Best Utilities ❑ Best Games

BACK ISSUES $8.95

(except months listed)

In Canada add $2.00 per issue; outside US and Canada add $4.00 per issue.

❑ Jan. '84	$9.95	❑ _____	$8.95
❑ _____	$8.95	❑ _____	$8.95
❑ _____	$8.95	❑ _____	$8.95
❑ _____	$8.95	❑ _____	$8.95

SPECIFY
❑ *DISK* ❑ *CASSETTE*

Make check or money order payable to **Double L Software.** N.Y. State Residents must add 8¼% sales tax.

Send coupon or facsimile to:
***Ahoy!* Program Disk/Cassette**
Ion International Inc.
45 West 34th Street, Suite 407
New York, NY 10001

NAME _____

ADDRESS _____

CITY _____ **STATE** _____ **ZIP** _____

```
10 GRAPHIC3:GRAPHIC0:REM RESERVE SPACE
20 BANK15:SUM=0:FORI=2816TO2869:READJ:SU
M=SUM+J:POKEI,J:NEXT:IFSUM<>7491THENPRIN
T"ERROR IN DATA STATEMENTS":END:ELSESYS2
816:REM MOVE THE CHARACTER SET
30 DATA 169,0,133,250,133,252,169,208
40 DATA 133,251,169,32,133,253,169,252
50 DATA 141,185,2,169,16,141,54,11
60 DATA 160,0,169,250,162,14,32,116
70 DATA 255,162,0,32,119,255,200,208
80 DATA 241,206,54,11,240,7,230,251
90 DATA 230,253,76,26,11,96
100 POKE2604,PEEK(2604)AND240OR8:REM TEL
L SYSTEM WHERE CHARACTER SET IS LOCATED
```

C-64 DISK LOADS WITH C-128 EASE

Are you tired of "PRESS PLAY ON TAPE"? If so you will like this very short program that makes eight the default device number. The routine, only 18 bytes long, does not use any popular programming space. It takes advantage of the fact that the LOAD and SAVE vectors (816-819) are followed by eight free bytes. The other seven bytes have been placed in the RS-232 pointer locations, another normally unused area. The routine needs no SYS number. Just run it, and the SAVE and LOAD vectors will be changed to pass through the seven byte additions. A RUN STOP/RESTORE will reset the vectors, but will not erase the rest of the program. Four POKEs will reinstate it.

```
POKE816,52:POKE817,3:POKE818,247:POKE819
,0
```

This utility allows commands such as LOAD"program name. It eliminates the necessity to use the ending quotes and the ,8.

—Thomas B. Smith
Gallipolis, OH

```
1 FORT=816TO826:READS:POKET,S:NEXT
2 FORT=247TO253:READS:POKET,S:NEXT:NEW
3 DATA 52,3,247,0,162,8,134,186,76
4 DATA 165,244,162,8,134,186,76,237,245
```

SLOW PRINT

By adding the following lines to your program, PRINT commands in your program will be executed slowly enough for you to be able to read the print on the screen as it is being printed! This will add a special touch to adventure games, and also to user instructions that are displayed before the actual program begins.

```
10 X=56324:POKEX,24:POKEX+1,0:FORD=1TO2:
NEXTD
30 POKEX,75:POKEX+1,46
```

Line 10 POKEs a smaller number into the computer timer so it will run at a slower rate. Line 30 returns your program to the normal rate after the slow PRINT. Add

SCREEN DUMP, ETC.™

Commodore 64 function keys used to:

* Dump any screen to printer (LO-RES, HI-RES, Sprites, custom characters - NO restrictions)
* Save/Load screen to/from disk (sprites and custom characters also)
* Display and modify locations of BASIC and screen memory
* MORE

Can be used during execution of other programs, without disrupting program operation. Compatible with most BASIC and machine language programs, and most DOT ADDRESSABLE printers. Available on disk only.

24.95 Includes shipping and applicable taxes (34.95 Canadian funds)

**** SATISFACTION GUARANTEED! ****
Return within 15 days for full refund

1-800-824-7888; Ask for Operator #530
(Orders only please)
(In Alaska & Hawaii, 1-800-824-7919; Oper. #530)

Commodore 64 is reg. trademark of Commodore Business Machines

Phone, or send check or money order to:
IRQ, Inc.
P.O. Box 457
St .Charles, MO 63302

"for Innovative, Reliable, and Quality solutions, look to IRQ"

Reader Service No. 240



V2.2 ULTRABYTE DISK NIBBLER

NEW UPDATED NIBBLE COPIER FOR COMMODORE 64 and 128 (in 64 mode)

- Copies 105 recent disks not copied by the original ULTRABYTE DISK NIBBLER
- Copies 99 + % of protected software
- New fast file copy program and new reliable fast backup for unprotected disks

NIBBLER V2.2 EVEN COPIES ITSELF

For this reason, no refunds will be given

THREE NIBBLERS ON ONE DISK

- Single 1541 or 1571, copies in 3 minutes
- Two 1541's, copies in 60 seconds
- Dual MSD drive, copies in 70 seconds
- Both automatic and manual copy parameters for single 1541 or 1571

$ 39.95 + $ 4.00 shipping & handling

Mastercard, Visa, Check or M.O., Calif. add 6.5% ($ 2.60) sales tax. Foreign orders / COD add $ 2.00. Payment must be in U.S. funds

UPDATES - Previous ULTRABYTE customers may order V2.2 for $ 20.00 plus $ 4.00 shipping. Owners of V2.0 or V2.1 may have their disk updated to V2.2 by returning the original disk with $10.00 plus $ 4.00 shipping. Foreign add $ 2.00. No COD's

To order, write or call 24 hr. order line
For information, write. Phone for orders only

ULTRABYTE (818) 796 - 0576
P.O. Box 789 LaCanada, CA 91011 USA

DEALERS & DISTRIBUTORS WANTED

Reader Service No. 241

the following two program lines to 10 and 30 above, and see how it works for yourself. —David S. Krause
Grissom AFB, IN

```
5 PRINT"[CLR]"
20 PRINT"SEE HOW SLOW THIS PRINTS ON THE
 SCREEN"
```

EASY PLOT

Here is a simple and very fast cursor movement routine that is as easy to use as IBM's LOCATE command. The entire routine is neatly hidden in a BASIC REM statement, allowing you to include it in any BASIC program without first loading a special machine language loader. To create the cursor movement routine first type and RUN the following BASIC program:

```
10 REM.............................
20 FOR J=2054TO2076:READX:POKEJ,X:NEXT
30 DATA 169,147,32,210,255,32,253,174,32
,158
40 DATA 183,202,134,214,32,241,183,202,1
34
50 DATA 211,76,16,229
```

If you typed in the program correctly you will notice that after running the program, line 10 will have changed. Don't worry, the strange jumble of BASIC key words is only the machine language routine as seen by the BASIC interpreter. The next step is to delete lines 20, 30, 40, and 50. Then SAVE line 10 to disk or tape. This will allow you to use the routine at later dates. There is only one restriction to using this routine, and that is it *must always* be the first line in any BASIC program. The EASY PLOT routine will allow you two different cursor movement options. The first cursor option will allow you to clear the screen and place the cursor, while the second option allows you to place the cursor and leave the screen display intact. To clear the screen use the format 100 SYS 2054, ROW#,COL# and to just place the cursor use the format 100 SYS 2059,ROW#,COL#. In both cases ROW# is the range 1 - 25 and COL# is the range 1 - 40. For example, if you wanted to place the cursor in the upper left corner of the screen after first clearing the screen and then place text in the center of the screen you would use the following program lines.

```
10 REM (AS FIRST CREATED)
20 SYS 2054,1,1:PRINT"EASY PLOT":REM CLE
AR AND PRINT
30 SYS 2059,12,13:PRINT"BY S.D. BETESH":
REM PRINT ONLY
```

—Saul D. Betesh
Kingston, ONT

REAL RANDOM NUMBERS

BASIC's random number generator isn't totally random. It also isn't very convenient for ML programmers to use. Here's a method for generating totally random numbers in machine language, or BASIC, by using the SID chip's random noise waveform. Set the high byte of the voice 3 frequency control to 255 so it's too high a pitch to hear. Then turn on bit 7 of the control register to select the noise waveform. Now you can read the random noise generator output for random numbers between 0 and 255.

For machine language, enter the following to set up voice 3:

```
LDA $D41B
```

Then read your random numbers by:

```
LDA #$FF
STA #$D40F
LDA #$80
STA $D412
```

For BASIC, enter the following:

```
10 POKE 54287,255
20 POKE 54290,128
30 PRINT PEEK(54299)
```

—Robert Olsen
Woodinville, WA

SEXTEX™ The nation's leading erotic computer communications network



$12.95 LIFETIME MEMBERSHIP

All you need is a computer with a modem to experience the thrill of online adult communications. SEXTEX™, the nation's fastest growing full service videotex network, features live interactive "Chatting", electronic mail and much more. Call or write for a FREE brochure—your computer will never be the same.

CVC ONLINE
dept. A
801 Second Ave.,
N.Y., N.Y. 10017
(212) 972-4719

Reader Service No. 239

QUEEN'S AND BISHOP'S TOURS

For the C-128

By Daniel L. Miller

In the November 1985 *Ahoy!*, Richard Ramella presented *Knight's Tour* in which we were challenged to cover the chessboard with the moves of the Knight. In my companion program, you must tour the board with either the Queen or the Bishop.

The Queen must cover all the squares and end on the same square on which she began. Legal moves are either parallel to the sides of the board or along the diagonals for any number of spaces. In deference to her royal lineage, the Queen can revisit a previously covered square. The Queen can tour the chessboard in 14 moves.

The Bishop must begin on a white square and move diagonally. He may not occupy a formerly covered square. The Bishop's tour can be accomplished in 17 moves.

When the chessboard appears on the screen, enter the starting Row/Column location of the piece; for instance, 3B. Remember, the Bishop must start on a white square. Press f1 to end the puzzle. If you would like to see the solution, answer 'Y' to the next prompt and the puzzle will reset and solve itself.

When I began to write this program, I had intended to do so in 64 mode on the Commodore 128. However, when I reached the routines for creating and manipulating the sprites for the Queen and Bishop, I quickly realized that I was ignoring the normous potential of the C-128's BASIC 7.0. Instead of using a separate sprite editing utility, I had the SPRDEF mode which enabled me to design the sprites while I was working on the program.

When I was satisfied with the two sprites, I PEEKed at the 128 bytes of the sprite storage location, starting at 3584, and transferred the values to DATA statements in my program. As you can see in lines 1180 and 1210, I eliminated all the zero values, since the interpreter automatically assumes zero if no other value is given. Instead of a series of POKEs to various registers, I initialized the sprite with the SPRITE command in line 80: SPRITE (number 1-8)[,on (1)/off (0)][,foreground color (1-16)][,priority (0 in front, 1 behind)][,x−expansion (0 off, 1 on)][,y−expansion (0 off, 1 on)][,mode (0 standard, 1 multicolor)]. Moving the sprite was just as simple with the MOVSPR command, also in line 80. This places the chosen sprite (1=Queen, 2=Bishop) at the fixed (x,y) screen coordinates of (40,140). To move the sprite to a new square, I determined the number of spaces moved (up/down/left/right/diagonally) in order to evaluate the offsets DX,DY in line 560. The sprite moves one space at a time within the DO UNTIL...LOOP.

The CHAR command is similar to PRINT AT in other dialects of BASIC. Although intended primarily for placing characters on a high-resolution screen, it can be used, as here, on a text screen. GETKEY eliminates the need for a loop (as 10 GET A$:IF A$="" THEN 10). The computer waits until a key is pressed and then continues. RESTORE can be reset to a specific line number as illustrated in lines 850 and 870. At startup, the function keys are loaded with several useful commands (DIRECTORY, RUN, LIST, etc.) but can be redefined with the KEY command as in line 1140. When I had finished the program, I entered RENUMBER to resequence the lines. These are the commands which I used in this program; however, there are many other commands for graphics and sound which must be seen to be appreciated. □

SEE PROGRAM LISTING ON PAGE 101

NOW GET TRUE DECENDERS FOR 801, 1525, GP-100 HUSH 80 & SIMILAR PRINTERS

From the Decender ROM People

WILANTA ARTS

SAMPLE ACTUAL SIZE

gyps
pager
peopl

FEATURING:

- True decenders
- A pleasing alternative
- Uniform character formation
- No change in graphic capability
- No change in software compatibility
- No change in printer operation
- North American standard font
- Complete instructions
- Easy installation
- No soldering

$39.95 Cdn **$29.95 U.S.**

Please Specify Printer

Ont. Residents add 7% Prov. Sales Tax

Cheque, Money Order, Visa or MasterCard

VISA

WILANTA ARTS

6943 Barrisdale Dr., Mississauga, Ont., L5N 2H5

1-416-858-9298

Get a Wilanta Decender ROM Today and make your old nightmare just a font memory of yesterday!

Reader Service No. 282

tcp COMMODORE

ORDERS ONLY
CALL TOLL FREE **1-800-468-9044**

Software orders over $50.00 will be shipped FEDERAL EXPRESS (yes, even with *these* prices)
You only pay TCP's standard shipping charge of $4.00 per order. This offer also valid on peripherals and accessories under 8 pounds. Orders arriving before 11:00 AM our time will be shipped out same day.*

FEDERAL EXPRESS

Computerized order entry, processing and status allow TCP to serve you faster and better!









- If through some oversight we don't have the lowest price, we would appreciate the opportunity to beat it. If we can,you will still get the benefit of our Federal Express shipping on software orders over $100.00
- We accept MasterCard, Visa, COD and mail orders.
- Purchase orders accepted from qualified corporations and institutions. Minimum order of $500.00 required.
- No sales tax on orders outside PA
- Buy with confidence. We honor manufacturer's warranty.

VISA MasterCard

To order by mail: We accept money order, certified check, personal check, Allow 2 weeks for personal check to clear.
Shipping: $4.00 for software and accessories $10.00 for printers and color monitors $8.00 for disk drives and other monitors Add $3.00 per box shipped COD. Call for other shipping charges. Additional shipping required on APO, FPO, AK, HI, and foreign orders.

Terms: ALL PRICES REFLECT CASH DISCOUNT, ADD 1.9% FOR MASTERCARD OR VISA. Manufacturer's warranty honored with copy of our invoice. **ALL SALES ARE FINAL.** Defective items replaced or repaired at our discretion. Pennsylvania residents add 6% sales tax. Prices and terms subject to change without notice.

DATA 20 XL-80

The XL-80 is an 80 column board that plugs into the back of your C-64. It's **compatible with the Mitey Mo** modem software to give you an 80 column terminal on your C-64. Included with the XL-80 is an 80 column word processor, spreadsheet, and mailing list program.

XL-80
$59.95

XL-80 & MITEY MO Package Deal
$107.95



LEGEND PRINTERS

808.....$159
880.....$CALL
1080A $199
1380.....$259
1385.....$295



JUKI



PRINTER/TYPEWRITER
2200 ..... $264
Daisywheel Printer, Portable Typewriter, Built in Correction Tape

PRINTERS
5510P $329
6000P..... $CALL
6100P $344

LETTER QUALITY PRINTERS when near letter quality isn't good enough

Cardco LQI $199
Epson DX-10 ..... $209
Epson DX-20 ..... $309
Star Powertype $299

PRINTER INTERFACES

G-WIZ $49.95
MW-350 w/4K Buffer $CALL
Cardco Super G... $CALL
Xetec Supergraphix $CALL
Xetec Jr. $46.95
Grappler CD..... $87.95
Tymac Connection $67.95

LX-80 .....$214.95
LX-80 tractorfeed..... $ 34.95
Homewriter 10....$229.95
includes Commodore or Atari interface
FX-85 ....$314.95
FX-286 ... $CALL
DX-10 .... $CALL
DX-20 .... $CALL

EPSON 1

PRO·LINE SOFTWARE

GT4 ..... $22.95
Fast Save, Fast Load Cartridge

C POWER
C COMPILER $69.99
CADPIC $36.95
CASHBOX.....$36.95
Wordpro 64.....$36.95
Spellpro 64.....$32.95
Mailpro 64.....$24.95
Profile 64.....$36.95
PAL 64.....$32.95
POWER 64 .....$32.95
TOOLBOX 64..... $59.95

The Print Shop

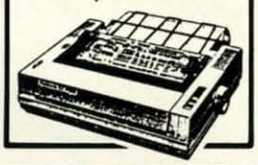
Broderbund Print Shop $25.95
Print Shop Companion $CALL
Graphics Library I, II or III $16.95
120 sheet color paper refill ½ red,½ blue, ½ gold .. $8.95

ENHANCER 2000

$159 DISK DRIVE
1 YEAR WARRANTY

PANASONIC

1091 ... $CALL
1080 ...$199.00
1092.....$299.00
1592.....$CALL
3131 Daisywheel .....$CALL
3151 Daisywheel .....$CALL



PRINTER PACKAGES

all packages work with C64 or C128

STAR SG-10 & XETEC SUPERGRAPHIX $269.95
SG-10 & Xetec Supergraphix jr $254.95
SG-10 & Cardco G-Wiz.....$259.95
SG-10 & MW-350 .....$269.95
SG-15 & Xetec Supergraphix $419.95
SG-15 & Cardco G-Wiz.....$412.95
SD-10 & Xetec Supergraphix $379.95

PANASONIC
1091 & Xetec Supergraphix $289.95
1091 & Xetec Supergraphix Jr. $265.95
1080 & Xetec Supergraphix $264.95
1092 & Xetec Supergraphix $359.95

MODEMS — MODEMS — MODEMS



MASTER MODEM $39.95
Includes Dow Jones, Compuserve Time
VOLKS 6470 300/1200 BAUD .$154.95
1670.....$157.95
1660.....$CALL
MITEY MO $59.95
VIP TERMINAL.....$34.95
VIDTEX TERMINAL..$23.95
Compuserve Starter Kit ..$19.95
Playnet Starter Kit $14.95

FREE PlayNET
STARTER KIT WITH PURCHASE OF ANY MODEM
(WHILE SUPPLY LASTS)

PRINTER BLOWOUT

COMREX

COMREX 220
$79.95
Commodore Ready from EPSON
50 CPS, Tractor Feed, 80 Columns

tcp **TUSSEY COMPUTER PRODUCTS** P.O. BOX 1006 STATE COLLEGE, PA 16804

128 CLASSIFIEDS

INFORMATION AND PA ORDERS 814-234-2236

OPEN 9-8 Mon-Fri; 10-5 Sat EAST COAST TIME

GAMES

BEST SELLING GAMES

Hitchhiker's guide	$22.95
F-15 Strike Eagle	$21.95
Karateka	$19.95
Kung Fu (Spinnaker)	$call
Flight Simulator II	$32.95
FS II Scenery disks	$15.95
Jet	$29.95
Microleague Baseball	$27.95
Microleague general manager disk	$27.95
Microleague 1985 teams	$15.95
Hobbit	$call
Sargon III	$37.95
Murder by the Dozen	$24.95

ACTIVISION

Alcazar	$19.95
Borrowed Time	$19.95
Computer Fireworks Celebration	$19.95
Countdown to shutdown	$19.95
Fast Tracks Slot Car Const	$19.95
Garry Kitchen's Gamemaker	$24.95
Great Amer RR	$22.95
Hacker	$19.95
Little Computer People	$24.95
Master Of Lamps	$19.95
Mindshadow	$19.95
Pitfall II: Lost Caverns	$19.95
Space Shuttle	$19.95

BLUE CHIP

Baron	$24.95
Millionaire	$24.95
Tycoon	$24.95

ELECTRONIC ARTS
CALL FOR OUR LOW PRICE ON ALL ELECTRONIC ARTS PRODUCTS!!

INFORCOM

Cut Throats	$22.95
Deadline	$25.95
Enchanter	$25.95
Hitchhiker's Guide	$22.95
Infidel	$29.95
Invisiclues	$6.95
Planetfall	$25.95
Sorcerer	$29.95
Spellbreaker	$29.95
Suspect	$29.95
Wishbringer	$25.95
Witness	$25.95
Zork I	$22.95
Zork II	$26.95
Zork III	$26.95

Mindscape
CALL FOR OUR LOW PRICE ON ALL MINDSCAPE PRODUCTS

SIMON & SHUSTER

G.I. Paper Airplane const	$call
JK Lasser's Income Tax guide	$39.95
Kermit's Story Maker	$19.95
NY Times Crossword Puzzle Vol. 1 or 2	$14.95
Spy Hunter	$31.95
Star Trek-Kobayashi alt	$29.95
Typing Tutor III	$29.95

SPINNAKER

Adventure Creator	$22.95
Alphabet Zoo	$16.95
Cosmic Combat	$call
Delta Drawing	$19.95
Facemaker	$19.95
Hey Diddle Diddle	$16.95
Homework Helper	$call
In search of the most amazing thing	$18.95
Kung Fu	$CALL
Snooper Troops I or II	$18.95

Call for other SPINNAKER Software

STRATEGIC SIMULATIONS
CALL FOR OUR LOW PRICE ON ALL SSI GAMES.

MISCELLANEOUS

C-64 WORD PROCESSORS

Font Master II	$34.95
Wordpro 64	$36.95
Spellpro 64	$32.95
Wordpro 3+/64	$19.95
Fleet System II	$call
Paperclip	$37.95
Paperclip w/spellpack	$49.95
Mirage Professional WP	$36.95
Trio	$call
Kid Pro Qyo	$32.95

C-64 DATABASES

Consultant	$39.95
Mirage Database w/Report gen	$36.95
Profil 64	$36.95
File Now	$call
Practifile	$call

C-64 SPREADSHEETS

Vizastar 64	$79.95
Pracitcal(d) or (t)	$call
Calkit	$39.95
Hes Multiplan	$29.95
PS, The Programmable Spreadsheet	$19.95
Calc Result Adv (d,c)	$67.00

MONOCHROME MONITORS (Composite Input)

NEC 1205 12" amber w/sound	$89.95
Goldstar MBM2233 12" amber	$79.95
Goldstar 12" green	$79.95
Zenith 1220 amber flat screen	$99.95
Zenith 1230 green flat screen	$99.95
Din to RCA phono jack cable	$6.95
RGB to RCA phono jack cable	$9.95

CARDCO

Write Now	$22.95
Calc Now	$19.95
Paint, File, Spell, Mail Now	$call
Numeric keypad	$34.95
5 slot cart. exp	$54.95
S'more Basic	$49.95

UTILITIES

Merlin 64	$34.95
Fast Load	$24.95
Pal 64	$32.95
Power 64	$32.95
Toolbox 64	$59.95
CSM 1541 align	$34.95
Mach 128	$call
C Power	$69.95

C-64 INTEGRATED PACKAGES

Vizastar 8K	$79.95
Trio	$call
Homepack	$39.95

MISCELLANEOUS

Koalapad	$59.95
Koala Gibson Light pen	$49.95
Naverone 3 Slot expander	$27.95

GRAPHICS

Print Shop	$25.95
Graphics Library I, II, or III	$16.95
Newsroom	$34.95
Clip Art I	$19.95
Clip Art II	$call

Financial & Accounting

Softsync Pers. Acct	$32.95
Cont. Home Acct.	$46.95
Timeworks General Ledger, A/R, A/P, Payroll, Inventory	$40.95 each
Infodesigns General ledger, A/P, A/R, Payroll, Inventory	$call
Cashbox	$36.95

ALSO IN STOCK . . .
Software from Access, Addison-Wesley, Broderbund, CBX, Epyx, Hayden. Call for Price and Availability.



COMMODORE 128
HARDWARE
1670. . . . $157.95

C128
1571, 1572 DRIVES
1902 MONITOR
MPS 1000 PRINTER
1350 MOUSE
1700, 1750 RAM EXPANSION

CALL NOW FOR LOWEST PRICES

SAVE A BUNDLE ON A BUNDLE
PACKAGE DEALS AVAILABLE
CALL FOR DETAILS

COMMODORE 128 SOFTWARE

WORD PROCESSORS

VIZAWRITE 128	$LOWEST PRICE CALL
WORDPRO 128	$59.95
PAPERCLIP	$37.95
PAPERCLIP W/SPELLPACK	$49.95
WORD WRITER 128 W/SPELLER	$49.95
PERFECT WRITER	$CALL

SPREADSHEETS

EPYX MULTIPLAN 128	$44.95
PERFECT CALC	$CALL
SWIFTCALC 128 W/SIDEWAYS	$49.95
VIZASTAR 128 (Integrated Spreadsheet, Database, Graphics)	$CALL

MISCELLANEOUS 128 SOFTWARE

PERFECT FILER	$CALL
JANE	$32.95
SUPERBASE 128	$69.95
CONSULTANT 128	$39.95
Sylvia Porter's Financial Planner	$CALL
Data Manager II	$49.95

NEW TITLES EVERY DAY!
CALL FOR LATEST INFORMATION!

RGBi/COMPOSITE MONITORS

Magnavox 8562 . . . $CALL
2 year warranty, all cables to 128 included. Monochrome mode available at flick of switch

Thompson Monitor $274.95
4 modes of operation. All cables to 128 included.

SEIKOSHA

SP-1000 VC . . . $CALL
Commodore ready. NLQ mode, friction and tractor feed standard.

SP-1000 . . . . . $CALL
Centronics parallel version of above printer

XETEC inc.

SUPER GRAPHIX interface w 8K buffer, down loadable fonts
. . . . . **$ lowest price**

SUPERGRAPHIX jr printer interface. . $46.95

Font Master II . $34.95

SG-10 . . . . . $CALL
SL-10C $226
Commodore ready
SG-15 . . . . . $364
SD-10 . . . . . $323
SD-15 . . . . . $449
POWERTYPE . . $299
18cps daisywheel
SR-10,
SR-15 . . . . . $CALL



INFODESIGNS SOFTWARE

Wordpro 3+/64, A/P, A/R, Inventory
Payroll, General Ledger, Communications, Sales, Management, or Negotiation Edge.
Your Choice . . . . . $19.95 EA

tcp IS A COMMODORE AUTHORIZED SERVICE CENTER

REPAIR RATES FOR OUT OF WARRANTY SERVICE

C-64 Repair	$49.95
1541 Align	$29.95
1541 Repair	$69.95
C128, 1571, Others.	$CALL

Repair Rates Include UPS Ground "Return" Shipping

General Accounting System **CMS**

INCLUDES:
- GENERAL LEDGER
- ACCOUNTS RECEIVABLE, BILLING, STATEMENTS
- ACCOUNTS PAYABLE, CHECK WRITING
- PAYROLL

ALL MODULES INCLUDED FOR **$134.95**

ORDERS ONLY...CALL TOLL FREE **1-800-468-9044**

tcp



HAS EVERYTHING!

SUBSCRIBE TO AHOY!

☐ Twelve Issues for $19.95 ($26.95 Canada and elsewhere)
☐ Twenty-four Issues for $37.95 ($49.95 Canada and elsewhere)

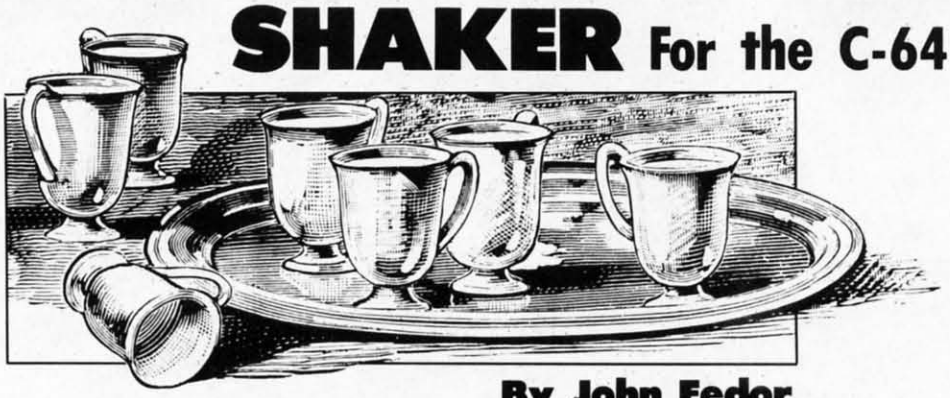
Name_____

Address_____

City_____ State_____ Zip_____

Send coupon or facsimile to:
ION INTERNATIONAL INC.
45 West 34th Street, Room 407, New York, NY 10001

SHAKER For the C-64



By John Fedor

Remember that con game with the three peanut shells and the peanut that never seemed to be under the shell you picked? Now you get to try your luck again. Only this time, there are seven cans of pop, six of which are shaken up. You must pick the correct one or else you get to drink pop the hard way!

In order to enter the program, use *Flankspeed* (page 85) to help spot typing errors. Use a starting address of $C000 and an ending address of $C878. Once it is entered, you can LOAD it (,8,1 or ,1,1) and start it by typing SYS49152 <RETURN>. The title screen will be displayed.

When starting the game, you get to choose your starting level (1-5). You will not be penalized for starting on a higher level. In fact, you get extra points for starting on higher levels. Move the joystick (Port 2) left or right to choose the level and press the fire button to start the game.

You will then see seven red pop cans on the screen. The computer will pick six of them and shake them. The computer always shakes them at the same speed. Remember which can was *not* shaken.

Now comes the hard part. The computer will shuffle the cans about 15 times. The lower the level, the slower the speed. Level 11 is truly for the super eye. Once the shuffling is completed, you move the flashing can to the correct can. Press the fire button to choose the can. If you are right, it makes a certain noise. If not, the can sprays out the pop. You get three attempts per game. My highest score is 2590. □

SEE PROGRAM LISTING ON PAGE 103

AHOY! PROGRAMS WANTED

Ahoy! is constantly in search of the best Commodore programs being written today. And we're proud of our record of success at finding them and presenting them to you.

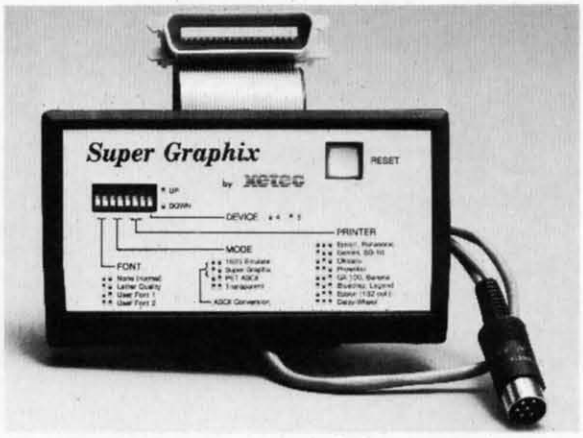
Please keep our chests bursting with pride, and our pages bursting with the finest game, utility, and productivity programs available on newsstands today.

Send your original efforts to *Ahoy!* Program Submissions Dept., Ion International Inc., 45 West 34th Street—Suite 407, New York, NY 10001. Submissions should be on disk and accompanied by a printout and an introductory article, as well as a self-addressed return envelope with sufficient postage affixed.

Oh—what's in it for you? Cold, hard cash, paid upon acceptance. You'll find that as some other Commodore magazines have lowered their rates, ours have gone up. And unlike some other publications that buy all rights, *Ahoy!* buys rights for one year only—after which time ownership of your program reverts to you. You'll also receive royalties based on the sale of our monthly program disk/cassette.

Your date with destiny awaits. Show us and your fellow *Ahoy!* readers what you can do!

Super Graphix



You Asked For It . . . Here It Is!!!

GRAPHICS and FONTS plus an 8K BUFFER for the ultimate in performance and speed. The XETEC Super Graphix interface for Commodore Computers now offers a new high in technology with these features:

- 8K Buffer Standard
- 10 Printing Modes
- 3 Internal Screen Dumps
- Extensive Command Channel
- Reset Button to Halt Printing from Buffer
- Switch Settings on Label for Quick Reference
- Correspondence Quality Font Built-In
- Capable of Storing 2 Additional Fonts
- Correct Graphics/Text Aspect Ratio for all Major Printers
- 8 Active Switches with Changes Constantly Monitored
- Internal Fonts Support Super-script, Sub-script, Underlining, Bold-face and Choice of 9 Pitches

Suggested list $99.95 • Includes Lifetime Warranty

xetec, Inc. / 3010 Arnold Rd. / Salina, KS 67401 / 913-827-0685

Reader Service No. 246

FOR COMMODORE 128 AND C-64 OWNERS ONLY:

BLITZ!™

NOW SHOWING AT SKYLES ELECTRIC WORKS

If your programs are slow, BLITZ!™ them

It's Spectacular
Bob has discovered a spectacular compiler for the **Commodore 64** and the **Commodore 128** that he calls ***BLITZ!***

It's Fast
BLITZ! is faster than PET SPEED, faster than any other Commodore compiler that has come down the pike. Your ***BLITZ!***-compiled program will run from *five to 20 times* faster than it did before you blitzed it.

It Translates
This disk program translates your slow BASIC programs into a much, much faster code. The ***BLITZ!*** compiler significantly improves the performance of your BASIC routines. It reads the entire program, reduces that program's size by deciding which operations need to only run once, interprets the operations, and then re-writes the program into its own special P-code.

It's Protective
For more advanced programmers, the ***BLITZ!*** compiler offers another benefit besides speed. It provides an almost infinite number of ways to add protection to your programs, because a compiled program is not readable. So security is inherent in the re-writing!

It's a Treasure
Using this compiler, you can now create a string of BASIC programs such that one automatically loads the next. You can also pass information from one program to another. You will find the ***BLITZ!*** compiler a treasured tool in your programming kit.

It's Popular
Reviewers and users have heaped the following praise on the ***BLITZ!***: "The ***BLITZ*** basic compiler is a dream come true for BASIC programmers." Compute!'s Gazette Jan 1985 "worth its weight in gold." TPUG Mar. 1985. "Wonderful" "Fantastic" "I can't imagine programming without it" User comments. It is even more popular with professional programmers. Many commercial programs now say "***BLITZ!***" when they are listed. The ultimate accolade for ***BLITZ!***.

C-64 or C-128

		SPRING SALE
***BLITZ!* C-128, Disk**	$129.00	99.95*
***BLITZ!* C-64, Disk**	99.00	49.95*

*There is an additional $4.50 U.S. and Canada, $15.00 Europe and Asia, shipping charge per order. California residents add sales tax.

Call Today for Fast Service!

Storage Power to the People

It's the largest
Yes, the Skyles Electric Works interfaced **Commodore SFD 1001** is the largest floppy disk drive available for the **Commodore 64**. How large? 1.058 million characters of storage. 6.22 times larger than the 1541 Disk Drive. Turn it on, format a diskette and the directory says 4133 blocks free!! No, this is not an expensive hard disk. it is a 5¼ inch, double sided, floppy disk drive. It is the same physical size, shape, color as the Commodore 1541 disk drive. It looks like a 1541, but it stores over 1 million characters of programs and data. Just think of it as 6.22 1541s in one. And at an amazingly low price!

It's the Fastest
Yes, the specially modified **QUICKSILVER** - interface makes this fastest loading and saving floppy disk drive available for the **Commodore 64**. Over 6 times faster program and file loading than a 1541 disk drive. Twice as fast as a **1541 Flash!** We made it this fast, because frankly, the advantages of a large disk memory almost disappear unless you have rapid access to the data. And at an amazingly low price!

It's the Least Expensive
Yes, on a price per character of storage basis, the **SEW/SFD 1001** is the least expensive floppy disk drive available for the **Commodore 64**.

		SPRING SALE
SEW/SFD 1001 Disk Drive System, C-64	$499.00	299.00*

QUICKSILVER™

Is the fastest IEEE-488 Interface available for the **Commodore 64**. How fast? As fast as the external IEEE-488 device will allow. For example, a program or file will load over six times faster from a Commodore 4040 or 8050 disk drive as compared to a 1541 disk drive. **QUICKSILVER** loads 7 times faster than a serial MSD drive. When used with printers speed is only limited by the printer.

QUICKSILVER is transparent. **QUICKSILVER** does not occupy any program memory. Almost all programs are completely compatible with **QUICKSILVER**. A word of caution, some IEEE disk drives have different formats, and 1541 formatted programs are not going to load. Some programs protect the disk by various operations in the 1541 disk memory. These programs will not load on non-1541 disk drives. However, for most uses **QUICKSILVER** is very quick and transparent.

QUICKSILVER is easy. Easy to plug into the cartridge port. Easy to plug additional cartridges into the built-in horizontal cartridge port extender. Easy to locate your IEEE device within 2 meters (6½ feet) of **QUICKSILVER** using the built-in 2 meter IEEE cable. Easy to select which device numbers you want **QUICKSILVER** to interface to the IEEE bus. Easy to use with almost all programs. Easy to buy, at an amazingly low price. from Skyles Electrics Works or your local dealer.

		SPRING SALE
QUICKSILVER, C-64 Cartridge	$129.95	99.95*

*There is an additional $4.50 U.S. and Canada, $15.00 Europe and Asia, shipping charge per order. California residents add sales tax.

From Skyles Electric Works, the oldest and largest professionals in the business.

This is just a few of the 200 + bargains from the newest and biggest Skyles catalog, hot off the press.

We know you'll want this page, in its full splendor, and the other pages overflowing with over 200 bargains in peripherals, software, and books that will make your Commodore 128 or C-64 computer even nicer to live with.

So, if we missed sending you your very own copy within the last few weeks, call us at 1-800/227-9998, unless you live in California, in which case call 1-415/965-1735.



Skyles Electric Works
231E South Whisman Road
Mountain View, CA 94041
(415) 965-1735

Reader Service No. 266

MEETING THE ULTIMA CHALLENGE

How to Find Fame and Fortune in Lord British's World

By Tracie Forman Hines

Featured This Month:

Meeting the Ultima Challenge.....47
Play It Again, Casey 48
The Bard's Tale 51
Hero of the Golden Talisman ...52
Quake Minus One.....53
The Goonies.....53
Sword of Kadash.....54

Hundreds of thousands of gamers have stayed up late trying to unravel its secrets since the first installment of the *Ultima* series made its debut in 1980. Each title is more convoluted than the last, and the gamer generally begins with a weak character who is totally ignorant of the surroundings or the true goal of the quest.

Richard "Lord British" Garriott's creation, unlike most of the adventures of the time, derives much of its play value from its role-playing aspects. A character develops an individual personality as the computerist makes discoveries about the land and battles the creatures of darkness to earn experience points.

Those familiar with non-electronic role-playing games will immediately recognize the pattern and slip into the *Ultima* universe. Newcomers will have to study this Horatio Algerish view of life in which the goal is to turn a weak persona into a powerful one.

The only scenario which hasn't stood the test of time is *Ultima I.* It hasn't lasted well mostly because of its primitive graphics and relative simplicity. While the original is still a great collector's item, this article deals with winning the follow-up scenarios.

The Road to Success

Each title differs from the others in the series, but there are certain universal *Ultima* strategies that can help even novices avoid pitfalls and painful deaths.

The most important tools a gamer needs to solve any of the scenarios are a notebook, a pad of large-grid graph paper, and a pen. Transact with everyone you meet in towns, villages, or cities, and write down what you learn. This is the only way to solve the adventure. It's a good idea to make lists of the residents of towns and villages. This way, you'll know where to find them.

Lord British is the final arbiter of life and death in the *Ultima* realms. The game often starts a player a mere stone's throw from his castle. Visit the monarch often to get the benefit of the extra levels and/or hit points the character earns as quickly as possible.

Carry lots of food, as much as the character can afford. The absolute minimum amount is about 200 units, enough to stave off starvation during a coast-to-coast hike, even if the party gets lost briefly. Keys, torches, and gems also come in handy, so stock up at the local Thieves' Guild.

If you think you've seen every location in a town, village, or dungeon level, peer at a gem just to be sure. Lord British can be devious, and he often hides vital areas or characters just out of sight. Gems are especially useful in dungeons, where they can find secret doors, treasure chests, stones, and other goodies.

Know the Neighborhood

Unlike many other adventure games, *Ultima*'s scenarios require little real mapping. After a few treks, most players will be familiar enough with the map to recognize landmarks. Of course, the cloth maps enclosed with each game help a lot, so remember to decipher the hieroglyphs. They can point the way towards specific places or solutions that would take a long time to figure out on your own. Make a note of any location not flagged on the cloth map. Use pins if you don't want to deface it.



Ultima III: ***bigger than precursors.***
READER SERVICE NO. 230



Ultima IV: ***honesty is best policy.***
READER SERVICE NO. 231

Dungeons and towers are the exceptions to the "no map" rule. Map each square carefully, or you could end up running around in circles, repeatedly stumbling into the same traps or missing secret doors that lead to the heart of the dungeon. Hint: it isn't necessary to explore towers or dungeons to win *Ultima II.* If you don't need the money, don't waste your time or hit points.

Never, but never, leave the game running while you get up to answer the phone. Your character could easily starve or be attacked and killed in your absence. Use the Z command, which suspends all game activity.

In *Ultima III* and *IV*, always have a few characters readily armed with missile weapons. It's the only way to beat certain monsters, especially seafaring and poisonous types. Position archers behind swordsmen, so both can attack.

Secrets of *Ultima II*

This scenario pits a single player against all the forces of Minax the Enchantress, who's wreaking havoc on the land in revenge for the destruction of her lover in the first episode. The player's first priority is to find and master the Time Doors, the now-you-see-em, now-you-don't portals which appear according to the phase of the moons.

Besides talking to the local townsfolk, try bribing people, especially hotel clerks. There's a lot more happening than meets the eye. Most players will have to travel to each time period more than once.

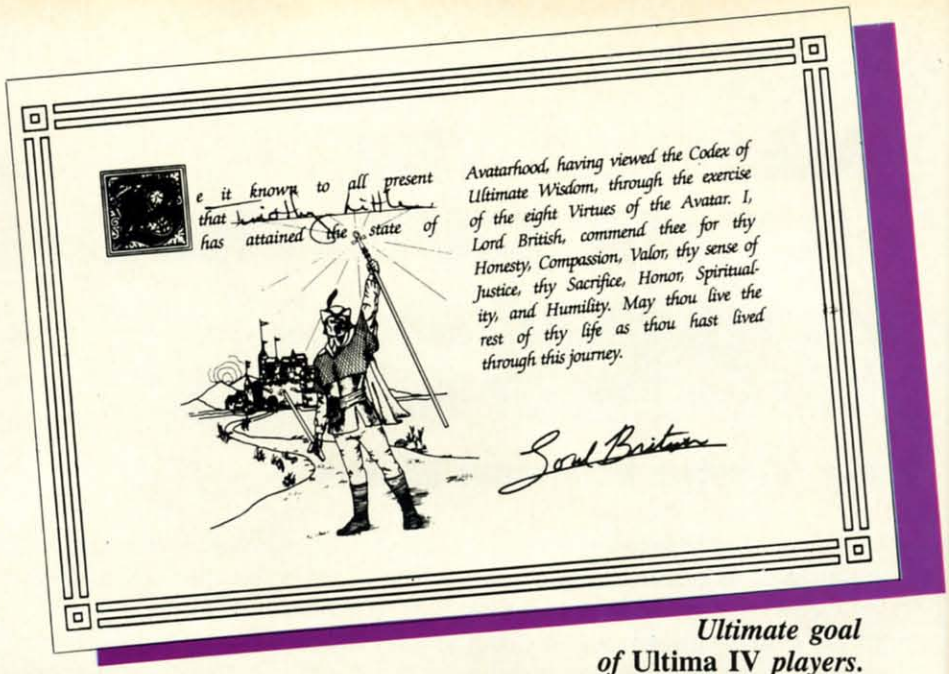
Try taking different technologies through time doors. But make sure you know where you're going before taking the rocket ship into space. Aimlessly wandering around the universe often proves fatal. Once sure of the destination planet's coordinates, and those for the landing strip back home, explore a few out-of-the-way planets just to see what they contain.

Exodus or Bust

Ultima III is much bigger and more complicated than its predecessors. Up to four individual characters join forces against evil. A character's race and class influences his or her attributes, so read the section on creating characters carefully before generating a party. For example, dwarves make lousy magic users.

This game requires players to go through a pseudo-death sequence to find a hidden area. While it may be too painful to imagine, allow events to take their course, and you could just be pleasantly surprised.

The Moon Gates instantly teleport the party from one place to another, sometimes landing the group in an otherwise inaccessible spot. Experiment with the Gates and write down which Gates lead where during each phase of the moon.



Ultimate goal of Ultima IV *players.*

Keep track of everything people say, and the order in which they say it. Write down comments verbatim, because the party may be required to do something in a particular sequence later in the game.

Use the "Appar Unem" spell to open chests whenever possible. No character has to die a miserable, poisoned death. If anyone in the party is poisoned, run, don't walk, to the nearest Healer.

Make sure each character carries a reasonably equal distribution of food into dungeons. That way, if gremlins steal food from any one person, other characters will have enough to compensate for awhile.

The "exotics" townies sometimes mentioned are not some sort of strange new spells. They are armor of the highest quality. "Exotics" are not located on the mainland.

In Search of Perfection

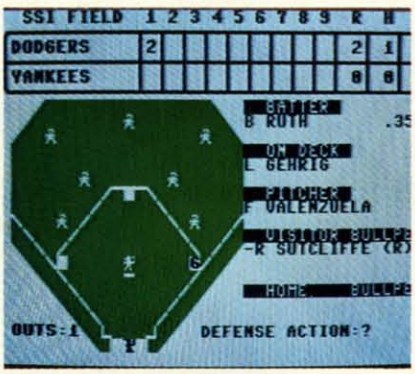
In *Ultima IV*, players *must* behave like heroes to make any progress. Stealing is possible, for example, but criminality sets the character back so far that it really isn't worth the trouble.

Among the actions that will advance characters quickly: "tipping" healers 100-400 hit points; sparing non-evil creatures; and dealing honestly with all non-player characters. Actions which will retard character growth include: stealing anything

PLAY IT AGAIN, CASEY

By Arnie Katz





World's Greatest Baseball Game *and* **Computer Baseball** *are two examples of games allowing managers to match teams of different eras.*

from anybody; stirring up trouble in towns; habitual lying; and running away from a lot of battles.

Go after the rune and mantra in Jhelom as soon as possible. Actually finding what you need might require bad enough behavior to lose you partial avatar points.

The way the gamer answers the gypsy fortune teller's questions shapes the character's starting position. If you're not happy with the character you begin with, for example, the best way to cut frustration is to start over from scratch.

Talk to Hawkwind often, since only he can tell you how much progress you're making. Try to elicit some sort of question from every character you meet. If someone hasn't asked a question, you probably didn't have a deep enough conversation with them.

Hole up and camp often. It's the best and cheapest way to regenerate lost hit points (unless you happen to be close to Lord British's castle, in which case inquiring about his health will restore everyone to full HPs). If the computer tells you that resting has had no effect, it's lying. Characters might not have any hit points restored, but their magic points always return to full strength after a nap.

Never press "0" when asked how many rounds you want to meditate at a temple. Not only will the meditating last almost forever, but you stand a good chance of losing avatar points if you stop prematurely. It takes quite a while to earn them back.

Mix up plenty of spells before entering dungeon rooms. Once engaged in battle, you can't concoct a handy fireball. The dungeons all connect at the bottom, so you can locate out-of-the-way dungeons by going all the way to the eighth level and walking through an altar room. You'll enter a different dungeon. To see exactly where the dungeon is on the terrain map, cast an "X-it" spell.

The ideal party has eight characters, one from each class. Potential party members can be found in the towns which represent their character classes.

If you kill a monster from a boat, it doesn't leave a chest of gold and no party member earns experience points. You don't have to kill every monster in an attacking party to earn financial reward, though. Forcing them to retreat earns a chest.

The phases of the moons are important when hunting mandrake and nightshade. Look for these most powerful reagents when the moons are dark. Moons continue to cycle while you mix reagents or hit "Z" (pause). If you're waiting for a moon gate or the right phase of the moon, use either of these methods to wait for the perfect moment. That way, you won't have to battle marauding monsters.

Final Advice

It may be hard to believe while you're banging your head against the monitor screen in frustration, but everything in each *Ultima* game has a solution hidden somewhere. If talking doesn't immediately provide a clue, try it again! Local gossip is the key to winning.

Origin Systems, creators of *Ultima III* and *Ultima IV*, market their own hint booklets. They provide no outright answers, only phrases to jog players' imaginations and nudge them towards solutions. The hint books are available directly from Origin for $12.95 each. Players who need even more help can call the company direct and get straight answers from Origin's friendly, knowledgeable staff.

Unfortunately, Sierra, publisher of *Ultima I* and *II*, doesn't offer the same support. Fortunately, there are a variety of good adventure game books on the market that offer complete solutions.

Happy orc hunting! And remember, in the *Ultima* universe, only the strongest strategists survive.

Origin Systems, 340 Harvey Rd., Manchester, NH 03103 (phone: 603-644-3360). ***—Tracie Forman Hines***

Getting the Most out of Computerized Statistical Baseball Games

Shortstop Ernie Banks lungs into the hole! He spears the ball and, in one fluid motion, shovels it to Rogers Hornsby at second base. The Rajah steps on second as Willie Mays slides into the bag to try to break up the double play. Hornsby pegs to first, where Don Mattingly stretches out to catch the ball a split second before Babe Ruth can touch first base. The St. Louis Aliens, masters of the Royal Amateur Micro Baseball League Organization (RAMBO), trot off the field with another victory.

There's only one way superstars of different eras and teams could play on the same field: a statistical baseball game. Statistical baseball employs mathematical models which represent the performance of actual players of the present and past. These models plug into algorithms which express the interrelationships among players in each specific situation.

The result of all this high-powered arithmetic is that statistically based baseball simulations replicate the real sport so that gamers can enjoy the vicarious challenge of making the same decisions that perplex Major League managers, coaches, and general managers. In other words, if you have Wade Boggs, he will hit, throw, run, and field for your team the same way he does for the Boston Red Sox.

Non-electronic statistical games, popular since the early 1950s, have spawned a hobby group which includes hundreds of play-by-mail and face-to-face leagues and hundreds of thousands of devoted players. The computer has proved to be a real bonanza for armchair managers, eliminating the need to roll dice to generate random numbers and consult mountains of charts on every play.

Commodore owners can choose from among four different statistical baseball titles: *Computer Baseball* (Strategic Simulations), *World's Greatest Baseball Game* (Epyx), *Statis-Pro Baseball* (Avalon Hill), and

Micro League Baseball (Micro League Sports Association). All are easy to learn and reasonably entertaining, and all have sufficient statistical accuracy to serve the needs of Walter Mitty-type managers. (See the chart on page for a comparison of these programs.)

Paths to Diamond Glory

Matching your favorite team against its principal divisional rival, the league titlist, or the world champion is usually the first thing a new stat replay gamer tries. It's always fun to see if one's strategizing could reverse the outcome of that crucial game or key series, but lovers of baseball simulations have come up with several other ways to have fun with such programs.

One choice, an especially good one for those who generally play solitaire, is an extended replay. Many find this activity very satisfying. It allows for direct comparison between actual performance and statistics produced with the game, and it gives the electronic skipper a chance to change sports history.

Although the truly ambitious may elect to restage an entire Major League season, using the disks which the publishers of all baseball programs sell for this purpose, this is a major undertaking. A full year's schedule consists of more than 2,100 individual games, and that's over 1,200 hours of actual playing time.

A better choice for most computerists is a replay of one team's season. It's something even a time-pressured manager can complete in a reasonable period of time, and it neatly avoids the boredom of replaying contests between unfamiliar or unappetizing teams.

How exacting to make the replay is a matter of personal choice. Purists consult back issues of *The Sporting News* or the daily newspaper to determine the exact line-ups used in each game. This generates the most lifelike statistics, and makes it easy to compare the computerist's achievements with those of real managers.

Truthfully, most fans of computer baseball will find this rigorous method entirely too much work. For most, simply trying to use players in a more or less realistic fashion is close enough. The statistics won't match the real major league totals exactly, but they'll be close enough to provide a frame of reference and points of comparison.

Another approach, good for solo play or as a day-long diversion at a summer barbeque, is a tournament. Let each competitor pick a team from a particular season, draw up an elimination ladder, and play toward a championship. An eight-team tourney requires just seven games—about four hours—to pick a winner. Constructing a tournament employing famous teams of the past is an exciting variation.

Many feel leagues provide the ultimate in stat replay baseball pleasure. Their seasons frequently extend through the winter, giving baseball zealots something to do when the only hardball news involves arbitration hearings.

Computerists who can't find local competition can join a mail loop. The manager of the visiting team in each series sends instructions to the home manager, who plays out the contest according to the guidelines.

Since this system is less than ideal, many computer baseball fans choose to join face-to-face circuits. Groups which have access to a computer room often meet one to four times per month to play one series each. Leagues without such facilities generally require the manager of the road team to travel to the home manager's computer to play a three or four game series.

Finding managers is a cinch. Most computer stores will post a small ad on the wall. Other good places to let the world know about your league are school, office, or supermarket bulletin boards. And you might give the local users group or BBS a whirl, too.

Though quite a few leagues utilize stock teams, alternative formats allow the participants to show their ability as general managers as well as field generals. The most popular is the draft league. Each manager picks the team of his or her dreams from a pool of eligible free agents. Generally, the ballplayers are updated after each real-life season to reflect their new level of performance, and league teams can retain the rights to a player from season to season.

All four of the programs on the market are fun to play and give would-be managers a chance to strut their stuff. For the dedicated armchair manager, however, all disks are not created equal.

For instance, if a draft league is your heart's desire, *Micro League Baseball* and *Computer Baseball* are the best choices, because they permit easy trading of players between teams. On the other hand, if full-season replays are the goal, *Statis-Pro* offers the biggest selection of complete past years.

The accompanying chart rates the four titles currently on the market in key areas.

RATING THE STATISTICAL BASEBALL GAMES

	Micro League Baseball	Computer Baseball	Statis-Pro Baseball	World's Greatest Baseball Game
Statistical Accuracy	★★★★	★★★★★	★★★★	★★★
Selection of Full Seasons	★★	★★★★	★★★	★★
Selection of Old-Time Teams	★★★★	★★★★★	★★	★★
Graphics	★★★★★	★★	★★	★★★★
Excitement Level	★★★★★	★★★	★★★	★★★
Strategic Scope	★★★★	★★★★	★★★★	★★★
Documentation	★★★	★★★★★	★★★★	★★★
Overall Rating	★★★★	★★★	★★★	★★

Some leagues are quite elaborate. The Royal Amateur Micro Baseball Organization, an eight-team aggregation based in New York City, has a weekly bulletin, monthly statistical report, a league championship party, and even a yearbook. Obviously, these are frills which can be customized to each group's wants.

Whatever way you choose to play, computer statistical baseball simulations can provide hours, or even years, of mental stimulation and pulse-pounding entertainment. And who knows? You may be the architect of the next computer baseball dynasty!

Books for Stat Fans

The ruling axiom of statistical baseball simulations is that the better you know the players, the better you will manage them. Watching and listening to actual games provides a lot of guidance about actual strategy, but reading is often the best way to get the big picture.

The annuals published by Street & Smith and *The Sporting News* provide excellent summaries of the previous season, along with pertinent statistics. Daily newspapers, such as *USA Today*, and the weekly *Sporting News* do the same for the season in progress.

A trio of quality paperbacks, issued annually, provide more sophisticated analysis for connoisseurs:

The Bill James Baseball Abstract (Ballantine Books) features exhaustive commentary by America's leading baseball scientist. It critiques every team and is loaded with unique studies and observations which genuinely illuminate the sport.

The Elias Baseball Analyst (Collier Brooks) is produced by baseball's most prestigious statistical service. It has every number you could possibly want or need.

The Scouting Report (Harper & Row) is an annual which exhaustively rates every major league pitcher and hitter. This is particularly useful for players of *Micro League Baseball*, since it provides information which helps select the right pitches for each moundsman to throw.

Of course, there are many, many more books and magazines devoted to the sport. These, however, form the basis of a stat game fan's basic library.

THE BARD'S TALE

Electronic Arts
Commodore 64
Disk; $39.95

Things are rotten in the once-peaceful town of Skara Brae. Mangar, an evil wizard, has the place in his power, and only a collection of the most powerful heroes and heroines can free Skara Brae from his devilish enchantments.

The Bard's Tale, billed as the first in a series of role-playing games called "Tales of the Unknown," chronicles the assault on Mangar and his minions. The computerist generates characters, forms them into adventuring parties, and challenges the monster-filled town and the even deadlier dungeons beneath it.

The specific goal in *The Bard's Tale* is to find Mangar and compel him to release Skara Brae and its citizens from his thrall. Beyond this, however, the program's wide-open construction gives it more depth and, consequently, greater replayability than adventures which are tightly tied to a central plot.

The path to Mangar is not linear. There are no clues to gather and puzzles to solve as such, though Skara Brae does have its share of mysteries. Before the gamer can confront the arch-mage, it is necessary to develop characters powerful enough to penetrate the hordes of crazed creatures which protect the villain.

As in such non-electronic role-playing games as "Dungeons & Dragons," characters begin life in *The Bard's Tale* in a virtually powerless state. Contact with some of Skara Brae's scarier residents often sends such low-level stalwarts to early graves. Characters increase their powers and abilities by gaining experience and finding useful magical items. Experience comes primarily from fighting and defeating hostile parties of monsters, and there's no shortage of opportunity for such encounters in *The Bard's Tale*.

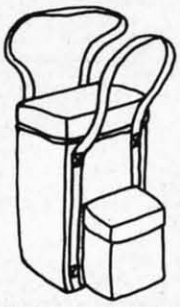
The race and class of a character have a major impact on the construct's abilities. And elf, for example, does better than a human as a magic-user, while a dwarf excels in combat. There are seven possible races, including human.

Each character is rated (3-18) in five separate traits: strength, intelligence, dexterity, constitution, and luck. A high intelligence helps a mage progress faster and do more at each stage, while high dexterity may give a Warrior the advantage of striking the first blow in battle.

There are 11 possible professions, each of which has a unique set of advantages. While a Warrior or Paladin leads the way in armed combat, Bards have a selection of songs which provide magical aid, and Rogues can hide in the shadows and disarm potentially lethal traps.

Magic-users are subdivided into four distinct classes. Conjurers deal in the creation and manifestation of real things, such as fire. Magicians can affect physical objects and do such things as enchant swords and make walls disappear. Sorcerers create magical illusions, a talent so powerful that only experienced charac-

COMPUTER
Porta-Bag
for Commodore 64 and Vic-20



Sturdy Canvass. Cushioned compartment for Keyboard. Holds 1541 Disk Drive and cables, Modem and Transformer. For only

$24.95

Plus $3.50 for S/H.

FREE FILE PROGRAM DISK IN BASIC and STICKER with System, Editing and Formatting Commands. (To stick over the 64 keyboard)

Send Check or Money Order to:
MOMENTUM INTERNATIONAL CORP
P.O.Box 628
San Juan, Puerto Rico 00902

Sorry, No COD's accepted.

Computer Porta-Bag is a trademark of Momentum International Corp. Commodore 64, 1541 and Vic-20 are trademarks of Commodore Electronics, Ltd.

Reader Service No. 245

ters can qualify for the profession. Wizards summon supernatural powers. Although an adventuring party is basically limited to six members, a Wizard can add a seventh in the form of an imp, undead creature, or powerful demon.

The magic system is based on spell points. Each spell has a cost, and a mage can cast the ones he or she knows as many times as desired until spell points are exhausted. Unlike some other contests of this type, the points regenerate during the course of an adventure, so gamers won't find it necessary to hoard their magic power for emergencies.

The armchair adventurer controls a party with the keyboard. The I-J-K-L grouping governs movements, while other commands permit characters to take or drop objects, attack or defend, and perform other similar activities.

The self-prompting combat system is silky smooth. When a party meets some monsters and decides to fight, the program asks what each character intends to do in that round of the battle. The possible choices are listed as a menu, and the computerist simply pushes the appropriate key to make a selection. When all party orders are confirmed, the screen reports how each hero and creature actually fared.

The adventure gamer views the action in first-person perspective. The buildings and monsters are depicted in reasonably detailed color drawings, and there are deft bits of animation. The title sequence, which shows a bard singing a song of heroes in a tavern, is especially attractive.

There isn't a lot of sound for a game whose title contains the word "Bard", but the simple melodies are a welcome bonus after hundreds of mute quest programs.

If *The Bard's Tale* has a fault, it's that designer Mike Cranford and Interplay Productions have embraced the rigorous approach of many non-electronic role-playing campaigns a little too enthusiastically. The lives of characters are breathtakingly fragile, and it takes a long time to guide a character to a high level of power.

Although the documentation provides lucid information about every game-system and the overall routine of play, many aspects are deliberately left vague so that players must learn from experience. All too frequently, such knowledge is gained only at the cost of several characters' hides.

Comparison with the great role-playing computer titles of the past, especially *Wizardry,* is inevitable. *The Bard's Tale* is five years newer than Woodhead and Greenberg's classic, and benefits from numerous improvements in hardware and software which have occurred since 1981.

If you're hunting for easy victories and mindless bashing, look elsewhere. But if you like an intense mental challenge of a deadly and beautiful fantasy world, then *The Bard's Tale* is a perfect choice.

Electronic Arts, 2755 Campus Drive, San Francisco, CA 94403 (phone: 415-571-7171). ***—Arnie Katz***

THE PUZZLE GENERATOR

THE PUZZLE GENERATOR is a complete Criss-Cross and Word-Search Puzzle development system for your Commodore 64 and 128 (in 64 mode) computers. It utilizes more than 15 built-in word categories to give it the capability to generate BILLIONS of puzzles, all automatically.

This powerful program diskette contains many features: Criss-Cross puzzles can be printed with or without a starter word; By varying the grid, puzzle size can range anywhere from 2 words to 100 words; Built-in word categories include Railtalk, Games, Boys and Girls Names, Fun Things, Computers, Adventure, Chess, Football, Baseball, Geography, Good Book, General Interest and more; Word editor enables users to create special interest puzzles from any list of words, including most foreign languages; Works with any printer (required); Puzzles, Answers, and Word Lists that you create can be saved on diskette; Menu driven for easy operation, and much more. Armed with these features THE PUZZLE GENERATOR transforms the worlds number one computer into the NEW King of Puzzles!

THE PUZZLE GENERATOR is a program that will enhance anyones education and is now being used in many schools throughout the USA.
PRICE $34.95

Data Disk for above with over 100 additional word categories (not required). PRICE $10.00

30 DAY MONEY BACK GUARANTEE

- Add $1.50 For Shipping Costs
- PA Residents Add 6% Sales Tax
- 48 Hour Shipping On All Items

ALSOFT

305 LARGE AVENUE • CLAIRTON, PA 15025
PHONE (412) 233-4659

MasterCard C.O.D. VISA

Reader Service No. 288

HERO OF THE GOLDEN TALISMAN

Mastertronic
Commodore 64
Disk; $9.99

Mastertronic's line of bargain-priced software frequently furnishes the best evidence of the difference in temperament between British computer gamers and their Colonial cousins.

Americans prefer their action games heavily spiced with strategy. The British market, dominated by young teenage male players, favors animated action games full of rooms and treasures which test reflexes to the utmost.

Despite the inappropriate cover art, which shows a private eye knocking out a thug, this is a straightforward action-adventure with fire-breathing dragons, evil wizards, and the seemingly inevitable magic talisman. The computerist must recover all five pieces of this amazing artifact while a swarm of electric butterflies makes existence precarious.

The documentation, several cuts above Mastertronic's previous standard, segments the dungeon into an alphanumeric grid. The instruction booklet actually lists every object in the game, where it can be found, and the sequence in which they must be collected. Unfortunately, it isn't much fun playing this type of game with an open booklet in front of you, and most players will be able to work out the proper order of activities on their own.

On the other hand, most users would probably appreciate help in figuring out how to utilize objects once they are acquired. The only reference to using the spacebar to activate objects is found in small type on the back of the package. Such an important detail should be mentioned more prominently.

Some explanation of the ratings displayed on the screen would have been a good idea, too. "STR" and "AIR" are fairly obvious labels, but what is "SC"?

The graphics are quite nice, especially the figure animation of the player's onscreen character. When he dives into the water, for example, the little adventurer tucks himself into a



Hero: ***nice graphics, maddening audio.***
READER SERVICE NO. 232

protective ball to cushion the impact. The audio, alas, is positively maddening. Although no mention is made of it in the instructions, a siren was constantly going off during play. Clicking the action button generally stopped it, but seconds later it was wailing away again. If designers insist on placing horns, whistles, and sirens in their games, their use should be minimal. It's even better if the documentation explains the significance of all the nerve-frazzling noise.

The most important element in this type of program is the play-action, and it's much too tight in *Hero of the Golden Talisman*. The character frequently double-jumps on a single push of the button, and invariably slips off rocks when he starts to jump too close to the edge.

Hero of the Golden Talisman has some appeal for young action gamers, but more mature ones will probably find other programs less frustrating and more stimulating.

Mastertronic, 7311-B Grove Rd., Frederick, MD 21701 (phone: 800-368-9900). ***—Bill Kunkel***

QUAKE MINUS ONE

Mindscape
Commodore 64
Disk; $29.95

Oil up the joysticks, computerists, this is one heavy duty entertainment program. Warren Foulkes and Mike Singleton's *Quake Minus One* is a great action-strategy contest with wonderful graphics and an excellent control system to make it all work.

The near-future plot centers on the Titan power station, a computer-run undersea complex. Drawing energy from the planet's core, Titan feeds power to a totally dependent high-tech world.

A metaphorical monkey wrench is flung into the gears when the Robot Liberation Front stages a terrorist raid on Titan. As the game begins, the RLF has sabotaged the station's computers, threatening a massive earthquake.

The government techies strike back, and retake the Hermes, one of the five computers which run Titan. Using Hermes' armed mobile units, the player must capture or destroy the other four computers.

The tactical display is the player's link to Hermes. The top half of the screen is devoted to the view screen, while the bottom contains a collection of gauges, clocks, and indicators.

The joystick-driven control scheme is quite ingenious. The player toggles from mode to mode simply by moving the cursor to the appropriate icon. Certain icons trigger entire submodes (Thrust, Static, Weapons, Junction, Repair, Command, and Emergency Command), which can then be accessed.

The tactical display includes a precise "you-are-here" map of the many roads and junctions comprising the Titan complex. Black dots indicate the RLF has control of the junction, while those under the player's sway are shown in white.

Weapons include mines, torpedoes, lasers, missile pods, fireball guns, ionic blasters, and two kinds of shields. Some of these weapons destroy, while others simply disable. Effective weapon selection requires considerable study and practice.

The player switches control from mobile unit to mobile unit in a frantic effort to retake junctions and reach the RLF-controlled computers: Zeus, Poseidon, Vulcan, and Ares, all of which are, of course, similarly equipped.

The graphics are excellent. Each structure is carefully rendered so that its shape is instantly recognizable by the computerist.

The game's documentation is pathetically inadequate. It is astonishing that Mindscape could have produced such a large booklet that explains so little. The 16-page rulebook teases the player with allusions to capturing a renegade computer instead of blowing it to atoms, but never discusses the mechanics of doing so. There is nothing in the rulebook to explain the tremendously complicated steering system, and accessing the repair mode is a prolonged exercise in frustration.



Quake: ***an ingenious control scheme.***
READER SERVICE NO. 233

Far more serious, however, is the lack of correspondence between game and instructions. The icon representing the plasma shield, for example, is printed upside down in the documentation, rendering it unrecognizable. A game as sophisticated and complex as *Quake Minus One* must be fully explained.

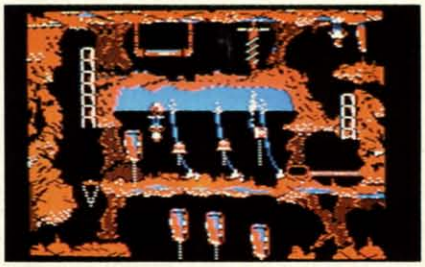
Documentation aside, *Quake Minus One* is a masterpiece. It possesses all the shoot-em-up "juice" any joystick commando could want.

Mindscape, 3444 Dundee Rd., Northbrook, IL 60062 (phone: 312-480-7667). ***—Bill Kunkel***

THE GOONIES

Datasoft
Commodore 64
Disk; $29.95

Several years ago, the entertain-



The Goonies ***is good enough for us.***
READER SERVICE NO. 234

ment software industry went bonkers over movie licenses. Computer game publishers acquired good and bad ideas alike in a mindless quest for success by association.

Unfortunately, the software companies concentrated their time and energy pursuing "hot tie-ins," and not enough on turning such licenses into computer programs. Some promising movie properties became dreadful games as a result of slipshod execution, while the concepts for others should never have escaped the brainstorming sessions. Most of these releases shared a common bond: abysmal failure.

In the wake of jokes about computergame versions of such unlikely movies as *Kramer vs. Kramer* and *The Marathon Man,* the software industry pulled back its singed fingers and vowed to forget the world of film.

As everyone knows, there are fashion cycles in computer software as in most other aspects of popular culture. Recently, several companies have begun rethinking that posture. Activision's success with *Ghostbusters* and Simon & Schuster's *Star Trek* have shown that the right property, creatively handled, can be both aesthetically and commercially viable.

The publisher which has enjoyed the most consistent success, albeit on a somewhat more modest scale than the previously cited examples, is Datasoft. The icebreaker was *Bruce Lee*, a multiscreen action-strategy contest. *Conan the Barbarian* and *Zorro*, both in the same style but with even more mental challenge, have followed up on this initial success.

The Goonies, one of the first titles released since the company's management shakeup, represents a new wrinkle on that established formula. Players journey through eight screens, following the plot of the movie to a fault. There's even a sequence involving an octopus which was cut from the film.

Each playfield is an action puzzle. The player must deduce which onscreen object goes where, and then employ two onscreen goonies to perform the appropriate action.

The first scenario takes place at the home of the infamous Fratellis, the villains of the piece. Both goonies must escape to the caverns underneath the old place, while avoiding the ever-present Mama Fratelli. A quick look at the doll house-style cutaway shows a printing press in the attic, a chair on the top floor, and a water cooler and fireplace on the main level. The user toggles back and forth between the two goonies by hitting the action button. The gamer must get one goonie to move the chair under the attic entrance in order to reach the printing press, which spews funny money out a side window. As long as the bogus bills rain down, Mama F will be sufficiently distracted to allow the second goonie to dump the water cooler into the fireplace. This opens a secret entrance to the underground caves to facilitate the escape.

The action continues with seven screens full of falling sandbags, secret slides, vultures, skull mountains, an octopus, a secret cove, and a treasure-laden pirate ship.

The sound and graphics, while not groundbreaking, are nonetheless quite charming and more than adequate for this unassuming and surprisingly enjoyable game. Each object is distinctly delineated, and music mavens will enjoy the perfunctory rendition of "Good Enough" while the credits roll.

Software Creations, 19808 Nordhoff Place, Chatsworth, CA 91311 (phone: 818-886-5922). ***—Bill Kunkel***

SWORD OF KADASH

Penguin Software
Commodore 64
Disk; $34.95

Sword of Kadash is a graphic adventure in which the user-surrogate searches for treasure, magical objects, and weapons while moving across a dungeon landscape depicted in overhead perspective. There are magical spells, traps, and all manner of wandering monsters.

Talk about déjà vu!

Despite the occasional "Arabian Nights" trappings, *Sword of Kadash* plays exactly like a poor relative of the *Apshai* clan. In fact, this program's weakest elements are those which distinguish it from the classic Epyx series.

Although a wide range of weaponry is available—dagger, morningstar, axe, sword—all are shown as a series



Kadash: ***1001 Arabian "mights."***
READER SERVICE NO. 235

of shooting darts. The documentation explains: "This allows you to inflict damage on a monster without direct contact." Then what's the point of having different weapons? True, a sword does more damage than a dagger, but the strategic advantage of projectile over hand weapon is surrendered to a crude coin-op sensibility. One of the great strengths of the *Apshai* games is that each situation calls for a different weapon.

The control system is original, but it really isn't very well constructed. *Sword of Kadash* limits user options other than movement to the fire button and spacebar.

The graphics are acceptable, though far from state of the art. This is not altogether surprising in a game originally copyrighted in 1984, but perhaps the Commodore edition should have gotten some sprucing up.

Very little is done with the Arabian possibilities, either. Why, for example, are we playing with "swords" rather than "scimitars"? *Ali Baba* (Quality Software) utilizes the visual potential of the exotic locale much more successfully.

Sword of Kadash is not a bad game, it is simply a step below many titles in its category. For those who've played the mylar off their *Apshai Trilogy* disks, however, *Sword of Kadash* offers some fresh challenges.

Penguin Software, 830 4th Ave., P.O. Box 311, Geneva, IL 60143 (phone: 312-232-1984).

—Will Richardson

ACHIEVE AN ACCURATE PERSONALITY ANALYSIS

GET THE GIRL THAT YOU WANT . . .NOW!

USE

THE ATTRACTOR

INTRODUCING

Now! A powerful social utility program has emerged! THE ATTRACTOR! An extraordinary concept in the application of personal computer software! The Attractor is a tested logic based personality analysis program that will enhance the social skills of the computer user. It is easy to use! And for only $32.00 this is one program that you can apply year after year.

The Attractor will improve your social life. It will assist you in the generation of purposeful conversation with a female personality. Using a set of pre-programmed questions you will collect vast quantities of information concerning the female personality in question. You will gain insight into the female's viewpoint on a variety of subjects, such as:

EMOTIONAL STABILITY
POLITICAL KNOWLEDGE
MOTIVATIONAL LEADERSHIP
INTERNAL CONFLICTS
SELF-ACTUALIZATIONS
SOCIAL ATTITUDES
MECHANICAL ABILITIES
HEALTH CARE
PRODUCTIVE LIFE-STYLE
JEALOUSY LEVELS
SOCIAL MATURITY

And after the analysis is complete you will receive a calculated percentage chance of getting a breakfast, lunch or dinner/movie date. A percentage calculation of a first date kiss and The Other is also included. In addition, an explanation of each of the pre-programmed questions is provided to help you in your administration of:

THE ATTRACTOR

OPERATION

The Attractor is divided into three phases. The first phase is the query phase which delivers the set of pre-programmed questions. The second phase is the analysis phase which presents a twenty-five point analysis of the female personality and includes "WHAT ARE THE CHANCES!". The third phase is the explanation phase which will give you and important insight into the multi-level meanings that are concealed withing the set of pre-programmed questions.

Reader Service No. 265

THE CHALLENGE

Now you can go on a real life adventure! You can stop playing fantasy games and apply your personal computer to your own self-development. You can enjoy a healthy social life. You can achieve status while the others bitterly complain that they "can't". But you can!

USE YOUR INTELLECT

You the comnputer programmer or operator, have wisely invested your time developing highly technical skills. It is the most intelligent thing to do. But sometimes the price paid is Social Alienation! But extremely intellectual computer people need not suffer the tragedy of social alienation. No! With The Attractor you, the computer programmer or operator, will apply your intellect to various social situations and with, perhaps devastating results.

YOU CAN ADVANCE

You can advance in the real world. Armed with a tremendous social weapon, (THE ATTRACTOR!), you will achieve a personality advantage and more! And for only $32.00 you really can't affort to be caught without this program. Especially when people around you are making good use of The Attractor.

VALUABLE BOOKLET

Included as part of The Attractor package, you will receive a ten page instruction/suggestion booklet. This folio contains complete loading and operation instruction as well as informative suggestions of how to apply this program to various social situations. So why wait! Act NOW! And go on a real adventure and get some real treasure!

TO RECEIVE THE ATTRACTOR MAIL THIS COUPON

NOW! SEND THE ATTRACTOR! All orders processed immediately! The Attractor is available on tape or disk drive, specify:

DISK DRIVE TAPE DRIVE

THE ATTRACTOR is available for COMMODORE 64 only.
Enclose $32.00 check or money order to:

THE V4CFE SOFTWARE COMPANY
P.O. BOX 1171
MERRITT ISLAND, FLORIDA 32952-1171

Name: _____

Address: _____

City/State/Zip: _____

Canadian Orders must be in U.S. Dollars. FLA. Residents add 5% sales tax.
Commodore is a registered trademark.

PRINTERS

EPSON

LX90	$234.95
HS80 Letterjet	318.95
JX80	448.95
FX185	454.95
LQ1500 (PAR)	949.95
FX85	331.95
LX80	210.95

STAR MICRONICS

SG10	$210.95
SG10C	234.95
SG15	368.95
SD10	321.95
SD15	440.95
SR10	468.95
SR15	581.95
Power type	299.95

CITIZEN

MSP10	$274.95
MSP15	438.95
MSP20	438.95
MSP25	548.95

PANASONIC

1091	$231.95
1092	368.95
1093	424.95
3151	424.95
3131	259.95

OKIDATA

Okimate 10	$170.95
Okimate 20	209.95
182	219.95
192	349.95
193	514.95
84	640.95

LEGEND

808/NLQ	$149.95
1080/NLQ	205.95
1380	259.95
13805	294.95

JUKI

6000	$189.95
6100	379.95
6300	769.95

TOSHIBA

P351	$1289.95
1340	599.95

DAISYWRITER

2000	$739.95

N.E.C.

2030	$699.95
2050	699.95
3530	1309.95
3550	1389.95

MODEMS

ANCHOR

Volkmodem 12	$179.95
Signalman Express	299.95
Lightning 2400	399.95
Westridge	59.95

DIGITAL DEVICES

300 Baud (Atari)	$98.95

HAYES

300	$137.95
300/1200	386.95
1200 B w/software	378.95
1200B	349.95

NOVATION

Smart Cat Plus (1200)	$309.95
Professional 2400	629.95

SUPRA

MPP1000E (Atari)	$54.95
MPP1064(C-64)	54.95

CAL-ABCO

Smart Team 1200	$199.95

C.D.I.

Mitey Mo (64)	$59.95

DISKETTES

BONUS	5¼	3½
SS/DD	$ 9.50	—
DS/DD	13.50	—

NO LABEL (with Pen & Flip-n-file)

SS/DD	$10.50	—
DS/DD	14.50	—

MAXELL

MD1	$15.95	32.95
MD2	19.95	38.95

MEMOREX

SS/DD	$12.50	29.95
DS/DD	16.50	34.95
FF30/20SS/DD	—	59.95
FF50/20SS/DD	36.95	—
FF50/20DS/DD	42.95	—

All Diskettes Carry a Lifetime Warranty

MONITORS

PRINCETON

Max 12E	$189.95
HX-9	459.95
HX-9E	519.95
HX-12	469.95
HX-12E	555.95
SR-12	589.95
SR-12E	649.95

NEC

1201 (Green)	$99.95
1205 (Amber)	99.95
1280 (TTL Green)	148.95
1285 (TTL Ameber)	148.95
1460	269.95
1401 (R.G.B.)	659.95

ZENITH

ZVM 122/123	$ 74.95
ZVM 124 (TTL Amber)	149.95
ZVM 131 (RGB)	279.95
ZVM 135 (RGB/Color)	459.95

TEKNIKA

MJ-10	$178.95
MJ-22	254.95

AMDEK

300G	$116.95
300A	126.95
310A	144.95
Color 300	175.95
Color 500	339.95
Color 600	398.95
Color 700	468.95
Color 710	538.95
Color 722	579.95

INTERFACES

INDUS

GT (Atari)	$198.95
GT (Commodore)	218.95

TANDON

TM100-2	$109.95

TEAC

55B	$104.95

COMPUTERS

COMMODORE

Amiga	CALL
C64	$145.95
C128	275.95
1541 Drive	165.95
1571 Drive	249.95
1572 Drive	379.95
1802 Color	185.95
1901	CALL
1902 RGB/Color	CALL
1670 Modem	185.95

DISK DRIVES

SUPRA

MTP1150	$45.95

DIGITAL DEVICES

U Print/Port	$49.95
U Print/16K	69.95
U Print/64K	79.95

CARDCO

G-Wiz	$48.95
AT-1 (Atari)	48.95

TYMAC

Epson	$58.95
PAR (Centronics Std.)	54.95

SOFTWARE

CONTINENTAL

Home Accountant	$27.95
Tax Advantage	27.95

BRODERBUND

Printshop	$27.50
Graphics Library I	17.50
Graphics Library II	17.50

SYNAPSE

Synfile	$31.95
Syncalc	31.95
Syntrend	27.95

BATTERIES INCLUDED

Paper Clip	$36.95
Homepak	31.95
Paper Clip w/spell	57.95

ORDER TOLL FREE

WESTERN REGION 1-800-351-3455

EASTERN REGION 1-800-351-3442

POLICY

No deposit on C.O.D. orders. Free freight on all prepaid cash orders over $300 in the Continental U.S.A. APO and FPO orders add $5.00 per hundred. For Priority Mail add $10.00 per hundred. Free shipping for PA residents. PA residents add 6% sales tax. All defective products must have a prior RA number.

"Where Prices are Born, Not Raised."

WHITE HOUSE COMPUTER



WESTERN REGION



EASTERN REGION

11327 Trade Center Drive
Suite 335
Rancho Cordova, CA 95670
CA toll-free 1-800-351-3422
Customer Service: 916-635-3455

Hours: Monday thru Friday 9 a.m. - 6 p.m.

P.O. Box 4025
Williamsport, PA 17701
PA residents—
Customer Service: 717-322-7700

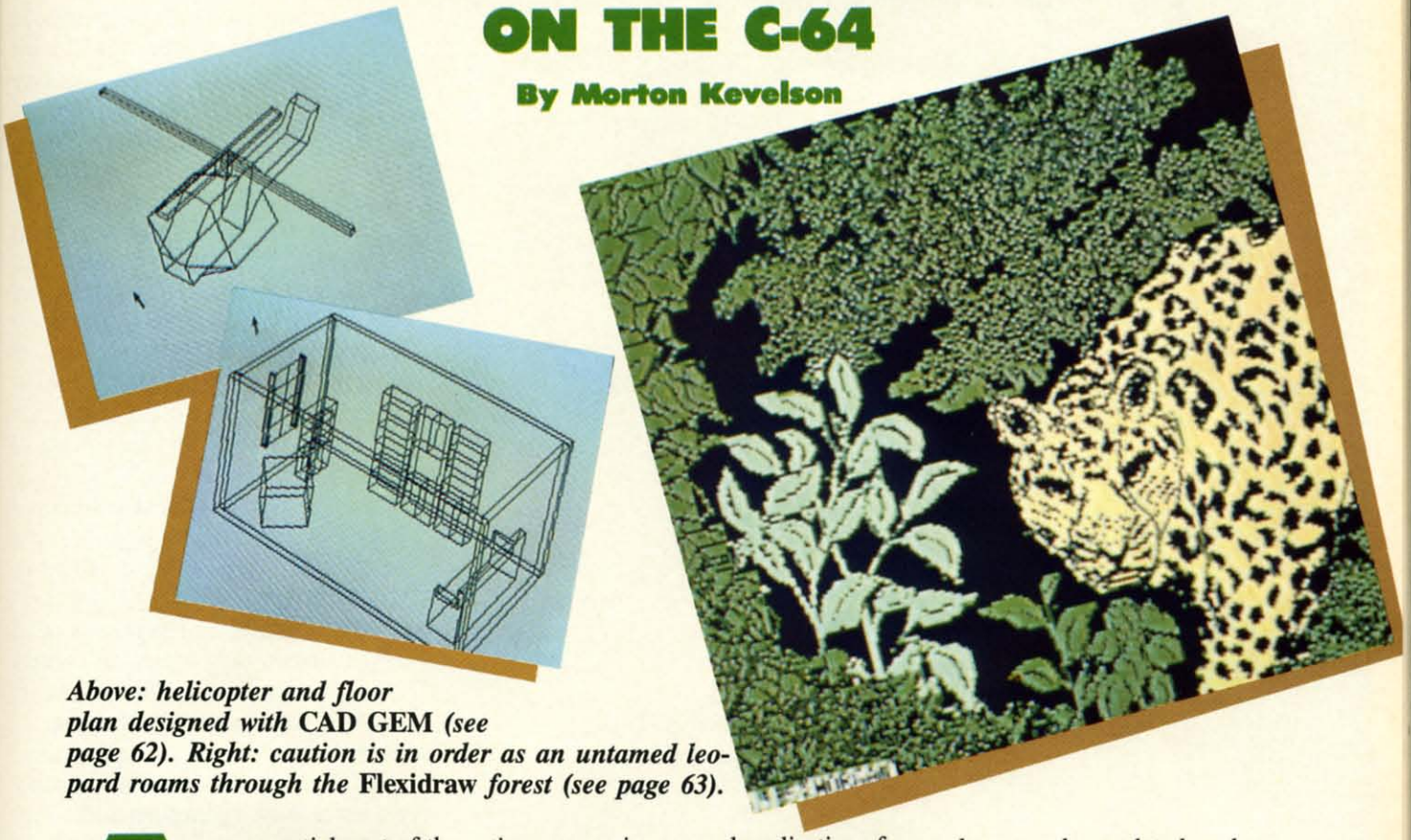
MASTER CARD 4% **VISA 4%** **AMERICAN EXPRESS 5%**

Reader Service No. 267

CAD graphics has long been an elusive goal for the C-64. We now have some commercial packages which have taken the first firm steps towards attaining this lofty ambition. Although the results look promising we are not yet convinced that a true CAD system can be implemented on an eight bit, 1 MHz computer.

COMPUTER AIDED DESIGN ON THE C-64

By Morton Kevelson



Above: helicopter and floor plan designed with **CAD GEM** *(see page 62). Right: caution is in order as an untamed leopard roams through the* **Flexidraw** *forest (see page 63).*

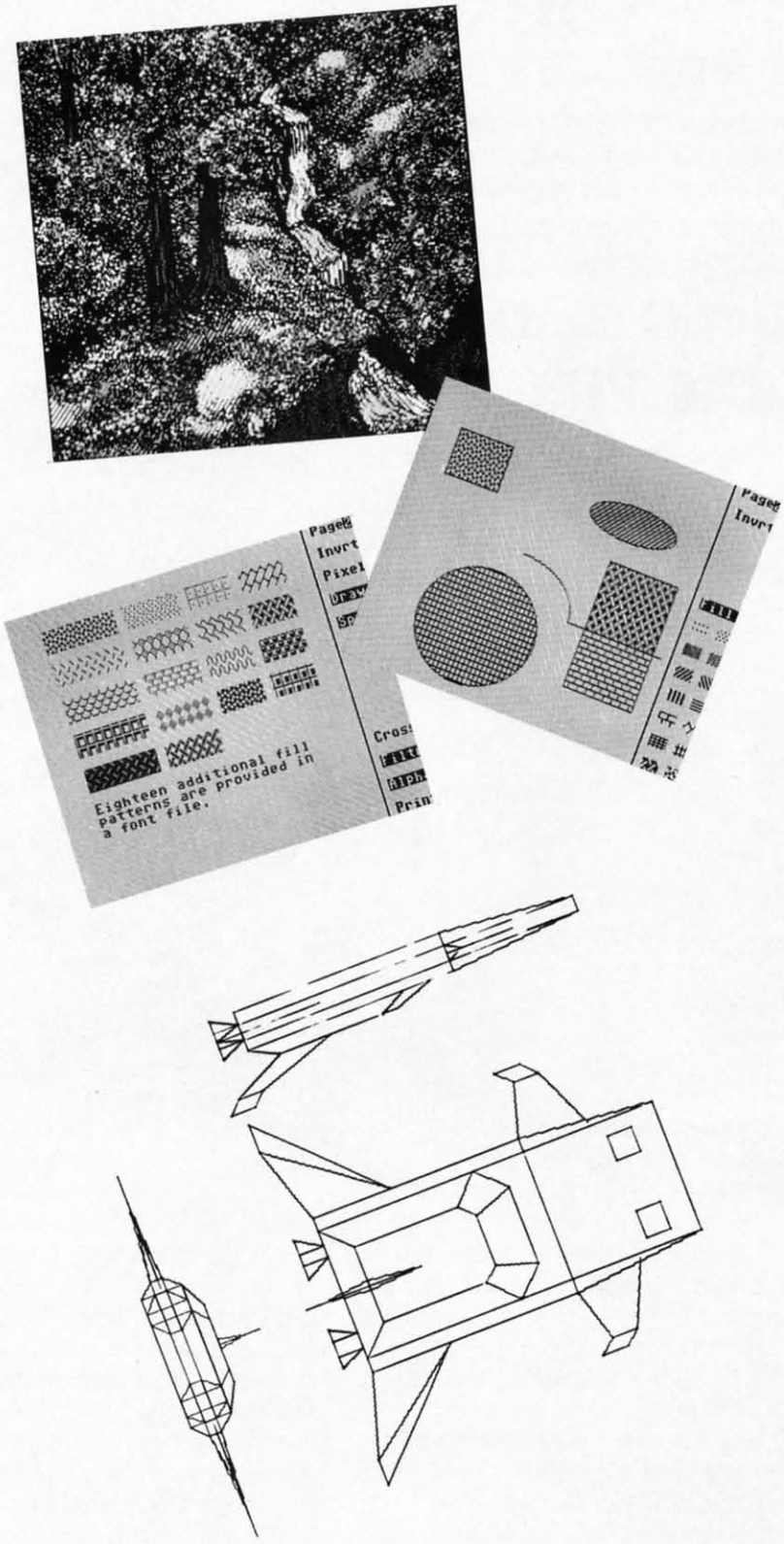
An essential part of the engineering process is the translation of physical ideas onto paper. The end product of all engineering activity is the manipulation of matter and materials in a beneficially constructive manner. In simple terms this means the creation of a physical product which we may use for our benefit. An essential step in the manufacturing process is the production of a detailed set of drawings which accurately describe the end product. These drawings must contain enough information to guide the parties involved through the various steps of the manufacture of a product.

The traditional method of creating these engineering drawings requires the time consuming manual application of transcriptive instruments to a durable drawing medium. These drawings are normally revised several times during the development process before the final design is released for production.

As with many time- and labor-intensive tasks, the computer has been sought out to alleviate the tedium. Computer Aided Design (CAD) was developed as soon as sufficient computational power was available to handle the complex tasks. A full featured CAD system can greatly speed up the design process while reducing errors and enhancing flexibility. Drawings may be rapidly revised, scaled, and otherwise modified to meet the varying requirements of different manufacturing tasks. Multiple layers or overlays can be updated and combined to form a complex composite drawing. The most powerful systems include extensive database facilities to organize the materials acquisition associated with the final construction.

As microcomputers increased in power and dropped in cost, more and more applications were transferred to them. What was formerly the realm of the mighty mainframe is now part and parcel of the most modest minicomputers. We are also well aware that the dividing line between minicomputer and microcomputer is no longer clearly defined.

As veteran users of the C-64 we have become somewhat jaded by what may be done with our modestly priced machines. We have seen text



From top: ***(1) Wayne Schmidt's Irish Spring may be visited on the*** **Flexidraw** ***disk excursion tour. It is shown here on the*** **Pen Palette** ***work palette. (2) 14 fill patterns are built into*** **Flexidraw** ***and available off the menu. Any of the Commodore characters can also be used as a fill pattern. (3) More fill patterns on*** **Flexidraw** ***disk. (4) Commodore 1520 Plotter dump of*** **CAD-3D** ***photo.***

processors, spreadsheets, and database packages which hold their own against the best which the eight bit (and some of the sixteen bit) micro world has to offer. It was just a matter of time before CAD applications were tackled as well.

In the following pages we present reviews of four drawing packages for the C-64. Each of these incorporates many CADlike features. Three of these employ the CAD designation in their nomenclature. The fourth makes no pretense of CADlike inclinations. Not surprisingly, this more traditional C-64 drawing package format is more atuned to the capabilities of the machine than the rest.

We applaud their designers' efforts in bringing these products to market. Although the results are impressive, the CAD promoted programs are a long way from full CAD systems. At best they are CADlike simulations of some features found on true CAD systems. A more apt description of these packages would be Wire Frame Three Dimensional Image Manipulator (WIFTDIM). Don't go looking up this term or writing us about it, as we just made it up.

A wire frame representation of an object depicts only edges and corners of an otherwise solid body. Thus a cube is shown as a collection of twelve lines joined at eight points. WIFTDIM images are fundamentally different from conventional bit map images. In the common bit map, both high-res and multicolor, what you see is what you've got. If you wish to reveal a different aspect of a displayed object then you must manually redraw the image. In contrast, the WIFTDIM stores each image as a table of points and connecting lines. Each point is described by its horizontal, vertical, and depth position in space with relation to an arbitrary but clearly defined location in your computer's memory. This gives the WIFTDIM the singular capability of displaying varying views of an object without requiring the user to redraw it.

When you are using a WIFTDIM the video display screen becomes a plane upon which the current view of the object is projected. As the ob-

PROGRAMMERS TAKE NOTE

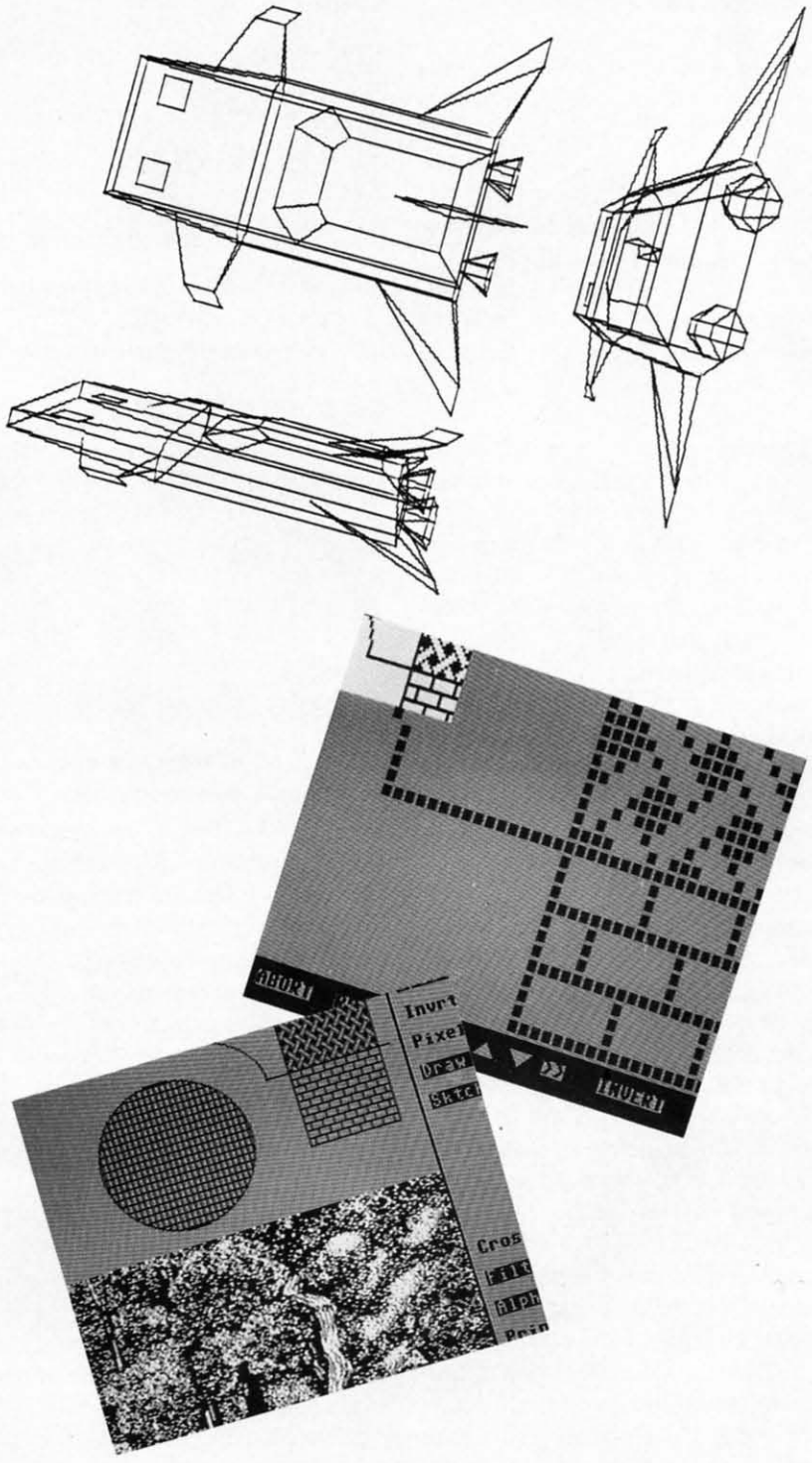
If you are interested in programming and the type of graphics discussed above, consider *Computer Aided Design for the C-128 and C-64* by Werner Heft. This collection of BASIC programs is published in Germany by Data Becker and in this country by Abacus Software. The routines are designed for the Commodore 64 equipped with a *Simons' BASIC* cartridge or a Commodore 128 and BASIC 7.0.

A step by step approach is used to present the fundamentals of geometric drawing with the computer. The program modules are designed to work individually or as an integrated whole. The final result is a functional WIFTDIM.

The bulk of this 310 page, $19.95 volume is devoted to the programs themselves. There is a bare minimum of text which guides the reader along while tying the whole thing together. The linking text is well-sprinkled with witicisms to keep the reader alert. The programs are well-structured for easy study. As with all Data Becker/Abacus books, the hand of the translator is evident.

ject is rotated, or the viewing plane is moved (it really does not matter which, as it is all relative anyway), different views of the object appear. What is most impressive about this process is not apparent to the user. The act of manipulating a three dimensional object in space is mathematically intensive requiring numerous detailed calculations. This process is no mean feat for a 64K, 1 MHz computer.

In light of all the demands that CAD in general and WIFTDIMs in particular place on the computer's resources, some compromise is necessary on what features will be included in the package. We now take a close look at how these developers have chosen to tackle the problem.



From top: ***(1) Another 1520 Plotter dump of a* CAD-3D *photo. (2)* Flexidraw's *zoom mode sports an original size window to let you know just where you are. The alignment grid is available in zoom mode as well. (3)* Flexidraw's *dual screens and split screen mode gives the artist much-needed workspace. Horizontal and vertical splits are illustrated opposite Wayne Schmidt's detailed design.***

CAD-3D

IHT Software
Commodore 64
Price: $39.95

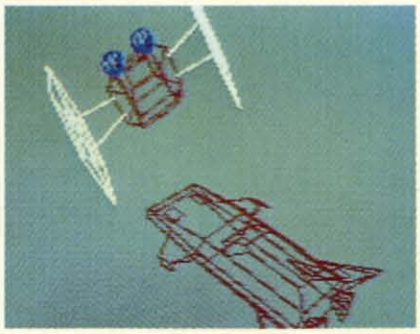
There are several ways of displaying a three-dimensional object on a two-dimensional plane. Orthogonal projection is the most common approach for engineering applications. This method maintains all viewing lines perpendicular to the plane of projection. The result is dimensional accuracy in the projections of all object surfaces which are parallel to the viewing plane regardless of the distance to the observer.

Orthogonal views are generally presented as a triad showing the front side and top of the object. Very often these will be accompanied by several additional views of key surfaces which are not parallel to the viewing plane. These surfaces appear distorted in the three basic views. However, if their angle is known, their true dimensions may be calculated from the basic views. Placing these views on auxiliary projection planes allows the objects' true dimensions to be presented.

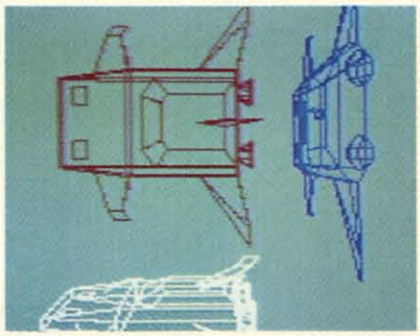
Although orthogonal projection is highly desirable from an engineering standpoint, it may be difficult to visualize the appearance of an object from these views. Several other drawing techniques have been developed to better stimulate the imagination of the human observer. The most effective of these is the perspective projection. The principle of perspective drawing is simply to size the view of an object inversely proportional to its distance from the observer. The apparent convergence of parallel railroad tracks into the distance is a well known example of this phenomenon.

CAD-3D provides the option of both orthogonal and perspective projection for viewing stored objects. This makes it visually simple to keep track of objects during the creation process.

The origin of the *CAD-3D* coordinate system is in the center of the video display. The x coordinates are laid out along the horizontal axis with increasing values to the right. The y coordinates are along the vertical axis with increasing values toward the top of the screen. The z coordinates are



An imminent **CAD-3D** *confrontation.*
READER SERVICE NO. 236



Three views of object in multicolor mode, with perspective turned on.

along a line perpendicular to the surface of the screen increasing toward the viewer. Both positive and negative values may be entered.

The two cursors which are displayed on the screen may be positioned using either the keyboard or joystick. The bottom line of the screen displays all three coordinates of the cursors as well as the current operating mode.

Objects are created by adding point pairs and a corresponding connecting line to a data matrix in the computer's memory. Adding a line is a three-step process of positioning the cursors, inserting a space in the matrix, and setting the connecting line. All data entry is accomplished by positioning the cursors till the desired values are displayed. Data points may be reviewed by stepping through the matrix redisplaying their values on the screen. There are no provisions for direct entry of numerical data or for listing the stored data values to the printer.

The data matrix may store up to a total of 2000 lines. The 3-D display field, or size of the object matrix, is 256 elements in all directions. That is, the x, y, and z coordinates may range from −128 to +127. The actual displayed image is limited to 256 horizontal by 192 vertical pixels on the C-64's high-resolution screen.

The user may choose between the C-64's high-resolution or multicolor display screens. In hi-res mode the display area is limited to the number of pixels specified above. In multicolor mode the entire display screen is used, although cursor movement is still in increments of the hi-res pixel size. Hi-res displays are single color. Multicolor displays can have up to three line colors. All colors, including border and background, may be set by the operator.

Objects created with *CAD-3D* may be translated along any or all of the three axes. Translation resolution is one unit. Translations are limited to the ranges specified above provided that none of the stored point values exceed these same limits. Rotation about any or all three axes is also possible. The rotation range is from −180 to +170 degrees and its resolution is 1 degree 24 minutes of arc.

All translations and rotations may be either absolute or relative. In the case of the former the motion is set and executed once. In the case of the latter the setting may be repeatedly applied with a single keystroke to incrementally step the position of the object. All movements may be temporary for preview purposes without affecting the data matrix. Permanent movements recalculate the coordinates stored in the object matrix in memory.

The object matrix may be partitioned into two parts. These "operative fields" may be individually or jointly displayed. Any consecutively stored set of lines may be designated as an operative field. As with all *CAD-3D* operations, the partition process is visually enhanced by positioning the cursors at the line endpoints while defining an operative field.

Translation and rotation may be performed on the displayed field without affecting the undisplayed field which is still in memory. Operative fields may be saved and loaded, allowing complex

objects to be constructed from primitive elements.

CAD-3D objects files are not saved as C-64 bit maps. Instead the actual point and line data is stored. The format of the object files is not provided, precluding the use of the data in your own programs.

A special save option lets you store the current hi-res screen as a bit map in *DOODLE!* file format for manipulation by City Software's graphic package. However, *DOODLE!* files may not be loaded back into *CAD-3D*.Once in bit map format, images may be displayed in your own BASIC programs.

A library of seven complex, well-executed images is included on the disk. Although these are very good for showing off the package's capabilities, we felt that a collection of primitive object building blocks would have been useful. If you do plan to create a library of primitive objects, note that *CAD-3D* lacks a scaling feature. Thus any objects which are to be combined must be designed to fit.

Hardcopy may be generated on the Commodore 1525/MPS-801/MPS-803 and 1526/MPS-802 printers. Any dot matrix printer with an interface that emulates the Commodore 1525 may also be used. Images thus created are simple bit map dumps of only the hi-res display. Objects stored in memory may have dimensions which exceed the display area, in which case only the visible display will be dumped.

The best hardcopy results are obtained with the Commodore 1520 Printer Plotter. This nifty, now extinct peripheral may still be available from many dealers. We obtained ours at a bargain basement price—$50 from a local Toys R Us. Plotter dumps have equal vertical and horizontal proportions. The entire matrix is dumped, included sections not visible on the display screen. The multicolor display may also be plotted using all three pen colors. There is no text capability in *CAD-3D* other than assembling characters as any other object.

The *CAD-3D* manual gives complete instructions which are brief, to the point, and with every evidence of having been translated from a foreign tongue. Some experimentation with the computer and the manual will be required to derive the true intent of some of the unintentionally cryptic instructions.

CAD-3D is suitable for instructional purposes. It is an excellent aid for illustrating the spatial relationships among simple objects. The drawing, translation, and rotation of images is fast enough to maintain the interest of the viewer.

CAD-3D is supplied on a copy-protected disk with a 30 day replacement warranty. No provisions are made for obtaining a backup copy.

IHT Software, 2269 Chestnut Street, #162, San Francisco, CA 94123 (phone: 415-441-1607).

CAD GEM

Micronic Interface Technologies
Commodore 64
Price: $79.95

This package is billed as a Computer Assisted Design Graphic Element Manipulation System. From this minor mouthful is derived the acronym by which it is known. *CAD GEM* is a WIFTDIM with broad capabilities.

Objects stored in *CAD GEM's* data matrix are displayed on the full C-64 high-resolution screen. The coordinates axes are centered about the visible screen. The x axis is horizontally positioned with increasing values to the right. The y axis runs vertically with increasing values toward the bottom of the screen. The z axis is perpendicular to the screen with increasing values away from the viewer. Although the y and z axes are reversed from the conventional orientation, the resulting set still forms a right handed coordinate system.

All of *CAD GEM's* operations are menu-driven. Selections are made by positioning the screen cursor over your choice and pressing the button on your input device. *CAD GEM* accepts input from the keyboard, joystick, trackball, Koala Pad, paddles, or light pen.

The first time you use *CAD GEM* you will be automatically guided through an installation procedure for selection of your input device and printer. This routine will be bypassed for all subsequent LOADs. However, you may rerun the setup program when required. Printers presently supported are the Commodore 1525, Gemini/Epson, Okidata, and C.Itoh 8510. You should also create some backup copies before your first use with the MASTER.COPY routine on the disk. This will let you create three copy-protected backup copies of the original copy-protected program disk.

CAD GEM's operations are driven from two main menus. Submenus display options as required. Objects are entered using the Edit menu. Starting from scratch you first enter a set of points either from the keyboard or by positioning the cursor using your input device. Once point entry is complete you must immediately set at least one line. Failure to do so will cause the program to forget your data. An orthogonal projection of the lines and points is displayed as they are entered. Line and point data may be listed to the screen or printer in a convenient tabular form.

RACE ANALYSIS SYSTEMS

Prcfessional Harness, Thoroughbred and Greyhound Race Analyzers with unparalleled features:

★ Five minutes worth of typing replaces over two hours of tedious hand calculations needed per race for this unique handicapping system.

★ Morning Line odds are not used, giving the bettor a source of information independent from the morning line.

★ Cross references into from up to twenty races and generates bet suggestions including best win, quinella, perfecta, exactra, trifecta and trifecta box.

★ Ratings can be viewed on screen, printed by printer or saved on diskette for future evaluation.

All of our race analyzers now include the MASTER ANALYSIS DEVELOPMENT PACKAGE. With the assistance of this powerful program users are able to easily build, develop, and fine tune computerized handicapping systems for all types of sporting events.

Available on disk for the Commodore 64 or 128*
3-PACK (all 3 Analyzers) . . . $79.95
2-PACK (any 2 Analyzers) . . . $59.95
1-PACK (any 1 Analyzer) . . . $39.95

30 DAY MONEY BACK GUARANTEE
- Prices Include Shipping
- PA Residents Add 6% Sales Tax
- All Orders Shipped Same Day

*In 64 Mode

ALSOFT
305 Large Avenue • Clairton, PA 15025
Phone (412) 233-4659
C.O.D.

Reader Service No. 290

Object files may be stored on disk for later recall. The distribution includes a large number of basic geometrical constructs and primitives. These include many of the basic geometrical shapes such as spheres and cylinders as well as a collection of electronic circuit symbols. Up to 100 primitives may be brought into memory at one time. Each of these modules may be independently manipulated with *CAD GEM's* translation, rotation, and scaling capabilities. Once the primitives have been fitted, the entire group may be manipulated as a single object. The individual character of the primitives may be maintained for as long as necessary. Complex objects can be saved as a collection of primitives in a single file or they may be combined into a single group.

Manipulation of primitive or objects is done in View mode. The image display, in this case, is a perspective projection of the composite object. Perspective may be adjusted by a combination of scaling and shifting of the object towards or away from the viewer. The bit map of the displayed screen may be saved to disk or dumped to the printer. Points which are out of range of the screen display will not be saved or printed as part of the bit map. Keyboard entry of text onto the bit map screen is possible immediately before performing a bit map dump.

Internally, the *CAD GEM* coordinate system spans the entire range of BASIC's floating point number set. This allows for the creation of huge objects at enormous distances from the viewer. In practice you must remember to balance the size and location of objects with the nine digit precision of the C-64's floating point math routines. The actual limit of object detail is a total of 750 points.

We found a number of quirks in the *CAD GEM* system during our tests. According to the preliminary manual all rotations are performed about the origin of the coordinate system. An appendix in the same manual states that rotations are performed about a point calculated from the average position of all object points. It turned out that the appendix was correct. We can see the value for rotations about the object "center" in view of the fact that objects may be shifted some distance from the origin. However, rotation about the origin would be of considerable utility during the initial object creation process. Rotation about the object center tends to generate intuitively unpredictable results.

The object editor had some awkward quirks as well. The edit lines function treated the first point in the data matrix as point number zero. All other edit functions considered this as point number one. The edit points function also reversed the order of entry of data points as they were added to the matrix.

A large number of the quirks we encountered were due to disagreement between the preliminary manual and the way the package actually worked. We expect this to be cleared up in the final version, although current shipments still include the preliminary documentation.

CAD GEM gives the impression of a powerful program which is awaiting completion. This opinion was somewhat bolstered by Computer Tools' "Tool Swapper." This newsletter which is intended to be "an ongoing series of semi-bi-directional releases" is being sent to all registered owners of *CAD GEM* and the company's other C-64 product, the *Graphic Screen Exporter* (a C-64 bit map conversion package). The January 1986 issue included some useful information on *CAD GEM*, including its object file data structure. Several intended enhancements of the package were announced as well. These include hidden line removal, on-screen text, formula input of object data, manual revision, and a plotter support package.

CAD GEM is a powerful package operating within the constraints of the C-64. It should be suitable for creating preliminary designs of moderately complex structures. We await with some interest the results of the final updates to this package.

Micronic Interface Technologies, Computer Tools Division, 159 West 53rd Street, Suite 15B, New York, NY 10019 (phone: 212-245-5718).

CADPAK-64

Abacus Software
Commodore 64
Price: $39.95

CADPAK-64 is a high-resolution bit map drawing package for the Commodore 64. It is a planar (or two dimensional) package, with images limited to the dimensions of the bit-map screen. *CADPAK-64* emphasizes the precise positioning of picture pixels on the drawing surface. It is unique among C-64 drawing programs in its ability to keep track of the physical dimensions of the object drawing on the display screen. Furthermore, this precise dimensioning will be transferred to paper to generate true scaled drawings.

Two versions of *CADPAK-64* are supplied with the package. These differ only with the choice of keyboard versus light pen as the input device. In either case you will have to supply your own keyboard or light pen.

The first step in using *CADPAK-64* is calibrating the package to match your printer. A dedicated sizing program prompts you through the procedure. This ultimately generates a small and large rectangle on your printer. You carefully ascertain the dimensions of these quadrilaterals using a ruler or other suitable implement. These values are then told to the computer, which fastidiously saves them to the program disk. Your choice of units is limited to inches or centimeters. Choose wisely, as all subsequent images will be scaled to this base unit (i.e., miles per inch, furlongs per centimeter, etc.). You will want to avoid needless repetition of this procedure, as the program disk is copy-protected. Just get it over with and place a write protect tab on the disk.

A wide range of printers are supported, including the Commodore 1525 and 1526, the Epsons and their lookalikes, the Okidata 92 and Okimate 10 (in black only), and the C.Itoh 8510. The program's opening screen includes a message announcing a plotter version of *CADPAK-64*. This has not yet materialized.

Every time you start up *CADPAK-64*, or whenever you start a new drawing by clearing the screen, you

will be prompted to enter your current dimensions and scale. For example, your dimensions may be in yards and the scale may be 10 yards per centimeter. The working dimension of the current drawing may be anything you like. From this point on *CADPAK-64* will automatically keep track of your cursor position in the specified units. The lower left hand corner of the screen is the origin of the coordinates.

All of *CADPAK-64's* operations are menu-driven. The accompanying screen photograph shows most of the available operations. Selections are made by merely pointing with the light pen or hitting the first two letters on the keyboard. Some selections will lead to one or two submenus before completion.

Although a draw option is available, it is not the way you will want to use *CADPAK-64*. Creating an image pixel by pixel tends to be a tedious and cumbersome process. Instead *CADPAK-64* is designed for efficient operation using its built-in geometric drawing functions. These span the range of the common shapes including circles, elipses (at any orientation), arcs (actually elliptical quadrants), lines (including rays and continuous segments), and rectangles.

The power of *CADPAK-64* lies in its built-in coordinate maintenance. The positioning and proportioning of the bit map screen are not left to purely visual selection. Instead the actual cursor position, in the selected units, is continuously available to the user by hitting the f5 key. This provides you with the cursor's absolute x and y coordinates, its relative x and y displacement from the previous cursor position, and the actual distance between these two points. All these values are in the units you selected at the start of the drawing (i.e., feet, meters, or whatever). These dimensions are scaled to the final hardcopy as calibrated on your printer and not to the screen. Thus circles which may appear flattened on the display will be properly rounded on the printer.

The cursor may be positioned either manually or automatically. The manual method requires a two-step process. First there is a coarse positioning in eight pixel increments. This is followed by fine tuning the cursor position a single pixel at a time. You step through the process using either the CTRL key (CONTROL for C-128 and SX-64 users) or the button on the light pen. The operational status of this "accupoint" feature is signaled by the color of the screen border.



CADPAK-64's *3-D font screen.*
READER SERVICE NO. 237



Olde English font screen. Customized fonts can also be generated.

Automatic cursor positioning is selected by pressing the COMMODORE key. This lets you enter the cursor coordinates from the keyboard. You may specify either an absolute position or a relative offset from the previous cursor location.

The automatic scaling also supports a measure function. This allows you to place the cursor at any point on your drawing and set its location. You may then move to a second point on the drawing. The automatic readout will then inform you of the horizontal and vertical displacement between these two points, as well as the absolute distance between them. Of course all these dimensions are in the real units of your choice.

Several powerful drawing support utilities are built into *CADPAK-64*. Two complete drawing screens are directly available. A copy function al-

COPY II 64/128™

BACKUP PROTECTED SOFTWARE FAST.

From the team who brought you COPY II PLUS (Apple), Copy II PC (IBM) and COPY II MAC (Macintosh) comes a revolutionary new copy program for the Commodore 64 and 128 computers.

- Copies many protected programs—automatically. (We update Copy II 64/128 regularly to handle new protections; you as a registered owner may update at any time for $15 plus $3 s/h.)
- Copies even protected disks in under 2 minutes (single drive).
- Copies even protected disks in under 1 minute (dual drive).
- Maximum of four disk swaps on a single drive.
- Includes fast loader, 12-second format.

Requires a Commodore 64 or 128 computer with one or two 1541 or 1571 drives.

Call 503/244-5782, M–F, 8–5:30 (West Coast time) with your in hand. Or send a check for $39.95 U.S. plus $3 s/h, $8 overseas.

$39.95

Central Point Software, Inc.
9700 S.W. Capitol Hwy. #100
Portland, OR 97219

Central Point Software INCORPORATED

Backup utilities also available for the IBM, Apple II and Macintosh.
This product is provided for the purpose of enabling you to make archival copies only.

DUST COVERS

★ CUSTOM MADE TO FIT
★ Heavy 32-oz. VINYL ANTI-STATIC
★ EXTENDS EQUIPMENT LIFE
★ Choice of Colors Lt. Tan or Brown

COMPUTERS
C-64; VIC-20; C-16; Plus 4 ..... 8.00
C-128, B-128 ..... 13.00
DATASSETTE (NEW, C2N) 5.00

DISK DRIVES
C-1541; C-1571 INDUS GT 8.00
MSD S/D; APPLE S/D 8.00
MSD D/D; APPLE D/D UNIT 10.00
ENHANCER 2000 ..... 8.00

PRINTERS
C-1525/MPS801 ..... 10.00
C1526/MPS802 ..... 13.00
C/MPS 803; C-1520 ..... 8.00
PANASONIC KX-P1090/91 ..... 13.00
EPSON MX/RX/FX 80 ..... 13.00
GEMINI 10 & STAR 10's 13.00
GEMINI 15 & STAR 15's 16.00
OKIDATA 91/92 ..... 13.00
OKIMATE 10 ..... 8.00

MONITORS
C-1702 ..... 16.00
C-1902/AMIGA 19.00
ZENITH ZVM 122/123 ..... 16.00
AMDEK COLOR I, 500/700 ..... 19.00
TEKNIKA MJ 10/22 ..... 19.00
CM-141 ..... 19.00
BMC COLOR 16.00
VIDEO RECORDERS 13.00
(Dimensions Required)

Order by stating NAME and MODEL and COLOR CHOICE TAN or BROWN.
Enclose check or money order plus $1.50 per item (4.50 max.) shipping and handling. California Res. Include 6.5% Sales Tax.

SPECIAL COVERS WILL BE MADE TO YOUR DIMENSIONED SKETCH. SEND YOUR REQUIREMENTS FOR OUR LOW PRICE QUOTES

Crown Custom Covers
9606 SHELLYFIELD RD., Dept. B
DOWNEY, CA 90240
(213) 862-8391

Reader Service No. 279

FACTORY AUTHORIZED

COMMODORE
REPAIR CENTER

1-800-772-7289
IN ILLINOIS (312) 879-2888

C64 Repair (PCB only) . **39.95***
1541 Repair **79.95***
1541 Alignment only **29.95***
Power Supplies . **34.95**
Commodore Parts . **CALL**

* Includes parts, labor & UPS return shipping. Air Freight add $10.00

Diagnosis fee of $25.00 for any unit altered or with no defects.

CALL BEFORE SHIPPING

VISA, MASTER or MONEY ORDER
SERIAL NUMBERS REQUIRED

24-48 HRS TURN AROUND
(Subject to Parts Availability)

TEKTONICS PLUS, INC.
150 HOUSTON ST.—STE. 308
BATAVIA, IL 60510

CLIP AND SAVE

Reader Service No. 280

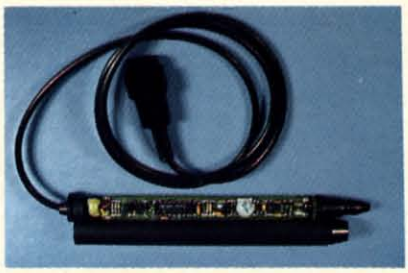
lows you to define an area on either screen and transfer it to any part of either screen. This may be a direct copy or a controlled copy. The copy controls include sizing, rotation in 90 degree increments, and mirroring of the copied block. Logical operations may also be performed on the copied image. These are equivalent to anding, oring, or exclusive oring the overlayed images. The option of copying with and without color is supported.

Although *CADPAK-64* is intended as a dimensioned drawing package, color support is available. This is limited by the C-64's high-resolution display mode to two colors in an 8 × 8 pixel cell.

Text may be placed anywhere on the screen using all of the Commodore characters. Alternate fonts or objects are available using the built-in font and object utilities. These let you create your own font or object sets for loading into the second screen. These custom fonts may be treated as text with the size under your control. You also have the option to use the object handler to place the text or object on the screen. This adds mirroring and rotation features to the placement of objects. *CADPAK-64* includes three fonts and one object file ready for your use. Object files and font files are treated identically by CADPAK.

The package includes a detailed manual with more than 80 pages of concentrated information. You may find it somewhat cumbersome at first, as this is primarily reference material. We suggest you carefully follow the three-chapter tutorial at the back of the manual. The disk includes several image files in support of the tutorial. Once you have learned the basic *CADPAK-64* operations, the remainder of the manual will be far more helpful. Overall *CADPAK-64* follows a very consistent set of procedures for all its operations. The package is well worth considering if your needs are for accurately dimensioned drawings.

Abacus Software, P.O. Box 7211, Grand Rapids, MI 45910 (phone: 616-241-5510).

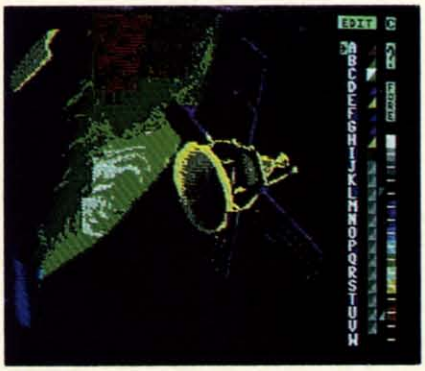


The Flexidraw light pen is loaded.
READER SERVICE NO. 238

FLEXIDRAW 5.0
Inkwell Systems
Commodore 64
Price: $149.95

We first looked at version 3.0 of the *Flexidraw* system in the November 1984 issue of *Ahoy!* We were well impressed with its performance then, just as we are now. Version 5.0 represents the latest release of this comprehensive light pen-driven graphics package. Many features have been added since we reported on the earlier version, far more than a mere two-digit increase in the version number would indicate. Thus we felt it would be worth our while to take a fresh look at its capabilities.

The package still includes Inkwell Systems' DT170 high-resolution light pen. This light pen, which represents the bulk of the package cost, is the most precise instrument of this type which we have encountered in the Commodore market. The accompanying photograph shows the complexity of the internal hardware of this deceptively simple package. The pen has a built-in pressure sensitive tip switch which may be used to signal the computer. This is an optically



Flexidraw's* Paint Palette *from a viewpoint in low earth orbit.

triggered switch with no contacts to corrode or wear out.

The package includes a double-sided 1541-formatted disk that is chock full of programs, support utilities, text fonts, clip art files, and sample images, with a total of only seven blocks free on both sides of the disk. As a first step you should back up the disk using the included fast copy utility.

Flexidraw is a high-resolution bit map screen drawing package. It includes many features which support both freehand sketching and precision manipulation of the bit map image. All the program's functions are accessed through an onscreen light pen-driven menu. This is a multilevel dynamic menu where the displayed functions automatically change to match the current operating mode. The menu only displays what is needed and conversely everything that is needed always seems to be displayed. Even the vertical dividing line between the drawing screen and the menu serves a purpose. It controls the width of the drawing brush.

The C-64 high-resolution bit map screen consists of 320 horizontal by 200 vertical dots or pixels. The *Flexidraw* menu steals 48 of these pixels, leaving a drawing surface only 272 pixels wide. The system more than makes up for this by letting the user link the two built-in drawing screens either vertically or horizontally. In this mode the left and right halves or the top and bottom halves of the two screens are displayed joined at the center of the screen. The identity of the individual work screens is maintained by using a different shade of gray for the screen background color.

This effectively extends the drawing surface to 542 dots horizontally or 400 dots vertically. Actually there is no limit to the size of the work surface using this technique. Completed screens may be saved to make room for new material. We consider this an effective response to the *Graphics Challenge* we presented in the October 1984 issue of *Ahoy!*

Most of *Flexidraw's* operations are controlled by the light pen. Some functions require the use of the keyboard. A handy overlay is provided for the function keys where the bulk of the keyboard operations reside. The remaining keyboard functions are primarily the CTRL key which may be used in lieu of the pen's tip switch and the left arrow key which is used to set points for some of the drawing functions. The RUN STOP key now activates the important "oops" or "undo" function for many of *Flexidraw's* operations. Of course the entire keyboard comes into play when you are entering text on the screen.

Flexidraw provides excellent support for precision operations. A grid mode restricts placement of pixels to 8 × 8 pixel character cell boundaries. A crosshair may be displayed on the screen for positioning at the pixel level while lining up with other screen objects. An effective zoom mode allows for dot by dot adjust-

GREAT PRODUCTS FOR YOUR COMMODORE

promenade C1™

The Eprom Programmer. Thoughtfully designed, carefully constructed, the *promenade* C1™ is respected around the world for quality and value. The original software controlled programmer does away with personality modules and switches. Intelligent programming capability can cut programming time by 95%! With Disk Software ..... still just $99.50

CAPTURE™

Take control of your '64 or '128* with this easy to use cartridge. Lets you make a back-up disk of your memory-resident software. Your program is then fully accessible to you and your program can be re-booted from your disk 3-5 times faster. Or make an auto-starting cartridge using the *promenade* C1 and a CPR cartridge kit. Its magic!

CAPTURE™ is a bargain at 39.95

CARTRIDGE MATERIALS:

CPR-3 - Three socket board, case and 3 eproms, for use with **CAPTURE™** 29.95
PCC2 - Two 2732 (4K) or 2764 (8K) eproms. For '64 or '128 in 64 mode 4.95
PCC4 - Four sockets for 2764, 27128 or 27256 (32K) eproms. Bank switching 17.95
PCC8 - Like the PCC4 but twice the capacity. For multiple programs 29.95
PRB4 - Four sockets, eprom & battery backed RAM combination 24.95
PTM2 - Basic 128 mode cartridge board. Two 2764 or 27128 eproms ..... 5.95†
PTM4 - Four sockets, 27128 & 27256 eproms. 128 mode bank switcher ..... 19.95†
PCCH2 - Plastic case for above cartridges (except PCC8) 2.25
Eproms - Always in stock at competitive prices.

†available June '86.
*when in 64 mode.

EPROM ERASERS:

Datarase - Hobbyist eprom eraser, 2 at a time, 3 to 10 minutes 34.95
PE14 - Industrial quality eraser, 7 to 9 at a time 79.95
Starter Set - **CAPTURE™**, *promenade* C1 and one CPR3 kit 149.95
Deluxe Set - **CAPTURE™**, *promenade* C1, Datarase and two CPR3 kits 199.95

SHIPPING & HANDLING: USA - UPS SURFACE $3.00 FOREIGN (AIR MAIL ONLY) $13.00

JASON-RANHEIM
1805 INDUSTRIAL DRIVE
AUBURN, CA USA 95603

TO ORDER TOLL FREE 800-421-7731
FROM CALIFORNIA 800-421-7748
TECHNICAL SUPPORT 916-823-3284
FROM OUTSIDE USA 916-823-3285
MC, VISA, AMEX WELCOME

Reader Service No. 281

ment while the original size image is displayed in an onscreen window.

Basic geometrical operations are supported. These include the drawing of boxes, circles, ellipses, and arcs or elliptical quadrants. Lines may be drawn point to point, continuously rubber banded, or fanned out from a single point. 14 fill patterns are built into the system. Many additional patterns may be created, since any of the keyboard characters can be used for this purpose. 24 additional fill patterns are included on the disk as a loadable character font.

Extensive text handling is provided with support for most of the C-64's full screen editor features. All the built-in Commodore characters may be used. Two additional fonts may be loaded in from disk. Eight standard size (8 × 8 pixel) fonts and two "Flexi" fonts are included on the disk. The "Flexi" fonts are custom quadruple sized (16 × 16 pixel) characters for elaborate text displays. A separate package, *Flexifont,* is available from Inkwell Systems. This program allows you create your own fonts and pattern fills for use with *Flexidraw.* This supplementary program disk also contains 33 additional font styles.

Flexidraw incorporates a comprehensive set of copy and paste functions. Although the operations have not changed from version 3.0, the nomenclature has. Paste operations are now done as test, with, and over. These correspond to logical exclusive or, logical and, and an exclusive or followed by an and. Thus two pastes in the same place using test will restore the original screen. Images copied to the scratchpad may be rotated or flipped in any combination before being pasted.

The copy operation is restricted to multiple character cell chunks. This permits the creation of symbol libraries or clip art files. These collections of symbols are designed to connect up when they are copied and pasted following the grid guidelines. Four of these image files are included on the program disk. These are collections of electronic, mathematical, and architectural symbols.

Full bit map printer dumps are included with *Flexidraw.* Supported printers include the Commodore 1525 and 1526 (currently the MPS-801/803 and the MPS-802) and the 1520 plotter. Other printers include the Epsons and their lookalikes, Okidata, and C.Itoh. Single size and quad size dumps are available. Remember the linked screens we talked about above. If you have a 1526, Epson type, Okidata, or C.Itoh printer, *Flexidraw* can automatically print two single size images side by side. The process may be repeated to generate hardcopy of as many vertically linked side by side images as you would like. Up to six of these screens will fit comfortably on a single 8½ × 11" sheet of paper.

The *Flexidraw* system lets you color in your high-resolution pictures using a separate *Pen Palette* utility. This program uses a unique and effective approach to adding color within the limits of the high-resolution bit map display. Remember only two colors are allowed within a given 8 × 8 pixel character cell.

Pen Palette works with a set of 23 "paint pots," each of which contains a foreground and background color pair. Images are saved in two parts, the basic bit map and a separate color file. The relationship of each paint pot and the cells which were painted with it is saved as well. This makes it possible to change the color of an entire screen area by changing the contents of a single paint pot.

If this all sounds a bit confusing, do not be concerned. An excellent tutorial based on five *Pen Palette* color images, which includes a final exam, provides a quick introduction to the system.

The *Flexidraw* system disk includes a collection of additional programs and utilities. These include:

A sprite editor and animator.

A display picture program which lets you put a light pen-driven arrow on the screen, suitable for lectures.

A light pen version of the *Follow Me* game.

A simple telecommunications program for transmitting *Flexidraw* images.

The Four Seasons, a quasi-animated display of Wayne Schmidt's *Irish Spring.* The colors of the leaves cycle through their seasonal changes while the spring waters flow down the hill.

As an added bonus, the basic *Flexidraw* machine language plotting routines may be accessed from your BASIC programs. These routines let you plot points, draw lines, and draw circles from within your BASIC programs.

Overall, *Flexidraw* is a very impressive package. Although its initial cost may seem high, it provides an excellent value for your dollar.

Inkwell Systems, P.O. Box 85152 MB290, 7677 Ronson Road, San Diego, CA 92138 (phone: 619-268-8792).



Reader Service No. 247

For Additional Information...

...on any of the products advertised or otherwise pictured in this issue of *Ahoy!*, circle the corresponding reader service number on the card located between pages 34 and 35.

NOW HEAR THIS

Making SID Sing—Part II By Mark Andrews

The Commodore 64, despite its plain looks and modest price, contains an amazingly powerful music and sound synthesizer. As you'll recall from last month's column, the heart of this built-in synthesizer is a microprocessor called the 6581 Sound Interface Device—often referred to as SID.

In the Commodore 64, this kid named SID controls a big block of RAM that extends from memory address $D400 through $D418 (54272 to 54296 in decimal notation). This chunk of memory can be broken down into four smaller segments, as follows:

$D400 -$D406 : Registers for Voice 1
$D407 -$D40D: Registers for Voice 2
$D40E-$D414 : Registers for Voice 3
$D415 -$D418 : Filter and Volume Controls

As you can see, the SID chip has three *voice registers*. Each register has a voice of its own, and each voice can be programmed independently of the other two. So SID can use his three voices to produce music in three-part harmony.

In addition, each of SID's three voices can produce many different kinds of sounds, and the characteristics of the sounds generated by each voice can be different from those of the sounds produced by the other two. So SID can be programmed to sound like a band of three different instruments playing simultaneously.

As the table above indicates, the block of memory that extends from $D415 to $D418 contains a set of registers labeled "filter and volume controls." These registers are used to control the volume and some of the sound characteristics of SID's three musical voices.

WAVEFORMS: THE SHAPES OF SOUNDS

SID's filter and volume controls are used to control the *timbre*, or overall characteristics, of SID's sounds. As you may recall from last month's column, the timbre of a sound is determined by a structure called a waveform. And SID, as last month's column also explained, can produce four distinct types of waveforms: a triangle waveform (which can sound like a xylophone or an accordion), a sawtooth waveform (which can resemble the sound of a trumpet or a harpsichord), a pulse waveform (which comes close to sounding like a piano) and a random-voice waveform (which can be made to sound like explosions and the sounds of percussion instruments).

The SID chip uses three registers—one for each voice—to determine the waveforms of sounds. These registers, called control registers, are $D404 (for voice 1), $D40B (for voice 2), and $D412 (for voice 3).

Only the high-order bits (4 through 7) of these control registers are used for determining waveforms. When bit 4 of a control register is set, the voice which that register controls will produce a triangle waveform. If bit 5 is set, a sawtooth waveform will be produced. Setting bit 6 will result in the generation of a pulse waveform, and setting bit 7 will generate random noise.

If none of these bits are set, the waveform that is produced will be a sine wave—a wave that produces a pure sound with no overtones.

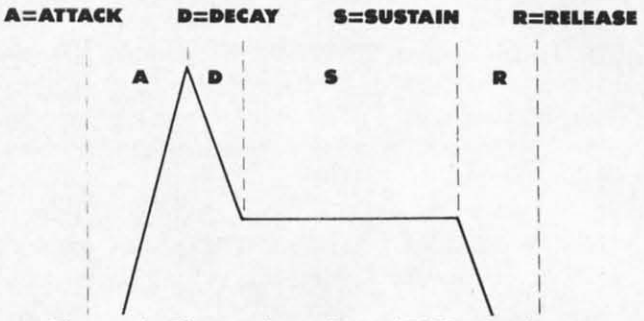


Figure 1: Illustration of an ADSR envelope.

THE ADSR ENVELOPE

One important characteristic of sound is *dynamic range*—the different in volume between the loudest level and the softest level of a sound. In the C-64, dynamic range is determined by something called an Attack/Decay/Sustain/Release (or ADSR) envelope.

The C-64 ADSR envelope derives its name from the fact that every musical note can be broken down into four distinct parts, or phases. These four phases in the life of a note are illustrated in Figure 1.

THE ATTACK AND DECAY CYCLES

The attack phase comes first because every note starts with an attack. The attack phase is the length of time that it takes the note to rise from no volume at all (a level of zero) to the note's maximum volume.

Once a note reaches its peak volume, its decay phase begins. The decay phase is the length of time it takes for the note to decay from its peak volume to a predefined "sustain" volume.

The SID chip uses three memory registers to control the attack and decay phases of notes. These are $D405 (for voice 1), $D40C (for voice 2), and $D413 (for voice 3).

Each of thesse attack/decay registers is divided into two parts: a low nibble (bits 0 through 3) and a high nibble (bits 4 through 7). To set the attack phase of a note, the high nibble of the attack/decay register is used. To set the decay phase of a note, the low nibble of the register is used. Each nibble can be set to a value ranging from $0 (for a duration of 2 milliseconds, or 2/1000 of

a second) to $F (for a duration of 8 seconds).

THE SUSTAIN AND DECAY CYCLES

As soon as the decay cycle of a note ends, its sustain cycle begins. During a note's sustain cycle, the note is held for a certain length of time at a predetermined volume. Then the note's release phase begins. During the release phase, the note drops from its sustain level to no volume at all, or a zero volume level.

Each of SID's three voices has one register that controls both the sustain and the release characteristics of the notes which that voice produces. The SID chip's sustain/release control registers are $D406 (for voice 1), $D40D (for voice 2), and $D414 (for voice 3).

To set the volume of a note's sustain cycle, the low nibble of the note's sustain/control register must be set to a value ranging from $0 (for no volume) to $F (to keep the sustain level at the note's peak volume). The duration of a note's sustain level is not determined by the setting of this nibble; to control the duration of the sustain level, a timing loop or some other kind of timing device must be used.

The release cycle of a note is controlled by the low nibble of the note's sustain/release register. Each release nibble can be set to a value ranging from $0 (for 6 milliseconds) to $F (for 24 seconds).

SETTING SID'S VOLUME

As explained last month, the volume levels of SID's three voices cannot be independently controlled: SID has only one volume-control register, and it always sets all three voices to play at the same volume. To set the overall volume of SID's sound, all you have to do is place a value ranging from $0 through $F in the lower four nibbles (bits 0 through 3) of Memory Register $D418 (often referred to as the SIGVOL register). The larger the value of this nibble, the louder SID's music. In most applications, the volume nibble of the SIGVOL register is kept at $F, its loudest setting.

PLAYING THE MUSIC

Once a note's volume and frequency have been set, and a waveform and an ADSR envelope have been programmed, the music can begin. To start a note, only one more bit must be set: a special bit called a *gate bit*. The SID chip has three gate bits, one for each voice, and each located in a different register. The three registers are $D404 (for voice 1), $D40B (for voice 2), and $D412 (for voice 3). The astute reader may recall that these three registers were mentioned earlier: their high-order nibbles are used to select the patterns of the waveforms that the SID chip generates. Now we can take a look at their low-order nibbles, working backwards from bit 3.

Bit 3 of each of these registers is called a *test bit*; it is used to disable an oscillator that is built into the voice that each register controls. When this oscillator is disabled, complex waveforms can be produced under software control—even waveforms that approximate those of human speech. When the oscillator is enabled, the sound of the associated voice becomes more musical.

Bit 2 of each SID control register is called a *ring modulation bit*. When this bit is set to 1, the triangle waveform of the voice controlled by the register is replaced by a ring-modulated combination of two oscillators. The associated voice may thus be used to simulate the sound of a bell or a gong.

Bit 1, known as a *synchronization bit*, can be used to synchronize the fundamental frequency of one oscillator with the fundamental frequency of another oscillator, thus enabling the programmer to create a wide range of complex harmonic structures using voice 1.

Bit 0 of each SID control register is the *gate bit* that starts a note. When a note's volume, frequency, waveform, and ADSR envelope have been determined, and when the SID chip has been given any other information which it may need to play the note, the gate bit can be set and the note will begin. To stop the note—whether it has completed its ADSR cycle or not—all a programmer has to do is clear the gate bit. The note will then stop playing. Once the gate bit has been cleared, the settings of any SID registers can be changed as desired. Then another note can be played—or another sound created—by setting the gate bit again.

MERLIN 64™

THE BEST MACRO ASSEMBLER FOR THE COMMODORE 64

Easy to use for the beginner or professional, Merlin 64 is an extremely powerful macro assembler.
Just a few of its features include:



- Fast assembly times
- Word processor like editor
- Conditional assemblies, Optional assembly to disk
- Includes Sourceror, an easy to use disassembler that creates Merlin 64 source files from binary data
- Macro library of common operations
- Cross Ref. utility program
- 80 column display compatibility

"This is the best assembler I've seen for the Commodore 64..."
Wm. Sanders / Assembly Language for Kids

"...an outstanding value...I can't imagine how it could be better."
C Peterson / AHOY! Magazine

$49.95*

*Plus $3.00 Shipping. CA Res. add 6% Sales Tax.

Ask your local dealer for details, or just write or call:

Roger Wagner™ PUBLISHING, INC.

P.O. Box 582 • Santee, CA 92071 • Telephone: 619/562-3221

Reader Service No. 248

To play the same note or create the same sound over and over again, all a program has to do is set and clear the gate bit repeatedly, while all other SID settings remain the same.

USING INTERRUPTS

The type-and-run program called MUSIC.S (see page 86) is a fairly simple assembly language program that can turn your Commodore's keyboard into a piano keyboard. Before you type and run the program, though, it might be helpful to understand the concept of *interrupts,* which are used in most high-performance music and graphics programs.

An interrupt—often referred to by its assembly language mnemonic, IRQ—is a high-priority routine designed to interrupt lower-priority programs, if necessary, so that it can do its work properly. No matter what is happening when an interrupt is called, a computer will stop everything else it is doing in order to process an interrupt (unless an even higher-priority interrupt is in progress, in which case the higher-level interrupt will be allowed to finish what *it* is doing before the lower-level interrupt begins). In other words, in an assembly language program, an interrupt always goes to the head of the line, where it can keep other routines waiting until it has done what it is supposed to do.

Assembly language programmers often use interrupts when they want to write time-critical routines. One very important interrupt routine is built into the Commodore 64's operating system. Called a hardware interrupt routine, it takes place exactly 60 times each second, during a brief period when the C-64 is not displaying anything at all on its screen. During this period, known as a screen refresh cycle, many essential housekeeping operations take place, all controlled by interrupts. The C-64's internal clock is updated, the keyboard is read, and a cursor-blinking operation is performed. When these and other essential chores are finished, the computer's hardware interrupt routine ends, and normal processing can resume.

The C-64's hardware interrupt routine can be of great assistance to the assembly language programmer. That's because it can be customized with the help of something called a *hardware interrupt vector.* In assembly language jargon, a vector is an entry point in an assembly language program. Usually, a vector is nothing but a pointer to the next routine in a program. But it is a special kind of pointer because it can be "stolen," or made to point to another subroutine. When a vector is stolen, the routine that it is made to point to is usually one that has been written by the person stealing the vector. When such a user-written routine ends, it usually terminates with an unconditional jump to the same routine that the stolen vector originally pointed to.

The effect of "stealing" a vector, then, is simply to insert a user-written routine into a set of operations that would ordinarily be controlled exclusively by a computer's operating system. If the stolen vector is part of the computer's screen-refresh cycle, the user-written routine will take place 60 times a second, with quartz-clockwork precision, and without any further effort on the part of the assembly language programmer!

A vector-stealing operation can be very easily used to customize the hardware interrupt routine used by the C-64. The vector that is usually stolen as part of this operation is called, logically enough, the hardware interrupt vector. It resides at memory addresses $0314 and $0315, and it is often labeled the CINV vector in C-64 programs.

A POTENTIAL PROBLEM

There is one more possible snag that must always be accounted for if the CINV vector is to be stolen successfully. Here it is:

The CINV vector consists of two 8-bit memory registers which, in combination, always hold a 16-bit address. So it takes two operations to alter the CINV vector. First the low byte that it points to must be changed. Then the high bit that it points to must be altered.

Since the CINV vector must be changed in two stages, there is always a chance that the C-64's hardware interrupt may begin after one of the vector's bytes has been changed, but before the other byte has been altered. If this happens, the CINV vector may point to a meaningless address when it is called, resulting in a program crash

THE BASEBALL DATABASE



LET YOUR COMPUTER KEEP TRACK OF YOUR TEAM'S BASEBALL STATS FOR YOU!

EASY TO USE
- Clear Screen Directions
- Easy Data Entry and Correction
- Detailed Users Manual
- Fast Statistics Retrieval from Disk

COMPREHENSIVE
- 23 Batting and Fielding Statistics
- 22 Pitching Statistics
- Up To 30 Players
- Unlimited Games
- Hits, Runs, Errors, LOB & ERs for Every Inning
- All Totals, Cumulatives, Averages Etc. Calculated

DETAILED PRINTED REPORTS
- Player Rosters
- Game Summaries
- Pitching Cumulatives
- And a lot more
- Win/Loss Records
- Team Cumulatives
- Player Histories

$49.95 APPLE IIe/IIc

$39.95 COMMODORE 64

- 15 day money back guarantee
- check or money order please, plus $2.50 shipping and handling
- Program specs and details available upon request

JACOBSEN SOFTWARE DESIGNS
1590 E. 43rd Avenue Eugene, Oregon 97405
Phone: (503) 343-8030

Reader Service No. 249

or a system failure.

To prevent this kind of catastrophe from taking place, the C-64's 6502 chip has two special instructions for making sure that interrupts are dealt with safely. One of these instructions is SEI, which stands for "set interrupt disable." The other is CLI, for "clear interrupt disable." When an SEI instruction is used in an assembly language program, the interrupt disable flag of the 6502 processor status register is set, and no maskable interrupts can take place. (There are two kinds of interrupts: maskable and nonmaskable. The CINV interrupt is of the maskable variety.)

When a CLI instruction is invoked during an assembly language program, it has just the opposite effect from that of the SEI register: it clears the P register's interrupt disable flag, and maskable interrupts are enabled.

The SEI and CLI instructions are tailor-made for applications like stealing the C-64's CINV vector. To make sure that a program does not crash when the CINV vector is stolen, simply use the instruction SEI before you change the vector, then use the CLI instruction after you've changed it. Then no interrupts will take place while the CINV vector is being altered, and the vector can be safely changed.

In MUSIC.S, the CINV vector is altered to include a note-timing loop. That ensures that the notes produced by the program will always be precisely timed.

In Lines 56 through 59 of MUSIC.S, the CINV vector is stored in a pair of memory addresses called USERADD and USERADD+1. Next, in Line 60, the SEI instruction is used to disable maskable interrupts. When that has been done, the address of a user-written routine (a note-timing loop) is stored in the address of the CINV vector. Then interrupts are reenabled with a CLI instruction.

The note-timing routine added to the CINV vector is labeled WAIT. It can be found in Lines 112 through 119 of MUSIC.S. The note-time routine ends with the statement

```
JMP (USERADD)
```

That statement ends the user-written note-timing loop with a jump to the address originally pointed to by the CINV vector.

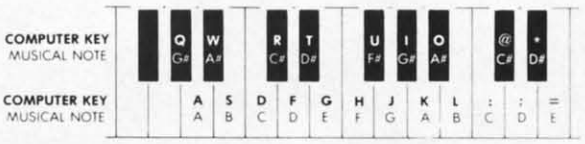


Figure 2: Keyboard arrangement for the MUSIC.S program.

RUNNING THE MUSIC.S PROGRAM

The MUSIC.S program was written using the *Merlin 64* assembler, but with relatively minor modifications it can be adapted for use with any assembler that is compatible with the C-64. When the program has been typed and assembled, it will convert your 64's keyboard into a piano-style keyboard. When the program is running, the middle row of keys—the row that starts with "A"—can be used like the white keys on a piano. The keys on the top row of your keyboard—beginning with "Q"— can be used as black keys. Figure 2 illustrates this arrangement.

Once you know how SID produces sounds, the MUSIC.S program is fairly easy to follow. And once you have it up and running, I'm sure you'll be able to find many ways that it can be improved. As written, the program makes use of only one of SID's voice registers, but there is no reason that it couldn't make use of all three, enabling you to pound your keyboard in three-part harmony.

The MUSIC.S program could be improved even more with some eye-catching color graphics. You could use either character graphics or high-resolution graphics to print a piano keyboard on your screen, and then print a note or some other symbol on any key that is hit to indicate that it's the key being played. And why not turn the "piano" used in the program into an electric organ or a music synthesizer, complete with "stops" designed to approximate the sounds of other instruments? With a little imagination, along with what you've learned about assembly language from reading these columns, I'm sure you can customize the MUSIC.S program in any of these ways, and many others! □

SEE PROGRAM LISTING ON PAGE 86

NEW
for the Commodore 128
DON'T GIVE UP YET!
BACK UP
virtually all 64/128
Software with
NEW 1571 Clone
Months of R&D have gone into the GCR CLONE MACHINE™ for 1571. Now you have the ability to reproduce GCR signals to back up virtually all software for the 64/128 including CPM (double sided too!). Included are:
1) Full Density Utility 2) GCR Copy 3) Directory Utilities 4) Auto Boot Maker (64&128 Modes) 5) Expansion module section (for future updates). ALL THIS for only $49.95
PRINTER INTERFACE
The MW-350 interface has been revised to fully support the 128 including complete CPM emulation total graphics, correct aspect ratios, print buffer, etc. Insist on compatability for only $79.00
MIDI APPLICATIONS
Synthesizers, Interfaces, Music Disks, Sequencer Software, Etc.
CALL - 201 - 838-9027
or write us at
Micro-W. DISTRIBUTING, INC
1342B Route 23 Butler, N.J. 07405
requires 128 with 1571 drive
VISA
Reader Service No. 250

COMMODARES
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 #30-1: FUNCTIONAL ENTRY

This problem is based upon a suggestion from Glen Bohusch (Erie, PA). Add the necessary lines to the following program to allow the user to type the definition for the function FNA(X). Once the definition has been entered, the program prints the values of the function in line 100.

```
10 PRINT "DEFINE THE FUNCTION FNA(X) = "
.....
100 FOR X=1 TO 10 : PRINT FNA(X) : NEXT
: END
```

PROBLEM #30-2: WHAT ENVIRONMENT?

Write a simple routine that determines the type of computer (VIC 20, C-64, C-128, or others), the current screen colors, and whether the screen is in 80, 40, or 20 column mode. This routine could be executed at the start of a program and would allow the program to behave differently for the different types of computers.

PROBLEM #30-3: WORD WRAPPER

Jim Speers (Niles, MI) has suggested yet another outstanding challenge. Very simply, see if you can implement the word-wrap function found on most word processors. Your program should allow text to be typed and displayed with a cursor. When a word is typed which will not all fit at the end of a line, it is to be erased, and as much of the word as has been typed is moved down to the start of the following line where typing continues.

Your solution should allow <DEL> and <RETURN> to operate properly. Cursor keys, <INS>, and <HOME> may be ignored. Jim used the back-arrow key to erase his graphic cursor and to end the program.

PROBLEM #30-4: COLOR BARS

Here is one for which the solution should be many times shorter than the description of the problem. This program prints randomly colored graphic blocks horizontally across the screen starting at the top row. Once two consecutive blocks of the same color have been printed, blocks are printed in pairs. Each pair will have randomly selected colors, but the two blocks in the pair are the same color. This continues until three consecutive pairs all have the same color, at which time blocks are printed three at a time with each of the triplets having the same color. And so forth.

An example should clarify the task:

```
CACBEDDBBEECCCCCCBBBAAADDDBBB...
```

Each letter represents a character-size graphics block, and different letters correspond to different colors. Initially every block is a different color until two consecutive blocks of color D are printed. Then blocks are printed in pairs until three pairs with the same color C are printed. Now triples are printed until four consecutive triples have the same color, at which time the colored blocks are printed four at a time. The process continues *ad infinitum*.

Allow scrolling after the bottom row is printed. What is the likelihood that the screen will ever be entirely one color?

Before we get to the solutions to *Commodares* from the February 1986 issue of *Ahoy!*, let's look at another contender for the World's Longest Listable Line championships. The clearcut winner (although achieved by devious means) is the following submission from Ben Mit-

chell, Jr. (New York, NY):

```
1 POKE 774,45
```

Run this one-liner, then try to list it. The line number is displayed followed by an infinite number (count 'em) of CMD commands! Of course I'm taking Ben's word that there are infinitely many of them—at least my computer didn't show any sign of reaching the end of the line.

This POKE statement tampers with a LIST command vector. Even the RUN/STOP-RESTORE sequence does not return things to normal. I suggest you find out what is normally stored in location 774 by typing PRINT PEEK(774) *before* you run the program. When you are tired of counting CMD's, restore the LIST vector to its original value by typing POKE 774,XXX where XXX is the value displayed by the PRINT statement.

The same procedure works for the C-128, but instead of showing infinitely many CMD's, the LIST command will generate an audiovisual show.

Len Lindsay (Madison, WI) raised an important question in his latest COMAL solutions to *Commodares.* He asked why we are always so concerned with the *shortest* or *most compact* programs rather than the *most readable* or *easiest to follow.*

Len's well-taken implication is that there is more to programming than cramming the most statements onto a single line. In fact the dictates of good programming generally frown upon such antics. On the other hand, the spirit of *Commodares* is intellectual pastime and good clean fun. There is no reason that every program we write must be easily interpretable, documentable, or even debuggable.

There is at least as much intellectual challenge in paring and rearranging a program's logic to allow it to fit onto one line of code as there is in writing the program in a rigorously structured and documented format. As far as changing the emphasis of this column from "shortest" to "most readable," we generally look for a happy medium. The length of the program is usually determined by its number of statements rather than its number of program lines. Sometimes (although certainly not always) one statement per line is preferred. All other factors being equal, the most readable, compact solutions are most likely to be used in this column.

We are certainly not biased against COMAL (to assuage Len's concern) or any other language. Structured programming is generally a desirable goal, and COMAL (along with Pascal and Modula-2 among others) certainly encourages structured programming. But in this column we are playing games and solving puzzles, and a compact five-line program can be a more appropriate solution than a structured twenty-line program. Most important, keep those solutions coming in whatever language you prefer to write.

Problem #26-1: Apples Anyone?, submitted by Ted Grondski (Springfield, MA), brought essentially two classes of solutions, the random search and the sequential search. Representative of the random search approach is the following program from Jacqueline Callaway (Orange Beach, AL):

```
1 REM
2 REM COMMODARE #26-1 :
3 REM      APPLES ANYONE?
4 REM SOLUTION BY
5 REM JACQUELINE CALLAWAY
6 REM
10 FOR I=1 TO 4 : READ L$(I) : NEXT
20 A=1 : B=2 : K=3 : D=4
30 W=INT(RND(1)*4)+1 : X=INT(RND(1)*4)+1
 : Y=INT(RND(1)*4)+1 : Z=INT(RND(1)*4)+1
40 IF A*W+B*X+K*Y+D*Z+A+B+K+D<>32 THEN30
50 IF W<>X AND W<>Y AND W<>Z AND X<>Y
 AND X<>Z AND Y<>Z THEN 70
60 GOTO 30
70 PRINT"ANN ";L$(W) :PRINT"BETH ";L$(X)
 :PRINT"KATE ";L$(Y) :PRINT"DOT ";L$(Z)
80 DATA SMITH, BROWN, BLACK, ROBINSON
```

Ann, Beth, Kate, and Dot got one, two, three, and four apples respectively. Ed Smith took as many as his sister. Fred Brown, George Black, and Jack Robinson each took two times, three times, and four times respectively as many apples as his sister. Since the total number of apples is 32, the statement in line 40 determines if the values of W, X, Y, and Z meet the specifications.

Rather than stepping through each possible combination of W through Z, Jacqueline's program randomly picks values for the four variables and tests them. The other conditional tests on line 50 make sure that no two variables have the same value.

The sequential search method is shown in this solution from Michael Marron (Stony Brook, NY):

```
1 REM
2 REM COMMODARE #26-1 :
3 REM      APPLES ANYONE?
4 REM SOLUTION BY
5 REM MICHAEL MARRON
6 REM
10 FOR I=1 TO 4:READ F$(I):NEXT I
20 DATA ANN, BETH, KATE, DOT
30 FOR A=1 TO 4 : FOR B=1 TO 4 : FOR C=1
 TO 4 : FOR D=1 TO 4
40 IF A=B OR A=C OR A=D OR B=C OR B=D OR
 C=D THEN 60
50 IF A+2*B+3*C+4*D+10=32 THEN GOSUB 70
60 NEXT D:NEXT C:NEXT B:NEXT A: END
70 PRINT F$(A);" SMITH",F$(B);" BROWN",F
$(C);" BLACK",F$(D);" ROBINSON":RETURN
```

Nested FOR-NEXT loops guarantee that every possible permutation of values will be tested.

For this problem with a small, finite number of possible combinations (namely 24), either solution is satis-

factory. The random method is desirable when there might be infinitely many combinations to test and not all solutions are required. The sequential method allows you to gauge the amount of time needed to find all solutions, even though it may or may not find those solutions more quickly than the random method. There is no way to know when the random method will hit upon the final solution. By the way, how would you solve this problem without a computer—randomly, sequentially, or with some combination of the two methods?

The solution from John Prager (Bay City, MI) to his own *Problem #26-2: What's Your Sine* nicely handles some of the intricacies of this problem. Without using log or trig functions, John's program calculates the sine of an angle given in radians.

```
1 REM
2 REM COMMODARE #26-2 :
3 REM   WHAT'S YOUR SINE?
4 REM SOLUTION BY
5 REM JOHN PRAGER
6 REM
10 INPUT "ANGLE (RADIANS)";X:S=X:F=X:N=1
20 F=-F*X/(N+1)*X/(N+2):N=N+2:S=S+F:IF F
<>0 THEN 20
30 PRINT"SINE :"S
```

Most solutions used the Taylor (Maclaurin) series expansion of the sine function:

$$\sin X = X - X^3/3! + X^5/5! - X^7/7! \ldots$$

where 7! (read 7 factorial) means 7*6*5*4*3*2*1 or 5040 for example. Each term is reached by multiplying the preceding term by X squared and dividing by the negative of the product of the next two integers, hence

$$X^5/5! = - X^3/3! * X * X / (4 * 5)$$

In John's program, S stores the sum of the terms and F stores each individual term. By alternating the multiplications and divisions, John's program is less likely to overflow (at least for values of X greater than one). John's program is also self-terminating. Once a term has been reached which is small enough to be stored as zero in the computer, line 30 is executed and the result is printed. You might add a PRINT N statement at the end to see how many terms are evaluated for various values of X.

This series expansion is not very accurate for large values of X. It is good to about five decimal places for X equal to 10. You could take advantage of the fact that

$$\sin (X + N * pi) = \sin (X)$$

for every even integer N to modify large values of X. Simply reduce the magnitude of the input number X by removing multiples of 2 * pi before starting at line 20. These statements will work:

```
5 PI = 3.14159265
15 IF ABS(X) > PI THEN X = X - SGN(X) *
2 * PI : S=X : F=X : GOTO 15
```

The SGN function allows negative values of X to be increased and positive values to be decreased.

The award for the shortest solution to this problem goes to Jack Silver (Medford, NY). One of Jack's solutions is simply

```
1 INPUT X : PRINT X
```

Indeed for angles very close to zero radians, the sine of the angle is very close to the angle itself. (See that for yourself in the series expansion above. If X is less than one, then X cubed is much less than one, and the first term is the most significant term.)

You might enjoy investigating the accuracy of Jack's program for various values of X. Compare SIN(X) with X as X approaches zero.

Edward Majewski (Milwaukee, WI) used a different method to find the sine of X. He evaluated the first five terms of a Chebyshev series polynomial.

```
1 REM
2 REM COMMODARE #26-2 :
```


ELECTRONIC ONE*

commodore



CALL
(614) 864-9994
P.O. Box 13428 • Columbus, Oh. 43213

COMMODORE HARDWARE	
C128	249.99
C64	139.99
1541 DISK DRIVE	179.99
1571 DISK DRIVE	239.99
1702 MONITOR	189.99
1802 MONITOR	179.99
1902A (RGB) MONITOR	279.99
PRINTERS	
STAR SG10 10	219.99
PANASONIC 1091	229.99
EPSON LX80	219.99
PANASONIC 1080	199.99
SEIKOSHA	179.99
COMREX	69.99
COMMODORE MPS 1000	239.99
MISC. HARDWARE	
G-WIZ INTERFACE	46.99
CARDCO GT INTERFACE	37.99
TYMAC CONNECTION	49.99
PPI	34.99
XETEC JR. INTERFACE	36.99
XETEC INTERFACE	56.99
MODEMS-TOTAL COMM.	29.99
COMMODRE 1200 BAUD	149.99
MESSENGER MODEM	34.99
MONITORS	
THOMPSON COMPOSITE 14" COLOR	149.99
THOMPSON (RGB)	259.99
TENIKA MO 10 14" COLOR	159.99
TENIKA (RGB)	269.99
XL80 80 COLUMN BOARD	34.99
1350 MOUSE (FOR 128)	42.99
SPECIAL	
STAR SG 10 C	208.00

COMMODORE SOFTWARE	
KUNG FU-EXPLODING FIST	19.99
KUNG FU-STICKS OF DEATH	19.99
KARATE CHAMP	19.99
KUNG FU MASTER	19.99
KARATEKA	19.99
HARDBALL	18.99
PSI TRADING CO.	18.99
THE DAM BUSTERS	18.99
LAW OF THE WEST	18.99
FIGHT NIGHT	18.99
COPY II	24.99
JET	24.99
FLIGHT SIM. II	32.99
S'MORE	44.99
FAST LOAD	24.99
MACH 5	24.99
MACH 128	29.99
SUPER PASCAL	44.99
HOME PAK	29.99
SYLVIA PORTER	54.99
HOME ACCOUNTANT	24.99
PRINT SHOP	27.99
NEWSROOM	32.99
WORD WRITER	44.99
MULTI PLAN	44.99

HOW TO ORDER: CASHIER CHECK, MONEY ORDER, MASTERCARD* OR VISA* (Add % for charge cards) . . . NO PERSONAL CHECKS . . . NO C.O.D.'s . . . SHIPPED U.P.S. **PRICES SUBJECT TO CHANGE.**
SHIPPING: Prompt one day shipping on in-stock merchandise. Ohio residents add 5.5% sales tax. Add $3.00 on all orders under $100.00 . . . Add $5.00 on all orders over $100.00.
INTERNATIONAL: Actual freight charge on all orders outside the continental United States including A.P.O.
CALL OR WRITE FOR FREE CATALOG

CALL ELECTRONIC ONE (614) 864-9994

Reader Service No. 251

```
3 REM   WHAT'S YOUR SINE?
4 REM SOLUTION BY
5 REM EDWARD MAJEWSKI
6 REM
10 B1=1.5707963:B3=-.64596336:B5=.079688
475:B7=-.00467222O3:B9=.000150817l6
20 INPUT"ENTER VALUE IN RADIANS";X : X=X
*2/+
30 Y=B1*X+B3*X^3+B5*X^5+B7*X^7+B9*X^9
40 PRINT"CALCULATED SINE";Y
50 PRINT"COMPUTER VALUE ";SIN((+/2)*X)
```

Edward's program is very accurate for X between −PI/2 and PI/2. To eliminate the exponentiation and in some cases improve accuracy, line 30 may be rewritten as follows:

```
30 X2 = X*X : Y = X * (B1 + X2 * (B3 + X
2 * (B5 + X2 * (B7 + X2 * B9))))
```

This type of polynomial expansion with stored constants is often the way that computers and calculators evaluate the advanced functions. Books on numerical analysis will provide further information on this subject.

No one sent all 66,150 possible four-letter "words" containing two vowels each (fortunately). However, there were several programs submitted which do generate such a list for *Problem #26-3: Dual Vowels*. For this problem some programs "built" the four-letter words to have exactly two vowels while others generated every possible combination of four letters and printed only those which contained just two vowels.

The following program from Paul Mather (Warminster, ONT) is the shortest and most straightforward of the solutions received.

```
1 REM
2 REM COMMODARE #26-3 :
3 REM   DUAL VOWELS
4 REM SOLUTION BY
5 REM   PAUL MATHER
6 REM
10 A$(1)="AEIOU":A$(2)="BCDFGHJKLMNPQRST
VWXYZ"
20 FOR Z=1 TO 6
30 READ X1,X2,X3,X4
40 FOR C1=1 TO LEN(A$(X1))
50 FOR C2=1 TO LEN(A$(X2))
60 FOR C3=1 TO LEN(A$(X3))
70 FOR C4=1 TO LEN(A$(X4))
80 PRINTMID$(A$(X1),C1,1);MID$(A$(X2),C2
,1);MID$(A$(X3),C3,1);MID$(A$(X4),C4,1),
90 NEXT C4,C3,C2,C1
100 NEXT Z
110 DATA 1,1,2,2, 1,2,1,2, 1,2,2,1, 2,1,
1,2, 2,1,2,1, 2,2,1,1
```

There are six different orientations for the two vowels within the four-letter word: positions 1&2, 1&3, 1&4, 2&3, 2&4, and 3&4. The DATA values in line 110 are read four at a time. A value of 1 corresponds to A$(1) which stores the vowels, and a value of 2 corresponds to A$(2) which stores the consonants. Each possible letter from the vowel array or the consonant array is chosen and used in the appropriate position in line 80.

It is easy to see how the total number of words may be calculated by looking at Paul's program. The Z loop is executed six times. Within each Z loop, the first vowel will have five different values as will the second vowel. Similarly the first and second consonants will each have twenty-one different values. The result is (6 * 5 * 5 * 21 * 21) or 66150 total combinations.

Martin Brookes (Framingham, MA) mentioned that his program took 2 hours 39 minutes to find the 66150 words. You might see if your program can beat his average of almost seven words per second.

During his work on *Problem #26-4: Spelled Number*, Wallace Leeker (Lemay, MO) uncovered a rather interesting and very subtle bug in his C-64. He discovered that Rob Lackey's program printed in the September 1985 *Commodares* did not give the correct result for the numbers 700 and 900. Rob's program inputs a number less than 10,000 and spells out the English equivalent. Strangely enough, 900 comes out "eight hundred" and 700 becomes "six hundred."

Even more puzzling was the fact that on an IBM PCjr, Rob's program works fine. So Wallace assumed there must be something wrong with his C-64. Alas, it looks as though the problem with the C-64 is somewhere in the firmware (BASIC software in ROM). On the C-128, Rob's program works fine. On the C-128 in C-64 mode, 900 still comes out "eight hundred."

Here's a short program which displays the problem.

```
1 REM
2 REM --- C-64 BUG ---
3 REM
10 FOR N=0 TO 9999
20 A=N/1000-INT(N/1000)
30 B=10*A:C=INT(B)
40 D=INT(10*(N/1000-INT(N/1000)))
50 IF D<>C THEN PRINT N,C,D
60 NEXT
```

In this program, D should equal the number of "hundreds" in N. A, B, and C are equivalent to the parts that make up D, and C should have the same value as D. On the C-128, this program does not print any values, meaning that C is equal to D for all numbers tested. On the C-64, however, three values of N from 0 to 9999 give different results for C and D (700, 900, and 1900).

The culprit, as many of you have no doubt surmised, is probably related to the internal storage and round-off of values. It is surprising that the C-64 and the C-128 handle the situation differently. Maybe there's more to the problem than internal round-off. Let us know what you uncover.

Ada Train
Assemble
Cadpak 6
Cadpak 1
Chartpak
Datamat
Forth Lan
Master . .
Personal
Powerpla
Quick Co
Super C C
Super Pas
Technical
Video Bas
Xper . . . .
Xref-128 .
Xref-64 . .
Alcazar .
Alter Ego
Computer
Countdow
Cross Cou
Gamemak
Ghostbus
Hacker .
Little Com
Master of
Mindshad
On Track
Slot Car C
Space Shu
Champion
Homewor
Stunt Flye
Ultima II .
Wiztype . .
Axiom Elit
Brother 15
Commodo
Commodo
Epson 185
Epson 85 .
Epson mx,
Epson mx,
Gorilla Ba
Juki 6000 .
Juki 6100 .
Legend 88
MPS 801 .
MPS 803 .
OKI 182,19
OKI 82,92,
SG 10-15 .
Minim
AMEF
CO
P.O. Box
ORDERING IN
(cert. chk.-vis
cash or cert. c
prices reflect
$3.50 shippin
inquiries invite
pricing subject
shipping in Co
tional Compute
number.

TOLL FREE 800-634-AICP Orders Only

ABACUS

Ada Training Course	$29.95
Assembler Monitor	29.95
Cadpak 64	29.95
Cadpak 128	45.95
Chartpak 64 or 128	29.95
Datamat	29.95
Forth Language	29.95
Master	29.95
Personal Portfolio	29.95
Powerplan	29.95
Quick Copy v2.0	16.95
Super C Compiler 64	59.95
Super Pascal	45.95
Technical Analysis	45.95
Video Basic	29.95
Xper	45.95
Xref-128	14.95
Xref-64	14.95

ACTIVISION

Alcazar	19.95
Alter Ego	29.95
Computer Fireworks	24.95
Countdown to Shutdown	19.95
Cross Country Road Race	19.95
Gamemaker	24.95
Ghostbusters	21.95
Hacker	21.95
Little Computer People	21.95
Master of the Lamps	19.95
Mindshadows	19.95
On Track Racing	19.95
Slot Car Construction	24.95
Space Shuttle	19.95

SIERRA ON LINE

Championship Boxing	18.95
Homeword Plus	32.95
Stunt Flyer	19.95
Ultima II	35.95
Wiztype	21.95

RIBBONS

Axiom Elite 5 LCD	5.95
Brother 15, 25, 35	5.95
Commodore 1525	6.95
Commodore 1526	6.95
Epson 185	6.95
Epson 85	4.95
Epson mx,fx,rx 100	6.95
Epson mx,fx,rx,1x 80	4.95
Gorilla Banana	6.95
Juki 6000	4.95
Juki 6100	3.95
Legend 880,1080,808	6.95
MPS 801	6.95
MPS 803	6.95
OKI 182,192	9.75
OKI 82,92,83,93	2.95
SG 10-15	2.95

Minimum Order 6 Ribbons

EPYX

Ball Blazer	24.95
Eidolon	23.95
Fast Load	23.95
Koronis Rift	23.95
Multiplan 64/128	40.95
Pitstop II	23.95
Program Tool Kit	27.95
Rescue on Fractalus	23.95
Summer Games	23.95
Summer Games II	23.95
Temple of Apshai	24.95
Vorpal	21.95
Winter Games	23.95
World Greatest Baseball	23.95
Worlds Greatest Football	23.95

ACCESS

Beach Head	21.95
Beach Head II	24.95
Leader Board	
Mach 128	30.95
Mach 5	21.95
Raid Over Moscow	24.95

ACCOLADE

Dambusters	19.95
Fight Night	19.95
Hard Ball	19.95
Law of the West	19.95
PSI 5 Trading Co.	20.95

BRODERBUND

Bank St. Filer	34.95
Bank St. Writer	29.95
Castles of Doctor Creep	19.95
Karateka	19.95
Music Shop	27.95
P/S Library 1-2-3	16.95
Print Shop	27.95
Print Shop Companion	21.95
Raid on Bungeling Bay	19.95
Stealth	19.95
Whistlers Bros	19.95

SPRING BOARD

Newsroom	30.95
Clipart	20.95
Clipart Part II	24.95

DAVIDSON ASSOC.

Math Blaster	31.95
Speed Reader II	44.95
Spell It	31.95
Word Attack	31.95

KOALA TECH.

Koala Pads 64	36.95
Koala Printer Utilities	16.95
Programmers Tool Kit	24.95

TIME WORKS

Data Manager 128	42.95
Data Manager II	29.95
Electronic Checkbook	16.95
Evelyn Wood Reading	29.95
Money Manager	16.95
Sideways	18.95
Swift Calc 128 w/sideways	42.95
Swift Calc 64 w/sideways	29.95
Word Writer 128 w/speller	42.95
Word Writer 64 w/speller	29.95

MICRO LEAGUE

General Managers disk	24.95
Micro League Baseball	24.95
Team Disks	16.95

SIMON & SCHUSTER

Spy Hunter	27.95
Tapper	27.95
Typing Tutor III	24.95

MICRO PROSE

Acro Jet	21.95
Crusade in Europe	24.95
Decision in the Desert	24.95
F-15 Strike Eagle	21.95
Gunship	21.95
Kennedy Approach	21.95
Silent Service	21.95

BATTERIES INCLUDED

Consultant 64/128	39.95
Home Pak	29.95
Paper Clip 64/128	39.95
Paper Clip w/speller	49.95

SUB LOGIC

Flight Sim. II	34.95
Jet	27.95
Scenery Disks 1-6	14.95
Scenery Disks 7-12	CALL

FIRST STAR

Spy vs. Spy	18.95
Spy vs. Spy II	18.95
Superman	18.95

INFOCOM

Ballyhoo	24.95
Cutthroats	24.95
Enchanter	21.95
Hitchhiker's Guide	21.95
Infidel	24.95
Invisiclues (all) ea.	6.00
Planetfall	21.95
Sorcerer	24.95
Spellbreaker	26.95
Starcross	29.95
Suspect	23.95
Suspended	27.95
Wishbringer	22.95
Witness	22.95
Zork 1-2-3	25.95

DISKS & ACCESSORIES

Disk Notchers	6.50
Disks No Lable (25)	18.95
Paper Color Assorted	14.95
Paper Okimate 200	8.95
Paper Pack 500 Sheets	7.95
Kraft Joysticks	9.95
Data Case 50	9.95

PRECISION

Superbase 128	56.95
Superbase 64	46.95
Superscript 128	47.95
Superscript 64	46.95

DESIGNWARE

Body Transparent	27.95
Grammar Examiner	27.95
Remember	49.95
States & Traits	27.95
Notable Phantom	31.95

ELECTRONIC ARTS

Bard's Tale	24.95
Sky Fox	24.95
Movie Maker	24.95
Carriers at War	35.95
Heart of Africa	24.95

HOT

Master Modems	36.95
Compuserve Starter	19.95
Practicalc 64	18.95
Practifile	18.95
Desk Mgr.	Call
Halley Project	24.95
Ultima III	36.95
Doodle	24.95
Home Accountant	44.95
Intl. Hockey	16.95
Super Bowl Sunday	21.95
Super Bowl Sun. Team Disk	16.95

HOTTEST

Karate Champ	22.95
Kung Fu Masters	22.95
Star Rank Boxing	19.95
Sargon III	31.95
Ultima IV	39.95
Kung Fu Exploding Fists	19.95

NEW

Kung Fu II	19.95
Gato	19.95
Ballyhoo	24.95
Leader Board	24.95
Touch Down Football	21.95
Vorpal	21.95
Print Shop Companion	21.95
Alter Ego	29.95

AICP

Disk Drive Cleaner	7.95
Disks	7.95
Printer Head Cleaner	7.95

AMERICAN INTERNATIONAL COMPUTER PRODUCTS

P.O. Box 1758, STATEN ISLAND, NY 10314

ORDERING INFO: In stock items shipped within 24 hrs. for prepaid orders (cert. chk.-visa-m/c). C.O.D. orders accepted, please add $4.00, must be cash or cert. chk. ONLY. NY State Residents add 8¼% sales tax. Advertised prices reflect a 4% discount for cash, credit cards add 4%. All orders add $3.50 shipping and handling. International orders add $5.00 + S&H. School inquiries invited. Personal checks allow 2 wks. for clearance. Availability and pricing subject to change without notice. Orders over $150.00 receive free shipping in Continental U.S. Make all checks payable to American International Computer Products. Defective exchanges require Return Authorization number.

Reader Service No. 270

Customer Service
718-351-1864
ORDERING ONLY
800-634-AICP
Outside N.Y. State
10AM to 6PM E.S.T.

INTRODUCTORY OFFER
BUY 2 PACKAGES OF A.I.C.P. DISKS and get 1 DISK NOTCHER *FREE*
GUARANTEED 100% ERROR FREE

Back to the problem at hand, the answer to *Problem #26-4* is that there is no answer. No number is equal to the sum of the letter values in its name (A=1, B=2, and so forth; "ONE" equals 15 + 14+ 5 or 34). Actually, David Stidolph (Madison, WI) sent a COMAL program which interprets the number "146" as "ONE FOUR SIX" (instead of "ONE HUNDRED FORTY SIX") and thereby found that this number does equal its letter value.

The solution from Michael Marron (Stony Brook, NY) is printed below. His program lists every number which differs from its "name values." The name values for each number are stored in the array V( ). The numbers 219 and 253 differ from their name values by only one.

```
1 REM
2 REM COMMODARE #26-4 :
3 REM   SPELLED NUMBER
4 REM SOLUTION BY
5 REM   MICHAEL MARRON
6 REM
10 PRINT" #","VALUE","DIFFERENCE"
20 DIM V(30):V(0)=0:X=-1
30 FOR I=1 TO 29:READ N$:S=0
40 FOR J=1 TO LEN(N$):V=ASC(MID$(N$,J,1)
)-64:S=S+V
50 NEXT J: V(I)=S :NEXT I
60 FOR A=0 TO 9 : FOR B=0 TO 9
70 IF A=0 THEN T=0
80 IF B=0 THEN H=0
90 FOR C=0 TO 19:X=X+1:GOSUB 150:NEXT C:
C=0
100 FOR D=20 TO 27:FOR E=0 TO 9
110 X=X+1:GOSUB 150:NEXT E:NEXT D
120 D=0:E=0:H=V(28):NEXT B:T=V(29):NEXT
A
130 END
150 V=V(A)+T+V(B)+H+V(C)+V(D)+V(E)
160 IF X<>0 AND ABS(X-V)<=5 THEN PRINT X
,V,ABS(X-V)
180 RETURN
900 DATA ONE,TWO,THREE,FOUR,FIVE,SIX,SEV
EN,EIGHT,NINE,TEN,ELEVEN,TWELVE
910 DATA THIRTEEN,FOURTEEN,FIFTEEN,SIXTE
EN,SEVENTEEN,EIGHTEEN,NINETEEN
920 DATA TWENTY,THIRTY,FORTY,FIFTY,SIXTY
,SEVENTY,EIGHTY,NINETY,HUNDRED,THOUSAND
```

Thanks to Jim Speers (Niles, MI), Len Lindsay (Madison, WI), Martin Brookes (Framingham, MA), and Wallace Leeker (Lemay, MO) for their solutions to this and other problems.

Other readers with contributions to *Commodares* this month include David Stein (Arlington, VA), Bill Binder (Northville, MI), James Hendrix (White Sands Missile Range, NM), Carolyn Predmore (Lawrence, KS)—hello to the University of Kansas, Bill Okerblom (Providence, RI), Louis Lemire, Frank Smith (Schaumburg, IL), Scott Nicodemus, John Fraleigh (Wappingers, NY).

Also congratulations to M. Mak (NY, NY), David Hoffner (Brooklyn, NY), Steve Pietrowicz (APO NY–Bad Toelz, Germany), Bob Muhlstadt (Henry, IL), Harold Garter (Phoenix, AZ), Martin McCallister (Scio, OH), Pete Troy (Casco, ME), Robert Post (Ft. Riley, KS), Robert Schader (Wyoming, MI), Michael van Bodegom (St. Albert, ALB), Charles Grady (Cleveland, TN), Ben Pflanzer (Lake Villa, IL), Eddie Byrd (White Oak, MO), Tom Isaman (San Antonio, TX), Thomson Fung (San Diego, CA), Karen Middaugh (San Diego, CA), Robert Johnson (Chico, CA), Dennis Diskin (Bozrah, CT), Billy Brown (Ruston, LA), and James Borden (Carlisle, PA).

Here's one more strange occurrence (whether it is a bug or not, we will leave up to you). Type this in direct mode and look at the results:

```
PRINT MID$(CHR$(34),1);2;3
```

How do you explain those CHR$(29) (reverse right brackets) following the 2 and the 3 in the computer's response? Something to do with that crazy Insert-Quote mode? Let us know what you figure out.

With two bugs to track down and some serious challenges this month, you should have some busy but enjoyable programming ahead. Keep those solutions and problems coming! □

Ribbon Land

Quality Products for Le$$

ORDER ***HOTLINE 1-800-221-4892***

In NJ or for Information CALL 201-842-1437

COLOR RIBBONS - Red, Blue, Yellow, Green, Brown, & Purple. *Silver, Orange & Gold.

Printer Types	Black EACH	Black 6+	Color EACH	Color 6+	†Transfer EACH	†Transfer 4+
*C-Itoh Prowriter	4.50	4.00	5.50	4.50	6.50	6.00
Canon A-40/50/55, PW-1080A/1088/1056	6.00	5.50	7.00	6.50	—	—
Commodore MPS801, Comrex 220	5.00	4.50	6.00	5.50	—	—
Commodore MPS1525, Gorilla Banana	5.00	4.50	6.00	5.50	—	—
Commodore MPS803	5.50	5.00	—	—	—	—
Axiom GP550, GP700	5.00	4.50	6.00	5.50	—	—
*Epson MX, FX, RX 80/85, Citizen 10/20	4.50	4.00	5.50	4.50	6.50	6.00
Epson MX, FX, RX 100/185, Citizen 15/25	6.00	5.50	7.00	6.50	—	—
Epson LX-80/90, Homewriter 10	5.00	4.50	6.00	5.50	7.00	6.50
Epson LQ1500	5.50	5.00	6.00	5.50	—	—
*Okidata 82, 92, 83, & 93/SG10, Gemini 10X	2.50	2.10	4.00	3.50	5.00	4.50
Okidata 182, 192 & 193	7.00	6.50	—	—	—	—
Okimate 20 (Thermal)	6.00	5.50	7.00	6.50	—	—
Panasonic 1090, 91 & 92	9.00	8.50	10.00	9.50	—	—
Panasonic 1093	5.00	4.50	6.00	5.50	—	—
Toshiba 1350, 51, P1340, P351, 341	6.00	5.50	7.00	6.50	—	—

†Heat Transfers Available in Red, Blue, Yellow & Black.

Multi-Strike Black Film Ribbons (*Red & Blue Available)	EACH	6+
Brother HR15/35, COMREX II	6.00	5.50
Diablo 620	4.50	4.25
Diablo Hi-Type II, C-Itoh Starwriter	3.50	3.25
Juki 6000, Juki 6100	4.00	3.75
NEC 3500	6.25	6.00
Commodore 1526, 802, Spirit 80, BMC-80, Legend 880, 808, 1080, 1380	6.25	6.00

MacInker - Re-Ink Ribbons for about 5¢.

C-Itoh Prowriter	49.95
Epson MX, FX, RX 70/80/100	49.95
Universal Base Plus Driver Kit for Most Nylon Ribbons	64.95
Ink Kit (Available in Red, Blue, Yellow, Green, Brown, Purple & Black)	8.00

Color Computer Paper - Red, Blue, Gold, Light Blue, Pink & Ivory.
100 Sheets ..... $6.00 600 Sheets or Rainbow Pack $24.00

Color Envelopes - Invitation Size/Red, Blue, Gold, Light Blue & Pink.
25 Envelopes ..... $2.50 50 Envelopes ..... $4.50 100 Envelopes $8.00

Print Head Cleaning Kits - Helps prolong ribbon & Print Head Life.

C-Itoh Prowriter	8.00
Epson MX, FX, RX 70/80/85	8.00
Epson MX, FX, RX 100/185	10.00
Epson LX-80/90	10.00
Okidata 82, 83, 92 & 93, SG10	5.00

CALL FOR PRICING ON ALL HARD TO FIND RIBBONS!

School & Business Purchase Orders Accepted. Dealer Inquiries Welcome! Dealer Price List on Request. NJ Resident add 6% Sales Tax • Add $3.00 Shipping & Handling for all orders under $50 and paper orders. UPS GROUND Only. Printer Model used to Identify Ribbon Type.

Ribbon Land • P.O. Box 8634 • Dept. AM6 • Red Bank • NJ • 07701

Reader Service No. 252

CADET'S COLUMN

THRUSTING INTO THE PUBLIC DOMAIN

Free Programs are a Modem or Mailing Fee Away!

BY CHERYL PETERSON

Within a short time of buying a computer, most owners learn that buying software could send them to the poorhouse if they aren't selective. The great number of packages that purport to serve the same function can make choosing software a nightmare. (We'll pretend that we don't know about those unscrupulous people who steal software.) Inexpensive software (marketed by companies like Mastertronic) does exist, but it certainly doesn't abound. With prices ranging from $15 to as high as $150 or more, it can be terribly difficult to accumulate a good mixture of useful packages.

And typically, when you find a commercial package that is almost what you need, you find that you can't modify it to make it work the way you want. The manufacturer won't help you and prevents you (through compiling and/or copy protecting his program) to let you make the changes yourself.

Outside of magazines, where does one find inexpensive packages that perform useful functions? And how can you modify these to do what you want? How is the honest computerist to find affordable software that keeps the kids entertained or helps them learn?

One good source of "almost free" programs is public domain (PD) software. Such programs usually cost little more than a disk copying and shipping fee. This software is distributed by a number of different organizations and is not copy-protected or copyrighted.

Copyright law provides a way for the author of a program, song, or literary or art work to prohibit others from distributing his creation. The author can selectively sell others the right to copy and distribute this work.

A public domain work, on the other hand, is one that is not covered by copyright. Currently works can only be copyrighted for the life of the author plus 50 years, or until the author relinquishes all rights. Relinquishing copyright can be as easy as failing to put the proper copyright notice on. However, if you get a copy of a program that has had the notice removed, it is still protected! So watch out for illegal copies. Sometimes it's hard to tell the difference between PD software and stolen software, but the copyright is valid if the owner places notices on all the copies he sells.

Many groups sell PD software for reasonable copying fees. These groups may have improved an old version of a program and put a copyright notice on it. If there is a copyright notice, you don't have the right to give it to friends.

The major communications services all offer PD software for downloading somewhere on their networks. CompuServe, PlayNET, and QuantumLink all have libraries of C-64 software. All you pay are connect charges while you are downloading. Each has a special procedure to capture the software on disk.

If there are electronic bulletin board systems (BBS's) in your area, they may have PD programs available to download. Some boards charge users a small sign-on fee to join. This one-time fee to join assures that members remember their passwords.

Another good source is Commodore user groups. Most local groups have a library of software that members are allowed to copy. In some cases, members buy programs for a small charge that covers disks and a copying fee. User groups usually have a membership fee that defrays the costs of running the group.

National groups, such as TPUG (the Toronto Pet User Group), also distribute public domain software to their members. See the list included with this column for addresses.

Many types of programs are available—games for children and adults, educational programs, productivity programs, and utilities that simplify many chores. BASIC, CP/M, and Amiga programs are being distributed.

The complexity of these programs rarely challenges that of commercial software. While some commercially offered software is little more than PD programs modified and documented, this shouldn't deter interest in PD packages. You may not know it, but the *Zork* series of programs was developed from a program called "ADVENTUR" that is still available on most electronic BBS systems. Obviously, the *Zork* programs are more complex, but they are also more expensive.

And sometimes a PD program's simplicity is an advantage. For instance, one program that I use frequently is *VDO.* This text editor was originally written as a quick and dirty (yet flexible) way to edit programs in CP/M. It wasn't meant to perform all the fancy gyrations that can be accomplished with a commercial package. *ED,* the text editor generally provided with CP/M, is a pitifully minimal editor and *VDO* was conceived as a way to avoid using *ED.*

VDO's big advantage is its size. At only 4K, it could be put on every disk. The utility of this becomes obvious when you are using a one disk drive system and want to do cleanup on your disks. Can you remember what's

in all those text files? Can you imagine putting a full-blown word processor on every disk you own?

C-128 BEGINNERS

I was pleasantly surprised a few weeks ago to receive a call from a local travel writer who was planning to computerize her writing. A local writers' group had recommended she contact me first. Her decision to buy a Commodore 128 was surprising to me in light of her total lack of experience with computers. I had (wrongly it seems) assumed that most C-128 buyers were C-64 owners upgrading their systems. As this incident brought home to me, some C-128 owners are also beginners. So I've added C-128 coverage to this column. I hope you approve.

The 1571 isn't as slow as the 1541, provided it is being used with the C-128 mode. Going to C-64 mode slows the 1571 to 1541 speed. But Access Software, designer of the *Mach 5* cartridge, has come up with *Mach 128*. *Mach 128* will speed up loading times from both 1541 and 1571 drives operating in C-64 mode. *Mach 128*'s switches can be set to power up the computer in C-64 or C-128 mode automatically. A cartridge-mounted reset switch can perform a warm reset for you, so you needn't power down if you get locked up.

The *Mach 128* cartridge has the same features as *Mach 5* with special 128 additions. It does work with a C-64 as well. At a $49.95 suggested list price, it's one of the first things C-128 owners will want to look into. Access is still providing its disk organizer program and BASIC +4K with their *Mach* products.

Other products that I've previously mentioned have been upgraded for the C-128. Abacus Software has developed a C-128 version of its BASIC compiler. William Sanders has issued an update to his book *Assembly Language for Kids* to include a C-128 version of the *Kids' Assembler* and information on differences between the C-128 and C-64.

Other good books for C-128 owners are being offered by Microcomscribe. *The Elementary Commodore 128,* also written by William Sanders, is a good place to start learning BASIC 7.0. As with all his books, there are sample programs and plenty of reference tables in the appendix. A more advanced volume, *The Commodore 128 Mode: An Inside View,* goes much deeper into programming and would be more suitable for experienced programmers.

Abacus Software has C-128 books available, but these are also intended for the more experienced. *C-128 Tricks and Tips* and *C-128 Internals* both deal with program-

SOURCES OF PD SOFTWARE

Commodore Software Association
P.O. Box 83655
Los Angeles, CA 90083
$15/year membership fee; $3 per program.

Home Software Systems
P.O. Box 85
Sterling Hts., MI 48077
$16.95 per disk; 5 disks available.

TPUG Inc.
101 Duncan Mill Road, Suite G7
Don Mills, Ontario, Canada M3B 1Z3
$25 membership.

Public Domain Users Group
P.O. Box 1442-CO
Orange Park, FL 32067

Spatial Concepts
P.O. Box 5662
Orlando, FL 32855
$4 for catalog.

John Richards
1040 Haven St.
Mt. Morris, MI 48458
$1 for catalog.

MKMC
Box 506
Newton, KS 67114
$2 for catalog; $3 per disk.

NGCCUG
P.O. Box 250
Clio, MI 48420
$1 for catalog; $6 per disk ($9 double-sided).

COMSIG Club
5838 Freemans Farm
San Antonio, TX 78233
SASE for info; $5 for details disk.

VAS
P.O. Box 4632
Huntsville, AL 35815
Double sided disk, 50 programs $7.50; SASE for catalog.

Schneider Software
440 West Green
West Hazelton, PA 18201
$4.95 per disk or 29 disks, 500+ programs for $39.95.

M&M Software
P.O. Box 3111
Terre Haute, IN 47803
Write for free list.

Knockout Software
P.O. Box 360-A
Pomona, NY 10970
Free catalog.

Futuresystems
Box 3040
Vista, CA 92083
$3 per volume; catalog for large SASE (specify computer).

CP/M

Poseidon Electronics
103 Waverly Place
New York, NY 10011
Catalog for SASE and $1.

AMIGA

Kinetic Designs Amigaware
1187 Dunbar Ct.
Orange Park, FL 32073
SASE for catalog; $9.95 per disk.

C™ COMMODORE-64

SOFTWARE-OF-THE-MONTH CLUB®

(division of O.C.S., Inc.)

We guarantee you'll never again buy useless software for your personal computer.

CLUB MEMBERSHIP OFFERS BIG SAVINGS
NO OBLIGATIONS

When you enroll you will

- Keep only the software that you can use. Examine for a full 10 days; if it's not what you want, return it for a full refund.
- Receive discounts up to 30% on your software choices.
- Be eligible for our Bonus Point Plan—additional discounts applied toward purchases.
- Receive our informative monthly newsletter full of helpful tips for getting the most from your Commodore-64.
- Receive notice of *Special Sales* where you'll save as much as 50% off list.

The Software-of-the-Month Club is Unique.
No minimum purchases are required—no automatic shipments to you.

Enroll now and receive *absolutely free* Public Domain Software.
Please check ☐ Cassette ☐ Disk

GREAT IDEA! I can't lose. Enroll me now in the Software-of-the-Month Club. I understand there is no obligation. Enclosed is my $10 membership fee.

☐ Check ☐ Money Order ☐ Bank Card

Name _____

Address _____

City/State/Zip _____

Visa/MC # _____ *Expiration date* _____

Signature _____

Cut out and mail today to

SOFTWARE-OF-THE-MONTH CLUB
Ohio Computer Services, Inc.
P.O. Box 128723
Cincinnati, Ohio 45212

3

Reader Service No. 242

ming techniques for the C-128. For those with BASIC programming experience who like to use PEEKs and POKEs, these two books offer a wealth of information.

The CP/M system distributed with the C-128 contains a major deficiency. There is no way to address the user port, so a modem or the Commodore RS232 adapter won't work. Commodore has fixed this problem and is currently claiming that they will send the upgraded operating system to all C-128 owners who mailed their CP/M-Digital Research registration cards. The card, distributed with the operating manual, is *not* the $19.95 special offer card that many users sent in. If you want the upgrade be sure you have mailed the right card.

CompuServe and QuantumLink are all offering the new operating system in their download areas. You must download the *NEWSYS* file to a C-64 format disk and then use a translation program (also available through download) to put the program on a C-128 CP/M disk. When the *NEWSYS* program is run, it modifies the CP/M system file on the CP/M disk. This means that you must have the old system file, *CPM+.SYS,* on the disk.

Once this is done, programs should be able to access the user port. The networks are also offering two modem programs, *IMP* and *XMODEM.* So it is worth it to get the new system if you want to download CP/M software. If you have an RS232 serial printer and want to hitch it to the user port the new system is a must.

Poseidon Electronics (see list) also has the new system and modem programs available on their CP/M software library disks. □



"Looks like little Joey has invented another game on his computer!"

IT'S NOT JUST KID STUFF.

While we *do* have a wide selection of children's educational and entertainment software, we also have a rapidly growing list of personal, business and programming software for not only the Commodore and the Atari, but also for the Apple II Series and the IBM. So don't pass us by just because you think we're only for kids. We're for you, too.

We're having a special sale, with up to 80% off selected software. Call now for a complete list.

Call toll-free outside Texas: 1–800–433-2938
– Inside Texas call: 817–292-7396

WEDGWOOD RENTAL
5316 Woodway Drive
Fort Worth, Texas 76133

Reader Service No. 243

LEROY'S CHEATSHEET®

NEW!! NEW!!

COMMODORE 128
KEYBOARD OVERLAYS
DIE-CUT — PLASTIC LAMINATED

Forget about constantly referring back to the manual for operating commands. Discover all the "special" commands buried in the manuals.
LEROY'S CHEATSHEETS™ are sturdy plastic laminated help sheets designed for use with popular software, hardware and languages for the C128 computer. Commands are grouped together for logical use. You learn and use your programs faster and easier.

FREE KEYBOARD EXTENDER
WITH EACH ORDER (A $2.95 VALUE)

only $7.95 each

☐ BASIC 7.0
☐ BLANKS (SET OF 3)
☐ DISK 1571
☐ EASY SCRIPT
☐ FLEET SYSTEM 2&3
☐ PAPER CLIP 128
☐ WORDPRO 128

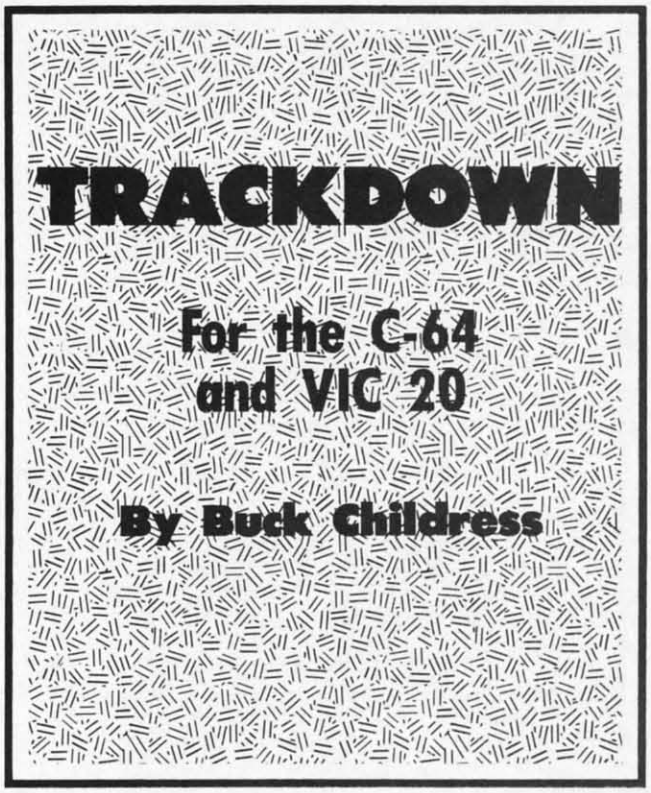
ahy 5

QTY. _____ X $7.95 = $ _____
SHIPPING $ 1.00 *
6% TAX (PA. ONLY) $ _____
TOTAL $ _____

* U.S. & CANADA $1.00
FOREIGN ORDERS $3.00
CHECK, M.O., MC/VISA
U.S. FUNDS NO C.O.D.

MC/VISA# _____
EXPIRATION DATE _____
NAME _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____

CHEATSHEET PRODUCTS INC.
P.O. Box 111368 Pgh., Pa. 15238
(412) 781-1551



If you're tired of sifting through endless program lines, looking for that long lost whatchamacallit, you'll love *Trackdown*. *Trackdown* is a short machine language program that instantly displays all of the line numbers for anything you seek, whether it's a single letter variable or a whole program line.

On the 64, *Trackdown* resides in an area of memory totally separate from BASIC, so you can load, save, and work on programs without disturbing it.

There's also a version for an unexpanded VIC 20. Since *Trackdown* uses only the top 180 bytes of VIC RAM, you still have over 3400 free bytes. As with the 64, you can load, save, and work on programs without disturbing *Trackdown*. All necessary POKEs needed to protect *Trackdown* from being overwritten by VIC BASIC programs are contained in the loader.

After running *Trackdown* (to get the ML data loaded), load the program you want to work on. Begin by entering whatever you want to find, in the form of a program line, as shown in this example:

```
0 GET#5,A$
```

Because *Trackdown* uses this line for comparison, the line number must be the lowest in the program. I prefer zero because it's the lowest possible line number and very few programs begin with it. If yours does, change it until you're through using *Trackdown*.

Let's say you want to find the sequence FORJ=1TO 1000. Just enter

```
0 FORJ=1TO1000
```

and press RETURN. Type SYS 53000 for the 64, or SYS 7500 for the VIC, then press RETURN. The numbers of all the lines that contain FORJ=1TO1000 will begin to appear on your screen. If you see the same line number more than one time, then it's entered on that line more than once.

Trackdown does count spaces. If you used spaces in the program, enter line zero with spaces:

```
0 FOR J = 1 TO 1000
```

You can shorten it to

```
0 FOR
```

and get the same line numbers plus the line numbers of all the other FOR-NEXT loops in your program.

Finding a variable, such as A=1, is done by entering:

```
0 A=1
```

Press RETURN, make the proper SYS, and there's the locations of A=1. Shortening it to

```
0 A=
```

returns the locations of the variable A, no matter what its value.

Trackdown really saves time when you want to find numbers, especially in long data lists. To find a certain number, say 169, enter

```
0 #169
```

Make sure to use the number sign. *Trackdown* will return all the numbers of the lines containing 169.

If you're looking for commands (keywords), don't shorten them. For example, if you want to find where PRINT appears, don't shorten it to:

```
0 PRI
```

The computer translates PRINT, POKE, GET, and other keywords into tokens.

When looking for a keyword that's contained within quotes (e.g.: I'll GET the car), put quotes in front of it:

```
0 "GET
```

In this case the word "GET" will be tracked instead of the GET command. The quotes at the beginning will prevent the keyword from being tokenized (in this case GET). *Do not* put quotes at the end. *Trackdown* doesn't like end quotes (kind of like spinach, I guess).

Remember, you can find anything, from a single character to a whole program line. Experiment with *Trackdown*. It's easy to use and really saves time. □

SEE PROGRAM LISTING ON PAGE 105

COMMODORE

MONITORS

1702



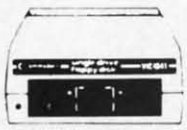
COMMODORE

$139.00

(RGB's Available)

DISK DRIVES

1541

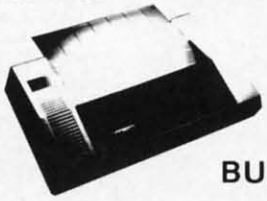


COMMODORE

$149.00

PRINTER

EPSON
WARRANTED



CR220

NOW RETAIL $200.00

$78.00

BUILT-IN INTERFACE

FREE TRIAL PERIOD

MODEMS POWER SUPPLY

For
The **C-64**



On Sale!



CALL for Special Pricing!

TUNERS

Turn your Monitor into a Color

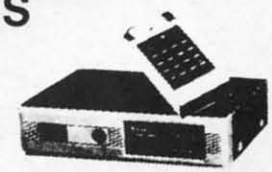


$99

CABLE TV

CONVERTERS

VHF CONVERTERS
JERROLD, OAK,
SCIENTIFIC,
ATLANTA, ZENITH



CALL TODAY FOR PRICE!!

PRO-TECH-TRONICS

Formally **T & D Electronics** • 6870 Shingle Creek Parkway #103 • Minneapolis, MN 55430

—*NEXT-DAY DELIVERY**—

CALL TODAY *IN STOCK ITEM

SCHOOL P.O.'s Accepted!

1-800-345-5080

SONY



3½" Single Sided Disks

Boxed in tens.

30+	50+	100+
1.72	1.69	1.65

Boxed in 100's, wrapped in 50's.

50+	100+
1.64	1.59



Nashua™

Boxed in tens	50+	100+
3½" SS	1.47	1.39
5¼" SS/DD	.84	.79
5¼" DS/DD	.89	.84
5¼" HD	2.14	2.09

RIBBONS

Sold in sixes, price each.

Epson MX-70/80	2.59
Epson MX-100	3.99
Epson LQ 1500	4.99
NEW Epson LX80	4.99
Okidata Micro 801/ 82A/83A/92/92	1.29
NEW Okidata 192/182	5.99
Okidata Micro 84/94	2.90
Diablo Hytype 11	3.19
NEC Spinwriter	5.29
C. Itoh Prowriter	3.09
APPLE IMAGEWRITER, Black	3.09
Color 6-Pack	4.75

ROLLTOP FILES



3½" model holds 55 . . . . . 17.49
(Retail Value $24.95)

5¼" model holds 120 . . . . . 24.99
(Retail Value $36.00)

CALL TOLL FREE 1 800 USA-FLEX

In Illinois 1 800-FOR-FLEX
or 1 (312) 351-9700

7 to 7 Central Time
10 to 3 Saturdays

USA FLEX

135 N. Brandon Drive Glendale Heights, IL 60139

Shipping/handling additional. Minimum order $50.00. Visa, MasterCard and Prepaid orders accepted. Corporations rated 3A2 or better and government accounts are accepted on a net 30 basis. C.O.D. orders add an additional $5.00 special handling charge. APO, FPO, AK, HI & PR orders add an additional 5% to the total order amount to cover PAL and insurance. No sales tax outside of Illinois.

Reader Service No. 268

NEW VERSION 2.0

THE MIRROR

THE MIRROR

DISK COPIER

$24.95

NO FINER OR MORE ADVANCED ARCHIVAL COPIER AVAILABLE AT ANY PRICE.
EASY TO USE. DOES NOT CAUSE DRIVE HEAD TO KNOCK.
COPIES UP TO 41 TRACKS.
PERIODIC UPDATE POLICY.
AUTOMATICALLY MAKES BACK-UP COPIES FROM VIRTUALLY ALL PROTECTED SOFTWARE.
NIBBLES, HALF TRACKS, COPIES EXTRA SECTORS AND EXTRA TRACKS.
REPRODUCES ALL DISK ERRORS AUTOMATICALLY.
FAST, COPIES FULL DISK IN AS LITTLE AS 4-7 MINS. EVEN COPIES ITSELF.

WE COPY MORE!
MASTERCARD, VISA, M.O. OR CHECK OK
+ $3 SHIPPING & HANDLING
C.O.D. OR FOREIGN ORDERS ADD $2
CALIF. ORDERS ADD 6% SALES TAX
— WRITE OR CALL —

Compumed

VISA

(408) 758-2436
P.O. BOX 6939
SALINAS, CA 93912
FOR COMMODORE 64 AND 1541 DRIVE
OR COMMODORE 128 AND 1571 DRIVE

Reader Service No. 269

COMPANIES MENTIONED IN *SCUTTLEBUTT*

For additional information on any of the products mentioned in this issue's *Scuttlebutt* section (see page 8), we recommend that you write or call the companies listed below directly.

Activision
2350 Bayshore Frontage Road
Mountain View, CA 94043
Phone: 415-960-0410

Addison-Wesley Publishing Co.
Reading, MA 01867
Phone: 617-944-3700

Bouncing Dog Software
P.O. Box 6753
Minneapolis, MN 55406
Phone: 612-729-7662

Brown-Wagh Publishing
1242 South Highland Avenue
Los Angeles, CA 90019
Phone: 213-936-5729

Cheatsheet Products, Inc.
P.O. Box 111368
Pittsburgh, PA 15238
Phone: 412-781-1551

Classic Image, Inc.
c/o Waxberg & Associates, Inc.
Shrewsbury Executive Center
1030 Broad Street
Shrewsbury, NJ 07701
Phone: 201-389-3633

Clinical Interviews
P.O. Box 69
Willard, NY 14558
Phone: 607-869-5955

Computer Friends
6415 SW Canyon Court, Suite #10
Portland, OR 97221
Phone: 503-297-2321

Free Spirit Software Inc.
5836 S. Mozart
Chicago, IL 60629
Phone: 312-476-3640

Howard W. Sams & Co.
4300 W. 62nd Street
Indianapolis, IN 46268
Phone: 317-298-5400

InfoBooks
P.O. Box 1018
Santa Monica, CA 90406
Phone: 213-470-6786

Juki Office Machine Corp.
Printer Division
20437 South Western Ave.
Torrance, CA 90501
Phone: 800-325-6134
(in CA 800-435-6315)

Knight-Ridder Newspapers, Inc.
One Herald Plaza
Miami, FL 33101
Phone: 305-376-3838

Micro R & D, Inc.
3333 S. Wadsworth Blvd., #A104
Lakewood, CO 80227
Phone: 303-985-4077

NoSync Development Corp.
#103-2334 Marpole Ave.
Port Coquitlam, B.C.
Canada V3C 2A2
Phone: 604-464-2983

Nu-Age Software
2311 28th Street North
St. Petersburg, FL 33713
Phone: 813-323-8389

Okidata
532 Fellowship Road
Mt. Laurel, NJ 08054
Phone: 609-235-2600

Prelco
14202 Gale Street
Tustin, CA 92680

Prism Software
401 Lake Air Dr., Suite D
Waco, TX 76710
Phone: 817-757-4031

PSIDAC
7326 N. Atlantic
Portland, OR 97217
Phone: 503-289-6254

SourceView Software Int'l
835 Castro Street
Martinez, CA 94553
Phone: 415-228-6220

Spectrum HoloByte Inc.
1050 Walnut, Suite 325
Boulder, CO 80302
Phone: 303-443-0191

Starpoint Software
122 South Broadway
Yreka, CA 96097
Phone: 916-842-6183

SubLOGIC Corporation
713 Edgebrook Drive
Champaign, IL 61820
Phone: 217-359-8482; orders 800-637-4983 except in IL, AK, HI

Tab Books, Inc.
Blue Ridge Summit, PA 17214
Phone: 717-794-2191

The Avalon Hill Game Co.
Microcomputer Games Division
4517 Harford Road
Baltimore, MD 21214
Phone: 301-254-9200

Tidal Bore Software
230 Pleasant Street
Truro, NS
Canada B2N 3S8
Phone: 902-895-4563

Timeworks
444 Lake Cook Road
Deerfield, IL 60015
Phone: 312-948-9200

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

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 C-128 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
[CLEAR]	Screen Clear	SHIFT	CLR/HOME	♥
[HOME]	Home		CLR/HOME	▌
[UP]	Cursor Up	SHIFT	↑ CRSR ↑	▀
[DOWN]	Cursor Down		↑ CRSR ↑	▄
[LEFT]	Cursor Left	SHIFT	← CRSR →	▐
[RIGHT]	Cursor Right		← CRSR →	▐
[SS]	Shifted Space	SHIFT	Space	■
[INSERT]	Insert	SHIFT	INST/DEL	▐
[DEL]	Delete		INST/DEL	▌
[RVSON]	Reverse On	CNTRL	9	■
[RVSOFF]	Reverse Off	CNTRL	0	■
[UPARROW]	Up Arrow		↑	↑
[BACKARROW]	Back Arrow		←	←
[PI]	PI		π	π
[EP]	English Pound		£	£

When You See	It Means	You Type		You Will See
[BLACK]	Black	CNTRL	1	■
[WHITE]	White	CNTRL	2	■
[RED]	Red	CNTRL	3	■
[CYAN]	Cyan	CNTRL	4	■
[PURPLE]	Purple	CNTRL	5	■
[GREEN]	Green	CNTRL	6	■
[BLUE]	Blue	CNTRL	7	■
[YELLOW]	Yellow	CNTRL	8	■
[F1]	Function 1		F1	■
[F2]	Function 2	SHIFT	F1	■
[F3]	Function 3		F3	■
[F4]	Function 4	SHIFT	F3	■
[F5]	Function 5		F5	■
[F6]	Function 6	SHIFT	F5	■
[F7]	Function 7		F7	■
[F8]	Function 8	SHIFT	F7	■

BUG REPELLENT By MICHAEL KLEINERT and DAVID BARRON

Bug Repellent is a checksum program used for proofreading BASIC listings typed in from *Ahoy!* magazine. For each program line you enter, *Bug Repellent* will produce a two-letter code that should match the code listed beside that line in the magazine.

Type in, save, and run the *Bug Repellent*. (If you have a C-64, type in the C-64 version. If you have a C-128, you will need to type in the C-64 version for use with C-64 programs, and the C-128 version for use with C-128 programs.) If you have typed in *Bug Repellent* properly, you will get the message BUG REPELLENT INSTALLED; otherwise you will get an error message. If you get an error message, double check the *Bug Repellent* program for typing mistakes. Type NEW and hit RETURN. Then type in and save, or load, the *Ahoy!* program you wish to check. Type in SYS 49152 for the C-64 version or SYS 3072 for the C-128 version and hit RETURN (this will begin execution of *Bug Repellent*). You will see the prompt SCREEN OR PRINTER ? Hit S if you want the codes listed on the screen, or P if you want them listed on the printer. To pause the listing depress and hold the SHIFT key.

Compare the codes your machine generates to those listed to the right of the corresponding program lines. If you spot a difference, that line contains an error. Write down the numbers of the lines where the contradictions occur. LIST each line, locate the errors, and correct them.

COMMODORE 64 VERSION

```
·100 FOR X = 49152 TO 49488:READY:S=S+Y                    AB
·110 IF Y<0 OR Y>255 THEN 130                              EA
·120 POKE X,Y:NEXT:GOTO140                                 ID
·130 PRINT"[CLEAR][DOWN]**ERROR**":PRINT"[DOWN
]PLEASE CHECK LINE"PEEK(64)*256+PEEK(63):END               ID
·140 IF S<>44677 THEN PRINT"[CLEAR][DOWN]**ERR
OR**":PRINT"[DOWN]PLEASE CHECK DATA LINES 170
-500":END                                                  HJ
·150 PRINT"[CLEAR]":POKE53280,0:POKE53281,6:PO
KE646,1                                                    NP
·160 PRINT"[RVSON][6" "]C-64 BUG REPELLENT INS
TALLED[6" "]"                                              LF
·170 DATA32,161,192,165,43,133,251,165,44,133              DL
·180 DATA252,160,0,132,254,32,37,193,234,177               DB
·190 DATA251,208,3,76,138,192,230,251,208,2                OF
·200 DATA230,252,76,43,192,76,73,78,69,32                  KN
·210 DATA35,32,0,169,35,160,192,32,30,171                  CA
·220 DATA160,0,177,251,170,230,251,208,2,230               CE
·230 DATA252,177,251,32,205,189,169,58,32,210              JE
·240 DATA255,169,0,133,253,230,254,32,37,193               CL
·250 DATA234,165,253,160,0,76,13,193,133,253               NB
·260 DATA177,251,208,237,165,253,41,240,74,74              MB
·270 DATA74,74,24,105,65,32,210,255,165,253                EP
·280 DATA 41,15,24,105,65,32,210,255,169,13                GH
·290 DATA32,220,192,230,63,208,2,230,64,230                AN
·300 DATA251,208,2,230,252,76,11,192,169,153               NG
·310 DATA160,192,32,30,171,166,63,165,64,76                BF
·320 DATA231,192,96,76,73,78,69,83,58,32                   EP
·330 DATA0,169,247,160,192,32,30,171,169,3                 PJ
·340 DATA133,254,32,228,255,201,83,240,6,201               FK
·350 DATA80,208,245,230,254,32,210,255,169,4               FL
·360 DATA166,254,160,255,32,186,255,169,0,133              CL
·370 DATA63,133,64,133,2,32,189,255,32,192                 GC
·380 DATA255,166,254,32,201,255,76,73,193,96               NN
·390 DATA32,210,255,173,141,2,41,1,208,249                 NH
·400 DATA96,32,205,189,169,13,32,210,255,32                IM
·410 DATA204,255,169,4,76,195,255,147,83,67                KC
·420 DATA82,69,69,78,32,79,82,32,80,82                     DC
·430 DATA 73,78,84,69,82,32,63,32,0,76                     ML
·440 DATA44,193,234,177,251,201,32,240,6,138               GN
·450 DATA113,251,69,254,170,138,76,88,192,0                JK
·460 DATA0,0,0,230,251,208,2,230,252,96                    NA
·470 DATA170,177,251,201,34,208,6,165,2,73                 DM
·480 DATA255,133,2,165,2,208,218,177,251,201               JA
·490 DATA32,208,212,198,254,76,29,193,0,169                FM
·500 DATA13,76,210,255,0,0,0                               PA
```

COMMODORE 128 VERSION

```
·100 FAST:FOR X = 3072 TO 3520:READ Y:POKE X,Y
:S=S+Y:TRAP110:NEXT:SLOW                                   IH
·110 SLOW:IF S<>49057 THEN PRINT"[CLEAR][DOWN]
**ERROR**":PRINT"[DOWN]PLEASE CHECK DATA LINE
S 140-390":END                                             JA
·120 PRINT"[CLEAR][DOWN]  C-128 BUG REPELLENT
INSTALLED"                                                 II
·130 PRINT"[4" "]TYPE SYS 3072 TO ACTIVATE"                IN
·140 DATA 32,161,12,165,45,133,251,165,46,133,
252,160,0,132,254,32,37                                    OF
·150 DATA 13,234,177,251,208,3,76,138,12,230,2
51,208,2,230,252,76,43                                     NC
·160 DATA 12,76,73,78,69,32,35,32,0,169,35,160
,12,32,80,13,160,0,177                                     OL
·170 DATA 251,170,230,251,208,2,230,252,177,25
1,32,89,13,169,58,32,98                                    EF
·180 DATA 13,169,0,133,253,230,254,32,37,13,23
4,165,253,160,0,76,13                                      JO
·190 DATA 13,133,253,177,251,208,237,165,253,4
1,240,74,74,74,74,24                                       LC
·200 DATA 105,65,32,98,13,165,253,41,15,24,105
,65,32,98,13,169,13,32                                     DE
·210 DATA 220,12,230,65,208,2,230,66,230,251,2
08,2,230,252,76,11,12                                      GM
·220 DATA 169,153,160,12,32,80,13,166,65,165,6
6,76,231,12,96,76,73,78                                    CP
·230 DATA 69,83,58,32,0,169,247,160,12,32,80,1
3,169,3,133,254,32,107                                     HC
·240 DATA 13,201,83,240,6,201,80,208,245,230,2
54,32,98,13,169,4,166                                      GK
·250 DATA 254,160,255,32,116,13,169,0,133,65,1
33,66,133,250,32,125,13                                    LB
·260 DATA 32,134,13,166,254,32,143,13,76,73,13
,96,32,98,13,165,211                                       JF
·270 DATA 234,41,1,208,249,96,32,89,13,169,13,
32,98,13,32,152,13,169,4                                   GD
·280 DATA 76,161,13,147,83,67,82,69,69,78,32,7
9,82,32,80,82,73,78,84,69                                  PL
·290 DATA 82,32,63,32,0,76,44,13,234,177,251,2
01,32,240,6,138,113,251,69                                 OK
·300 DATA 254,170,138,76,88,12,0,0,0,0,230,251
,208,2,230,252,96,170,177                                  FJ
·310 DATA 251,201,34,208,6,165,250,73,255,133,
250,165,250,208,218,177                                    GA
·320 DATA 251,201,32,208,212,198,254,76,29,13,
0,169,13,76,98,13,0,0,32                                   FI
·330 DATA 170,13,32,226,85,76,180,13,32,170,13
,32,50,142,76,180,13,32                                    OF
·340 DATA 170,13,32,210,255,76,180,13,32,170,1
3,32,228,255,76,180,13,32                                  AK
·350 DATA 170,13,32,186,255,76,180,13,32,170,1
3,32,189,255                                               BP
·360 DATA 76,180,13,32,170,13,32,192,255,76,18
0,13,32,170,13                                             FP
·370 DATA 32,201,255,76,180,13,32,170,13,32,20
4,255,76,180,13,32,170                                     ID
·380 DATA 13,32,195,255,76,180,13,133,67,169,0
,141,0,255,165,67,96                                       BJ
·390 DATA 133,67,169,0,141,1,255,165,67,96,0,0
,0                                                         IF
```

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 previous 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.

```
LL ·100 POKE53280,12:POKE53281,11
ED ·105 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[15" "]";
   ·110 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY PROGRAM[6" "
   ]"
MC ·115 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[9" "]"
DM ·120 PRINT"[RVSON][3" "]COPR. 1984, ION INTERNATIONAL INC.
   [3" "]"
DH ·125 FORA=54272TO54296:POKEA,0:NEXT
IM ·130 POKE54272,4:POKE54273,48:POKE54277,0:POKE54278,249:PO
   KE54296,15
NH ·135 FORA=680TO699:READB:POKEA,B:NEXT
KO ·140 DATA169,251,166,253,164,254,32,216,255,96
HJ ·145 DATA169,0,166,251,164,252,32,213,255,96
JB ·150 B$="STARTING ADDRESS IN HEX":GOSUB430:AD=B:SR=B
HC ·155 GOSUB480:IFB=0THEN150
FO ·160 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16
KE ·165 B$="ENDING ADDRESS IN HEX":GOSUB430:EN=B
IF ·170 GOSUB470:IFB=0THEN150
FP ·175 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16
MN ·180 IFB>255THENB=B-255:POKE254,PEEK(254)+1
GE ·185 POKE253,B:PRINT
HN ·190 REM  GET HEX LINE
IL ·195 GOSUB495:PRINT": [c P][LEFT]";:FORA=0TO8
FG ·200 FORB=0TO1:GOTO250
MD ·205 NEXTB
ME ·210 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN340
LH ·215 PRINT" [c P][LEFT]";
IK ·220 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "
PD ·225 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255
LK ·230 NEXT
IA ·235 IFA%(8)<>TTHENGOSUB375:GOTO195
FK ·240 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOTO195
MN ·245 REM    GET HEX INPUT
AB ·250 GETA$:IFA$=""THEN250
HO ·255 IFA$=CHR$(20)THEN305
GC ·260 IFA$=CHR$(133)THEN535
MD ·265 IFA$=CHR$(134)THEN560
KF ·270 IFA$=CHR$(135)THENPRINT" ":GOTO620
GE ·275 IFA$=CHR$(136)THENPRINT" ":GOTO635
BJ ·280 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55:GOTO295
GM ·285 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48:GOTO295
LE ·290 GOSUB415:GOTO250
LL ·295 PRINTA$"[c P][LEFT]";
OA ·300 GOTO205
CG ·305 IFA>0THEN320
OP ·310 A=-1:IFB=1THEN330
OB ·315 GOTO220
CJ ·320 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A-1
HG ·325 A=A-1
BE ·330 PRINTCHR$(20);:GOTO220
KH ·335 REM LAST LINE
AD ·340 PRINT" ":T=AD-(INT(AD/256)*256)
GJ ·345 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255
PL ·350 NEXT
IA ·355 IFA%(A)<>TTHENGOSUB375:GOTO195
KF ·360 FORB=0TOA-1:POKEAD+B,A%(B):NEXT
HN ·365 PRINT:PRINT"YOU ARE FINISHED!":GOTO535
ON ·370 REM BELL AND ERROR MESSAGES
FL ·375 PRINT:PRINT"LINE ENTERED INCORRECTLY":PRINT:GOTO415
DH ·380 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":GOTO415
JA ·385 PRINT:PRINT"ENDING IS LESS THAN STARTING!":B=0:GOTO41
   5                                                          HD
   ·390 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED RANGE!":B=0:
   GOTO415                                                    AG
MC ·395 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:GOTO415        KN
DM ·400 PRINT"?ERROR IN SAVE":GOTO415                         EI
   ·405 PRINT"?ERROR IN LOAD":GOTO415                         GL
DH ·410 PRINT:PRINT:PRINT"END OF ML AREA":PRINT               PG
IM ·415 POKE54276,17:POKE54276,16:RETURN                      BH
   ·420 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:PRINTA$:RETURN      IM
NH ·425 REM GET FOUR DIGIT HEX                                PC
KO ·430 PRINT:PRINTB$;:INPUTT$                                GM
HJ ·435 IFLEN(T$)<>4THENGOSUB380:GOTO430                      II
JB ·440 FORA=1TO4:A$=MID$(T$,A,1):GOSUB450:IFT(A)=16THENGOSUB
   380:GOTO430                                                AD
FO ·445 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+T(4):RETURN   GF
KE ·450 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-55:RETURN           EH
IF ·455 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-48:RETURN           KP
FP ·460 T(A)=16:RETURN                                        NP
MN ·465 REM ADRESS CHECK                                      LI
GE ·470 IFAD>ENTHEN385                                        MI
HN ·475 IFB<SRORB>ENTHEN390                                   MG
IL ·480 IFB<256OR(B>40960ANDB<49152)ORB>53247THEN395          MI
FG ·485 RETURN                                                IM
MD ·490 REM ADDRESS TO HEX                                    EB
ME ·495 AC=AD:A=4096:GOSUB520                                 HG
LH ·500 A=256:GOSUB520                                        CE
IK ·505 A=16:GOSUB520                                         PN
PD ·510 A=1:GOSUB520                                          MJ
LK ·515 RETURN                                                IM
IA ·520 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):GOTO530            CJ
FK ·525 A$=CHR$(T+48)                                         JP
MN ·530 PRINTA$;:AC=AC-A*T:RETURN                             AC
AB ·535 A$="**SAVE**":GOSUB585                                AI
HO ·540 OPEN1,T,1,A$:SYS680:CLOSE1                            LH
GC ·545 IFST=0THENEND                                         EO
MD ·550 GOSUB400:IFT=8THENGOSUB420                            FJ
KF ·555 GOTO535                                               FF
GE ·560 A$="**LOAD**":GOSUB585                                AB
BJ ·565 OPEN1,T,0,A$:SYS690:CLOSE1                            MF
GM ·570 IFST=64THEN195                                        JH
LE ·575 GOSUB405:IFT=8THENGOSUB420                            CM
LL ·580 GOTO560                                               FO
OA ·585 PRINT" ":PRINTTAB(14)A$                               FG
CG ·590 PRINT:A$="":INPUT"FILENAME";A$                        OM
OP ·595 IFA$=""THEN590                                        GF
OB ·600 PRINT:PRINT"TAPE OR DISK?":PRINT                      DF
CJ ·605 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+A$:RETURN          IG
HG ·610 IFB$<>"T"THEN605                                      FN
BE ·615 RETURN                                                IM
KH ·620 B$="CONTINUE FROM ADDRESS":GOSUB430:AD=B              DK
AD ·625 GOSUB475:IFB=0THEN620                                 MA
GJ ·630 PRINT:GOTO195                                         OI
PL ·635 B$="BEGIN SCAN AT ADDRESS":GOSUB430:AD=B              FH
IA ·640 GOSUB475:IFB=0THEN635                                 NK
KF ·645 PRINT:GOTO670                                         DI
HN ·650 FORB=0TO7:AC=PEEK(AD+B):GOSUB505:IFAD+B=ENTHENAD=SR:G
   OSUB410:GOTO195                                            BK
FL ·655 PRINT" ";:NEXTB                                       EC
DH ·660 PRINT:AD=AD+8                                         GN
JA ·665 GETB$:IFB$=CHR$(136)THEN195                           MN
   ·670 GOSUB495:PRINT": ";:GOTO650                           JD
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 83 and 84 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

NOW HEAR THIS
FROM PAGE 67

Use of an assembler required for entry! See introductory article.

MUSIC.S

```
 1 *
 2 * MUSIC2
 3 *
 4           ORG   $8000
 5 *
 6 SFDX      EQU   $CB
 7 *
 8 CINV      EQU   $314
 9 USERADD   EQU   $311
10 *
11 GETIN     EQU   $FFE4
12 *
13 SIGVOL    EQU   $D418
14 ATDCY1    EQU   $D405
15 PWHI1     EQU   $D403
16 PWLO1     EQU   $D402
17 SUREL1    EQU   $D406
18 FREHI1    EQU   $D401
19 FRELO1    EQU   $D400
20 VCREG1    EQU   $D404
21 *
22 TIMER     EQU   $FB
23 CHAR      EQU   TIMER+1
24 *
25           JMP   INIT
26 *
27 MATRIX    DFB   62,10,9
28           DFB   13,18,17
29           DFB   21,22,26
30           DFB   29,30,34
31           DFB   33,37,38
32           DFB   42,45,46
33           DFB   50,49,53
34 *
35 HIFREQ    DFB   13,14,14
36           DFB   15,16,17
37           DFB   18,19,21
38           DFB   22,23,25
39           DFB   26,28,29
40           DFB   31,33,35
41           DFB   37,39,42
42 *
43 LOFREQ    DFB   78,24,239
44           DFB   210,195
45           DFB   195,209
46           DFB   239,31,96
47           DFB   181,30
48           DFB   156,49
49           DFB   223,165
50           DFB   135,134
51           DFB   162,223
52           DFB   62
53 *
54 * CLEAR SOUND REGISTERS
55 *
56 *
57 INIT      LDA   #0
58           LDX   #$18
59 CLOOP     STA   $D400,X
60           DEX
61           BNE   CLOOP
62 *
63 * SET UP TIMER
64 *
65           LDA   #60
66           STA   TIMER
67 *
68 * SET UP INTERRUPT
69 *
70           LDA   CINV
71           STA   USERADD
72           LDA   CINV+1
73           STA   USERADD+1
74           SEI
75           LDA   #<WAIT
76           STA   CINV
77           LDA   #>WAIT
78           STA   CINV+1
79           CLI
80 *
81 * SET REGISTERS
82 *
83           LDA   #15
84           STA   SIGVOL
85           LDA   #9
86           STA   ATDCY1
87           LDA   #0
88           STA   SUREL1
89           STA   PWHI1
90           LDA   #255
91           STA   PWLO1
92           LDA   #64
93           STA   VCREG1
94 *
95 GETKEY    LDA   SFDX
96           CMP   #64
97           BNE   SKIP
98           LDA   #0
99           STA   CHAR
100          JMP   GETKEY
101 *
102 SKIP     LDX   #20
103 CHECK    CMP   MATRIX,X
104          BEQ   PLAY
105          DEX
106          BPL   CHECK
107          JMP   GETKEY
108 *
109 PLAY     CMP   CHAR
110          BNE   CONT
111          JMP   GETKEY
112 *
113 CONT     STA   CHAR
114          LDA   #60
115          STA   TIMER
116          LDA   #64
117          STA   VCREG1
118          LDA   HIFREQ,X
119          STA   FREHI1
120          LDA   LOFREQ,X
121          STA   FRELO1
122          LDA   #65
123          STA   VCREG1
124          JMP   GETKEY
125 *
126 WAIT     LDX   TIMER
127          DEX
128          BNE   RETURN
129          LDA   #64
130          STA   VCREG1
131          LDX   #0
132 RETURN   STX   TIMER
133          JMP   (USERADD)
```

GOT A MATCH
FROM PAGE 30

```
·5 REM"[6" "][c A][14"[s *]"][c S]                    GC
·6 REM"[6" "][s -] GOT A MATCH? [s -]                 FC
·7 REM"[6" "][c Z][14"[s *]"][c X]                    FO
·8 REM"[5" "]BY  WALTER E. MEYERS                     GB
·9 REM"  403 CARRIAGE LANE, CARY, NC                  HF
·10 POKE 53269,0:POKE 53272,21:POKE 648,4
  :POKE 56576,PEEK(56576)OR 3:GOTO 100                BJ
·20 POKE 198,0:WAIT 198,1:I=PEEK(631):POK
  E 198,0:RETURN                                      JE
·30 POKE S+24,15:POKE S+5,45:POKE S+6,165
  :POKE S+4,33:POKE S+1,6:POKE S,5                    PJ
```

```
·35 FOR T=1 TO 100:NEXT:POKE S+4,32:POKE S+4,16:RETURN OE
·40 POKE S+24,15:POKE S+6,247:POKE S+4,17:POKE S+1,40:GOTO 35 FA
·50 POKE 781,LN:POKE 782,COL:POKE 783,0:SYS 65520:RETURN DH
·60 FOR I=S TO S+24:POKE I,0:NEXT:RETURN BG
·70 PRINT"[CLEAR]" PL$ N$(K):RETURN FN
·80 POKE V+6,144:POKE V+16,0:POKE V+21,8:RETURN JD
·90 N=INT(RND(0)*D+1):RETURN PC
·99 REM          INITIALIZE JN
·100 SC=53281:BO=53280:POKE SC,15:POKE BO,15:PRINT"[CLEAR][DOWN][DOWN][c 4][5" "]ONE MOMENT, PLEASE." NC
·110 FOR MUSIC=1 TO 124:READ A:NEXT JK
·120 FOR TYPE=49152 TO 49184:READ A:POKE TY,A:NEXT AI
·130 FOR SPRITE=49216 TO 49599:READ A:POKE SP,A:NEXT EH
·140 FOR JOYSTICK=49600 TO 49736:READ A:POKE JO,A:NEXT KB
·150 V=53248:POKE V+23,53:POKE V+29,48:FOR I=1 TO 6:POKE 52215+I,I:NEXT IA
·160 POKE V,255:POKE V+2,255:POKE V+4,254:POKE V+8,242:POKE V+9,194 ML
·170 POKE V+10,245:POKE V+11,236:POKE V+39,7:POKE V+40,7:POKE V+41,8:POKE V+42,7 PL
·180 POKE V+43,8:POKE V+44,14:S=54272 KH
·190 DIM T$(19):P=2:GOTO 1000 CK
·198 : DI
·199 REM  INSTRUCTIONS IP
·200 PRINT"[CLEAR][4"[DOWN]"][c 4][s B]ERZERKONS COME IN FOUR DIFFERENT KINDS,"SPC(6)"AND IN A "; CL
·210 PRINT"VARIETY OF COLORS.":PRINT"[DOWN][s H]ERE THEY ARE:":PRINT:PRINTTAB(2)NM$(1); PN
·220 PRINTTAB(13) NM$(2) TAB(22) NM$(3) TAB(32) NM$(4):PRINTTAB(4) BZ$(1); EH
·230 PRINTTAB(14) BZ$(2) SPC(8) BZ$(3) SPC(8) BZ$(4):PRINT:PRINT:PRINT IF
·240 PRINT SK$ " [s H]IT ANY KEY WHEN Y'ALL'RE DONE"SPC(10)"STUDYIN' AND ARE READY"; MP
·250 PRINT" TO PLAY.":GOSUB 20 CB
·398 : DI
·399 REM  INPUT GG
·400 PRINT"[CLEAR][DOWN][DOWN][c 4][s H]OW MANY FOLKS'LL BE PLAYIN'" NG$:SU$="":CN$="":VB$="IS" IG
·410 GOSUB 20:NP=I-48:IF(NP<1)OR(NP>9)THEN 410 DF
·420 PRINT"[DOWN][DOWN][s N]UMBER OF PLAYERS ="NP:PRINT:PRINT ID
·430 PRINT SK$ "[s P]ICK A DIFFICULTY LEVEL BY HITTING[6"[RIGHT]"]A NUMBER KEY.":PRINT JL
·440 PRINTTAB(9)"[BLACK][s E]ASY"SPC(17)"[s H]ARD" SPC(15)"[RED][c Q][s *][s *][s +][s *][s *][s +][s *][s *][s +][s *][s *][s +][s *][s *][s +][s *][s *][s +][s *][s *][c W]" GK
·450 PRINTTAB(9)"[BLACK]1  2  3  4  5  6  7  8  9" II
·460 GOSUB 20:IF (I<49)OR(I>57) THEN 460 OO
·470 I=I-48:D(1)=I+3:I=60-(I*5):CY=INT(2.5*I) CO
·480 PRINT"[DOWN][DOWN]"SK$ "[s H]IT ANY KEY WHEN YOU'RE READY TO [7"[RIGHT]"]START.":GOSUB20 HA
·498 : DI
·499 REM  MAIN LOOP FA
·500 C$="1[BLACK]2[WHITE]3[RED]4[PURPLE]5[GREEN]6[BLUE]":FOR K=1 TO NP:POKE BO,0:POKE SC,15:FOR I=1 TO 4:D=D(1) JE
·510 GOSUB 90:Z(I)=N:IN(I)=20-Z(I):D=6:GOSUB 90:Z$(I)=MID$(C$,(N*2)-1,2) CE
·520 RZ$(I)=RIGHT$(Z$(I),1):NEXT:PRINT"[RED]":GOSUB 70:PRINT:PRINT:FOR I=1 TO 4 DN
·530 PRINTTAB(IN(I));:FOR J=1TOZ(I):PRINT RZ$(I) BZ$(I);:NEXT:PRINT:PRINT:NEXT OE
·540 FOR I=1 TO 4:PRINT:NEXT:LN=17:COL=30:GOSUB 50:PRINT M$:POKE V+21,53 BF
·550 VE=144:FOR I=1 TO 15:POKE V+1,VE+2:POKE V+5,VE:FOR J=1 TO 10:POKE 52216,P EO
·560 P=3-P:FOR T=1 TO CY:NEXT:NEXT:VE=VE+1:NEXT:POKE V+21,0 AE
·570 POKE SC,0:PRINT"[CLEAR][CYAN]":GOSUB 70:PRINT"[HOME]"TAB(19)"[YELLOW][RVSOFF][s M]OVE THE POINTER TO" GN
·580 PRINTTAB(19)"YOUR ANSWER AND HIT":PRINTTAB(19)"THE FIRE BUTTON.[CYAN]" NJ
·590 PS$=STR$(PS(K)*10):PRINT" [RVSON] SCORE "PS$"[RVSON]  [c 8]":PRINT FI
·600 FOR I=1 TO 4:LN=9:COL=5:GOSUB 50:PRINT"[s H]OW MANY " NM$(I) "?[3" "]":GOSUB 80 MC
·610 PRINT "[DOWN] 1  2  3  4  5  6  7  8  9 10 11 12":POKE V+7,147:POKE 49152,24 AF
·620 POKE 49153,24:POKE 49154,34:POKE 49155,10:POKE 49156,240:SYS 49600 IF
·630 IF PEEK(V+16)=8 THEN AN=INT(PEEK(V+6)/34)+11:GOTO 650 ' PA
·640 AN=INT((PEEK(V+6)-11)/24)+1 LG
·650 IF AN=Z(I) THEN GOSUB 40:PS(K)=PS(K)+1:GOTO 670 GJ
·660 GOSUB 30 BC
·670 GOSUB 80:LN=15:COL=5:GOSUB 50:PRINT"[s W]HAT COLOR?" DG
·680 PRINT"[DOWN]BLACK  WHITE[3" "]RED  PURPLE  GREEN  BLUE":POKE V+7,197:POKE 49152,56 AF
·690 POKE 49153,32:POKE 49154,56:POKE 49155,0:POKE 49156,200:SYS 49600 LP
·700 HO=PEEK(V+6)-24:IF PEEK(V+16)=8 THEN
```

```
  HO=HO+255                                                    HD
·710 AN=INT(HO/52+1):IF AN=VAL(Z$(I)) THE
  N GOSUB 40:PS(K)=PS(K)+1:GOTO 730                            PE
·720 GOSUB 30                                                  BC
·730 NEXT:POKE V+21,0:NEXT:POKE V+21,0:GM
  =GM+1:IF GM<6 THEN 500                                       CK
·798 :                                                         DI
·799 REM    PRINT SCORES, NEW/END GAME                         CJ
·800 PRINT"[CLEAR][BLUE]":POKE SC,15:POKE
  BO,15:LN=2:COL=9:GOSUB 50:PRINT ES$:PRI
  NT                                                           HE
·805 FOR I=1 TO NP:PRINTTAB(13)"[c 4][s P
  ]LAYER" I "[LEFT]:" PS(I)*10:X(I)=PS(I):
  NEXT                                                         ML
·810 FOR J=1 TO NP:FOR I=1 TO NP:IF X(J)<
  PS(I) THEN X(J)=0                                            JL
·820 NEXT:NEXT                                                 EF
·825 FOR J=1 TO NP:FOR I=1 TO NP                               PL
·830 IF X(J)<>0THEN IF J<>ITHEN IF X(J)=P
  S(I)THEN SU$="S":CN$="AND":VB$="[3"[LEFT
  ]"]ARE"                                                      KD
·840 NEXT:NEXT:PRINT"[DOWN][DOWN][s P]LAY
  ER" SU$;                                                     OB
·845 FOR I=1 TO NP:IF X(I)<>0 THEN PRINT
  I;CN$;                                                       NO
·850 NEXT:PRINT VB$" THE WINNER" SU$ "!"                       JP
·860 PRINT"[DOWN]  [s H]IT [RED][s Y][c 4
  ] IF Y'ALL WANT TO PLAY AGAIN OR" R$ TAB
  (9)"ANY OTHER KEY";                                          FB
·870 PRINT" TO END.":GOSUB 20:IF I=89 THE
  N GM=0:NG$=" THIS TIME?":GOTO 400                            DL
·880 GOSUB 60:POKE 53272,21:POKE 648,4:PO
  KE 56576,PEEK(56576) OR 3:PRINT"[CLEAR][
  c 7]"                                                        OO
·890 POKE SC,6:POKE BO,14:CLR:NEW:END                          FH
·998 :                                                         DI
·999 REM  LOAD FONT                                            DG
·1000 POKE 56334,PEEK(56334) AND 254:POKE
  1,PEEK(1) AND 251:SYS 49152                                  ID
·1010 POKE 1,PEEK(1) OR 4:POKE 56334,PEEK
  (56334) OR 1                                                 AH
·1020 READ A:IF A<0 THEN 1040                                  KI
·1030 FOR I=0 TO 7:READ B:POKE 61440+(A*8
  )+I,B:NEXT:GOTO 1020                                         OC
·1040 FOR IRQ=53236 TO 53245:READ A:POKE
  IRQ,A:NEXT                                                   EG
·1050 POKE 53246,PEEK(792):POKE 53247,PEE
  K(793):POKE 792,244:POKE 793,207                             KK
·1098 :                                                        DI
·1099 REM  STRINGS                                             AD
·1100 T0$="[RVSON][c 2][c M][15" "][WHITE
  ][c B]":T1$="[RVSON][c 2][c M]  ":T2$="[
  3" "][WHITE] [RVSOFF][c 4][c K]"                             KJ
·1110 T$(1)=" [s U][s I][s U][s I][c R] [
  s U][s I] ":T$(2)=" [s B][c S][3"[s B]"]
   [c Q][c W] ":T$(3)=" [s J][c X][s J][s
  K][s E] [s E][s E] "                                         LF
·1120 T$(4)="[c A][c R][s I][s U][s I][c
  R][s U][s I][s A][s A]":T$(5)="[3"[s B]"
  ][c Q][c W][s B][s B] [c Q][c W]":T$(6)=
  "[6"[s E]"][s J][s K][s E][s E]"                             PN
·1130 T$(7)="[3" "][c A][3"[s *]"][c S]
  ":T$(8)="  [c A][s K][s U][s *][s I][s J
  ][c S] ":T$(9)="  [s B]  [c A][s K] [s B
  ] "                                                          EJ
·1140 T$(10)="  [c Z][s I] [s Q] [s U][c
  X] ":T$(11)="[3" "][c Z][3"[s *]"][c X]
   ":T$(12)="  A TALE  "                                       PK
·1150 T$(13)="  OF THE  ":T$(14)=" OLD WE
  ST ":T$(15)="[10" "]":T$(16)=T$(15)                          BM
·1160 T3$="[RVSON][c 2][c V][RVSOFF][15"
  "][WHITE][s @][c 4][c K]":T4$="[c C][RVS
  ON][16"[c I]"][RVSOFF][c V]"                                 LM
·1170 G$="[39" "]":SK$="[WHITE][c Z][s *]
  [RVSON][s Q][s Q][RVSOFF][s *][c X][DOWN
  ][4"[LEFT]"][RVSON][c F][c D][RVSOFF][RI
  GHT][RIGHT][UP][c 4]"                                        MI
·1180 C1$="[GREEN][RVSON] [UP][LEFT] [UP]
  [3"[LEFT]"] [c U] [c U] [UP][5"[LEFT]"]
  [RIGHT] [RIGHT] [UP][5"[LEFT]"] [RIGHT]
  [RIGHT] [UP][3"[LEFT]"] [RIGHT] [UP][3"[
  LEFT]"] [UP][LEFT] [UP][LEFT] "                              CG
·1190 C2$="[GREEN][c K][UP][RVSON][LEFT][
  c D][c I][UP][3"[LEFT]"][c I][RVSOFF][c
  K][RVSON][c K][UP][3"[LEFT]"][RVSOFF][c
  K][c K][c D][UP][LEFT][LEFT][RVSOFF][c K
  ][5"[DOWN]"]"                                                BC
·1200 BZ$(1)="[RVSON]&'[DOWN][LEFT][LEFT]
  *+[UP]":BZ$(2)="[RVSON]$%[DOWN][LEFT][LE
  FT]*+[UP]":BZ$(3)="[RVSON]!#[DOWN][LEFT]
  [LEFT]*+[UP]":NM$(2)="[s M]OES"                              DC
·1210 BZ$(4)="[RVSON]()[DOWN][LEFT][LEFT]
  *+[UP]":NM$(1)="[s L]ARRIES":NM$(3)="[s
  C]URLIES":NM$(4)="[s S]HEMPS"                                IN
·1230 N$(1)=" [c S] [DOWN][3"[LEFT]"] [s
  B] [DOWN][3"[LEFT]"] [s E] ":N$(2)="[s U
  ][s I] [DOWN][3"[LEFT]"][s U][s K] [DOWN
  ][3"[LEFT]"][c Z][s C] "                                     CE
·1240 N$(3)="[s U][s I] [DOWN][3"[LEFT]"]
  [s D][c J] [DOWN][3"[LEFT]"][s J][s K] "
  :N$(4)="[s A][s A] [DOWN][3"[LEFT]"][c Z
  ][c W] [DOWN][3"[LEFT]"] [s E] "                             OH
·1250 N$(5)="[c A][s C] [DOWN][3"[LEFT]"]
  [c Z][s I] [DOWN][3"[LEFT]"][s J][s K] "
  :N$(6)="[s U][s I] [DOWN][3"[LEFT]"][c Q
  ][s I] [DOWN][3"[LEFT]"][s J][s K] "                         KO
·1260 N$(7)="[c A][c S] [DOWN][3"[LEFT]"]
   [s B] [DOWN][3"[LEFT]"] [s E] ":N$(8)="
  [s U][s I] [DOWN][3"[LEFT]"][s W][c J] [
  DOWN][3"[LEFT]"][s J][s K] "                                 NC
·1270 N$(9)="[s U][s I] [DOWN][3"[LEFT]"]
  [s J][c W] [DOWN][3"[LEFT]"][s J][s K] "
  :NG$="?":M$="[c 2][c K][DOWN][LEFT][c K]
  [DOWN][LEFT][c K][c 4]":R$=CHR$(13)                          KK
·1280 PL$="[RVSON] [c A][s I][s A] [s U][
  s I][s A][s A][c A][s C][c A][s I] "+R$+
```

```
"[RVSON] [c Q][s K][s B] [c Q][c W][s J]
[c W][c Q][s C][c Q][c J] "+R$+"[RVSON]
[s E] [c Z][s C][s E][s E] [s E][c Z][s
C][s E][s E] [UP][UP]"                          DN
·1290 ES$=SK$+"[c D][7"[c I]"][c F][DOWN]
[9"[LEFT]"][RVSON][c K][s Q][s S]CORE[s
Q][RVSOFF][c K][DOWN][9"[LEFT]"][c C][RV
SON][7"[c I]"][RVSOFF][c V][UP][UP]"+SK$
+"[DOWN][DOWN]"                                 HC
·1298 :                                         DI
·1299 REM  PRINT TITLE                          AJ
·1300 PRINT"[CLEAR]":POKE 648,200:COL=0:F
OR I=12 TO 16:LN=I:GOSUB 50:PRINT"[RVSON
][YELLOW]" G$:NEXT                              OD
·1310 COL=4:LN=15:GOSUB 50:PRINT C1$:COL=
35:LN=13:GOSUB 50:PRINT C2$                     JF
·1320 COL=10:LN=2:GOSUB 50:PRINT T0$:FORI
=1 TO 16:PRINTTAB(10)T1$ T$(I) T2$:NEXT         JN
·1330 PRINTTAB(10)T3$:PRINTTAB(10)T4$:POK
E 53272,44:POKE 56576,PEEK(56576)AND252         OD
·1340 POKE SC,15:POKE BO,15:GOSUB 1400          OG
·1350 PRINT SK$ "[s H]IT [RED][s I][c 4]
FOR [s I]NSTRUCTIONS, OR ANY ";                 FO
·1360 PRINT SPC(12) "OTHER KEY TO SKIP TH
EM. ":GOSUB 20:IF I=73 THEN 200                 AK
·1370 GOTO 400                                  DI
·1398 :                                         DI
·1399 REM  PLAY THE MUSIC                       KB
·1400 RESTORE:GOSUB 60:POKE S+24,15             LO
·1410 POKE S+5,96:POKE S+6,70:POKES+12,96
:POKE S+13,70:POKE S+19,96:POKE S+20,70         HC
·1420 READ N1,N2,N3,DR:IF DR=-1 THEN GOSU
B 60:RETURN                                     ML
·1430 H1=INT(N1/256):L1=N1-(H1*256):H2=IN
T(N2/256):L2=N2-(H2*256):H3=INT(N3/256)         DK
·1440 L3=N3-(H3*256):POKE S+1,H1:POKE S,L
1:POKE S+8,H2:POKE S+7,L2:POKE S+15,H3          OI
·1450 POKE S+14,L3:POKE S+4,17:POKE S+11,
17:POKE S+18,17:FOR T=1 TO DR*20:NEXT           LG
·1460 POKE S+4,16:POKE S+11,16:POKE S+18,
16:GOTO 1420                                    JH
·1998 REM       DATA BLOC                       PL
·1999 REM  MUSIC                                GD
·2000 DATA 7217,8583,11457,6,7217,8583,11
457,2,7217,8583,11457,12                        IN
·2010 DATA 5728,7217,8583,12,8583,11457,1
4435,6,8583,11457,14435,2                       IM
·2020 DATA 8583,11457,14435,12,7217,8583,
11457,12,7217,8583,11457,6                      CF
·2030 DATA 8583,11457,14435,2,11457,14435
,17167,18,11457,14435,17167,4                   FK
·2040 DATA 9634,12860,15294,4,9634,11457,
14435,4,8583,10814,12860,24                     EP
·2050 DATA 8583,10814,12860,4,8583,11457,
14435,4,9634,12860,15294,12                     PK
·2060 DATA 9634,12860,15294,12,8583,11457
,14435,6,8583,10814,12860,2                     CI
·2070 DATA 8583,11457,14435,12,7217,8583,
11457,12,7217,8583,11457,4                      CD
·2080 DATA 8583,11457,14435,4,8583,10814,
12860,18,5728, 7217, 8583,4                     KH
·2090 DATA 6430,7647,10814,4,8583,10814,1
2860,4,7217,8583,11457,24,0,0,0,-1              CN
·2098 :                                         DI
·2099 REM  CUSTOM TYPEFONT                      GO
·2100 DATA 169,0,133,251,133,253,169,216        EC
·2110 DATA 133,252,169,240,133,254,162          IF
·2120 DATA 16,160,0,177,251,145,253,136         IL
·2130 DATA 208,249,230,252,230,254,202          FP
·2140 DATA 208,240,96                           KA
·2198 :                                         DI
·2199 REM  SPRITES                              PL
·2200 DATA0,0,0,0,0,0,0,0,0,0,48,0,0,56,0
,0,56,0,0,124,0                                 AF
·2210 DATA0,126,0,0,126,0,0,127,0,0,255,1
28,1,255,128,1,247,192,1,245,224                EF
·2220 DATA3,245,224,3,193,224,3,25,224,3,
131,224 ,3,199,192,1,231,128,0,248,0,0          NE
·2249 :                                         DI
·2250 DATA0,224,0,0,224,0,0,240,0,0,240,0
,1,240,0,3,248,0,3,216,0                        MI
·2260 DATA3,216,0,3,220,0,3,220,0,6,220,0
,14,222,0,14,214,0,12,199,0                     FN
·2270 DATA28,87,128,24,85,128,26,7,128,14
,47,0,7,111,0,3,252,0,0,240,0,0                 KK
·2299 :                                         DI
·2300 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0                                      DH
·2310 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,120,0                                    EH
·2320 DATA0,252,0,1,254,0,1,255,0,3,255,0
,3,255,0,3,254,0,1,252,0,0                      IB
·2349 :                                         DI
·2350 DATA 0,12,0,0,30,0,0,30,0,0,30,0,0,
30,0,0,30,0,1,158,0,19,158,0,51,128,0           EE
·2360 DATA 115,159,192,112,31,192,7,193,1
92,127,159,192,127,191,192,63,255,128           OK
·2370 DATA 24,255,0,3,248,0,15,255,0,0,0,
0,7,254,0,7,254,0,0                             NO
·2399 :                                         DI
·2400 DATA0,0,0,0,0,0,0,0,0,63,227,224,80
,246,32,95,180,32,64,52,32,63,228,32            NN
·2410 DATA12,38,48,127,254,24,193,7,12,12
9,7,134,193,7,131,127,253,131,193,7,131         PK
·2420 DATA129,3,131,193,7,3,127,254,3,48,
70,3,48,67,3,31,254,3,0                         PN
·2449 :                                         DI
·2450 DATA7,255,254,7,255,254,6,127,254,4
,63,254,6,127,254,7,255,254,7,255,254           CN
·2460 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0      PD
·2470 DATA0,0,0,0,0,0,0,0                       FG
·2498 :                                         DI
·2499 REM JOYSTICK                              DA
·2500 DATA173,0,220,41,15,201,11,240,13,2
01,7,240,59,173,0,220,41,16,208,236              CH
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 83 and 84 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
·2510 DATA96,0,173,6,208,205,1,192,240,22
 6,205,3,192,208,24,169,0,141,21,208      BD
·2520 DATA141,16,208,173,4,192,141,6,208,
 169,8,141,21,208,76,60,194,0,56,173      FI
·2530 DATA6,208,237,0,192,141,6,208,76,60
 ,194,0,173,6,208,205,2,192,240,176       CE
·2540 DATA205,4,192,208,25,169,0,141,21,2
 08,169,8,141,16,208,173,3,192,141,6      CK
·2550 DATA208,169,8,141,21,208,76,60,194,
 0,24,173,6,208,109,0,192,141,6,208       GO
·2560 DATA76,60,194,0,162,207,160,0,200,2
 08,253,202,208,248,76,192,193            AN
·2598 :                                   DI
·2599 REM  CHARACTER DATA                 JB
·2600 DATA122,127,63,31,15,7,3,1,0        BK
·2610 DATA161,0,0,15,31,56,48,48,48       JI
·2620 DATA163,0,0,240,248,28,12,12,12     AN
·2630 DATA164,0,0,15,31,63,63,63,48       HF
·2640 DATA165,0,0,240,248,252,252,252,12  MK
·2650 DATA166,8,12,143,127,56,240,112,48  JJ
·2660 DATA167,16,48,241,254,28,15,14,12   LM
·2670 DATA168,0,0,15,30,62,62,54,50       HB
·2680 DATA169,0,0,240,120,124,124,108,76  OP
·2690 DATA170,48,48,56,31,15,0,0,0        PM
·2700 DATA171,12,12,28,248,248,0,0,0      MF
·2710 DATA193,255,255,255,195,195,195,195
 ,195                                     BI
·2720 DATA194,195,195,195,195,195,195,195
 ,195                                     CI
·2730 DATA195,255,255,255,7,7,255,255,255 GH
·2740 DATA196,255,255,255,224,224,255,255
 ,255                                     BG
·2750 DATA197,195,195,195,195,195,255,255
 ,255                                     KI
·2760 DATA201,255,255,255,15,7,131,195,19
 5                                        JI
·2770 DATA202,195,195,193,224,240,255,255
 ,255                                     OH
·2780 DATA203,195,195,131,7,15,255,255,25
 5                                        AA
·2790 DATA209,255,255,231,195,195,231,255
 ,255                                     HB
·2800 DATA213,255,255,255,240,224,193,195
 ,195                                     ND
·2810 DATA215,195,195,225,240,240,225,195
 ,195                                     CC
·2820 DATA235,195,195,195,192,192,195,195
 ,195                                     HE
·2830 DATA237,195,195,195,192,192,255,255
 ,255                                     BB
·2840 DATA238,255,255,255,3,3,195,195,195 KI
·2850 DATA240,255,255,255,192,192,195,195
 ,195                                     IF
·2860 DATA242,255,255,255,0,0,195,195,195 ID
·2870 DATA243,195,195,195,3,3,195,195,195 ML
·2880 DATA245,195,195,135,15,15,135,195,1
 95                                       EA
·2890 DATA253,195,195,195,3,3,255,255,255 HD
·2900 DATA254,248,248,124,124,62,62,31,31 HN
·2910 DATA255,0,128,192,224,240,248,252,2
 54,-1                                    KE
·2918 :                                   DI
·2919 REM  INTERRUPT REQUEST              CN
·2920 DATA72,169,4,141,136,2,104,108,254,
 207                                      CP
·4998 :                                   DI
·4999 REM  CHECK DATA                     HM
·5000 CK=0:CC=0                           AG
·5010 FOR I=1 TO 124:READ A:CK=CK+A:NEXT  DD
·5020 IF CK<>958347 THEN PRINT"ERROR IN M
 USIC DATA, LINES 2[3"0"]-2090":STOP      GO
·5030 PRINT"MUSIC DATA OK":CK=0:CC=0       JJ
·5040 FOR I=1 TO 33:READ A:CK=CK+A:NEXT    NH
·5050 IF CK<>5974 THEN PRINT"ERROR IN FON
 T DATA, LINES 2100-2140":STOP            IC
·5060 PRINT"FONT DATA OK":CK=0:CC=0        IN
·5070 CK(1)=4844:CK(2)=4520:CK(3)=1909:CK
 (4)=4626:CK(5)=5185:CK(6)=3159           BA
·5080 FOR J=1 TO 6:FOR I=1 TO 64           GM
·5090 READ A:CK=CK+A:NEXT                  MI
·5100 IF CK<>CK(J) THEN PRINT"ERROR IN SP
 RITE"J"DATA":STOP                        BA
·5110 PRINT"SPRITE#"J"DATA OK":CK=0:CC=0:
 NEXT:CK=0:CC=0                           IJ
·5120 FOR J=1 TO 137:READ A:CK=CK+A:NEXT   EM
·5130 IF CK<>16579 THEN PRINT"ERROR IN JO
 YSTICK DATA, LINES 2500-2560":STOP       KF
·5140 PRINT"JOYSTICK DATA OK":CK=0:CC=0    BK
·5150 FOR J=1 TO 289:READ A:CK=CK+A:NEXT   CG
·5160 IF CK<>44406 THEN PRINT"ERROR IN CH
 ARACTER DATA, LINES 2600-2910":STOP      GM
·5170 PRINT"CHARACTER DATA OK":END         BF
·5180 FOR J=1 TO 10:READ A:CK=CK+A:NEXT    PH
·5190 IF CK<>1197 THEN PRINT"ERROR IN INT
 ERRUPT DATA, LINE 2920":STOP             DA
·5200 PRINT"INTERRUPT DATA OK":END         DP
```

STAR STRIKE
FROM PAGE 34

STAR STRIKE

```
·5 DN=PEEK(186)                           AG
·10 IFA=0THENA=1:LOAD"SPRITES",DN,1       PA
·15 SYS49152                              KF
·20 IFA=1THENA=2:LOAD"SS",DN,1            BA
·30 POKE52,60:POKE56,60:CLR               CF
·45 GOTO10100                             IJ
·50 POKE53281,6:POKE34058,0               CB
·55 E=0:S=0:F=0:M=0:D$=""                 AN
·100 PRINT"[CLEAR][4"[DOWN]"]"TAB(5)"[RVS
```

```
ON][GREEN][27"*"]"                                                EB
·105 PRINTTAB(5)"[RVSON]*[WHITE][7" "]SEL
ECT LEVEL[6" "][GREEN]*"                                          NJ
·110 PRINTTAB(5)"[RVSON][27"*"]"                                  OP
·120 PRINT"[DOWN][DOWN][YELLOW]"TAB(13)"[
RVSON]1[RVSOFF]  BEGINNER"                                        PH
·125 PRINT"[DOWN][DOWN][CYAN]"TAB(13)"[RV
SON]2[RVSOFF]  SKILLED"                                           BO
·130 PRINT"[DOWN][DOWN][c 3]"TAB(13)"[RVS
ON]3[RVSOFF]  ADVANCED"                                           HH
·135 PRINT"[DOWN][DOWN][c 6]"TAB(13)"[RVS
ON]4[RVSOFF]  NEUROTIC"                                           EC
·140 TI$="[6"0"]":A$=""                                           HA
·145 GETA$:IFVAL(A$)>0ANDVAL(A$)<5THEN160                         MO
·150 IFVAL(TI$)>30THEN45                                          HK
·155 GOTO145                                                      CM
·160 IFVAL(A$)=1THENPOKE33083,50:POKE3438
1,1:POKE36539,40:A=50                                             CP
·165 IFVAL(A$)=2THENPOKE33083,40:POKE3438
1,2:POKE36539,30:A=100                                            JA
·170 IFVAL(A$)=3THENPOKE33083,25:POKE3438
1,3:POKE36539,20:A=150                                            KH
·175 IFVAL(A$)=4THENPOKE33083,20:POKE3438
1,3:POKE36539,15:A=200                                            FP
·180 PRINT"[CLEAR][5"[DOWN]"]"TAB(12)"[RV
SON][CYAN] STAR STRIKE "                                          AO
·185 PRINTTAB(12)"[RVSON][3" "]PHASE I[3"
"]"                                                               MC
·190 GOSUB17000                                                   IN
·200 FORX=37692TO37919:POKEX,0:NEXT                               IK
·210 POKE37721,20:POKE37894,15:PRINT"[CLE
AR]"                                                              HI
·220 GOSUB15000                                                   JH
·230 SYS32768                                                     KO
·240 FORX=1TO1000:NEXT                                            OK
·250 POKE53269,0                                                  PL
·260 GOSUB16000                                                   IK
·270 IFPEEK(37702)>0THEND$="1":GOSUB19000                         MD
·280 E=PEEK(37719):F=PEEK(37913):S=PEEK(3
7721)                                                             BO
·300 IFVAL(D$)=1THEN900                                           DH
·420 PRINT"[CLEAR][5"[DOWN]"]"TAB(12)"[RV
SON][CYAN] STAR STRIKE "                                          AO
·430 PRINTTAB(12)"[RVSON][3" "]PHASE II
"                                                                 MA
·440 GOSUB17000                                                   IN
·450 FORX=37692TO37919:POKEX,0:NEXT                               IK
·460 POKE37721,S:POKE37894,20:POKE37734,1
:PRINT"[CLEAR]"                                                   BN
·470 GOSUB15000                                                   JH
·480 SYS32768                                                     KO
·490 FORX=1TO1000:NEXT                                            OK
·500 POKE53269,0                                                  PL
·510 GOSUB16000                                                   IK
·520 IFPEEK(37702)>0THEND$="1":GOSUB19000                         MD
·530 E=E+PEEK(37719):F=F+PEEK(37913):S=PE
EK(37721)                                                         LN
·670 IFVAL(D$)=1THEN900                                           DH
·675 IFVAL(A$)=1THENPOKE34381,2                                   JE
·676 IFVAL(A$)=2THENPOKE34381,3                                   JG
·677 IFVAL(A$)=3THENPOKE34381,4:POKE34058
,1                                                                MO
·678 IFVAL(A$)=4THENPOKE34381,5:POKE34058
,2                                                                KP
·680 PRINT"[CLEAR][5"[DOWN]"]"TAB(12)"[RV
SON][CYAN] STAR STRIKE "                                          AO
·690 PRINTTAB(12)"[RVSON]  PHASE [3"I"]
"                                                                 PI
·700 GOSUB17000                                                   IN
·710 FORX=37692TO37919:POKEX,0:NEXT                               IK
·720 POKE37725,1:POKE37721,S:PRINT"[CLEAR
]"                                                                LA
·730 GOSUB15000                                                   JH
·740 SYS32768                                                     KO
·750 SYS36377                                                     KI
·760 FORX=1TO1000:NEXT                                            OK
·770 POKE53269,0                                                  PL
·780 POKE54276,0:POKE54290,0:POKE54283,0                          PN
·790 GOSUB16000                                                   IK
·800 IFPEEK(37910)=0THENGOSUB19000                                JO
·805 IFPEEK(37910)>0THENGOSUB21000                                MK
·900 POKE53281,6:POKE53280,2                                      DD
·970 PRINT"[CLEAR][DOWN]"TAB(11)"[RVSON][
WHITE]  STAR STRIKE  "                                            MD
·980 PRINTTAB(11)"[RVSON][4" "]SCORES[5"
"]"                                                               BP
·1000 PRINT"[DOWN][DOWN][WHITE][3" "]ALIE
N SHIPS DESTROYED  [YELLOW][3"-"]",E                              FN
·1010 PRINT"[DOWN][WHITE][4" "]ALIEN FIRE
 DESTROYED  [YELLOW][3"-"]",F                                     PG
·1020 PRINT"[DOWN][WHITE] REMAINING SHIEL
D ENERGY  [YELLOW][3"-"]",S                                       JD
·1050 T=E*A+S*A+F*A                                               BL
·1060 PRINTTAB(12)"[DOWN][CYAN]TOTAL SCOR
E"                                                                KL
·1065 PRINTTAB(15)"[DOWN][YELLOW]"T                               DB
·1070 IFM=0THEN1110                                               CA
·1075 T=T+1000                                                    MI
·1080 PRINT"[WHITE][3"[DOWN]"]  BONUS FOR
 DESTROYING MOTHER SHIP"                                          LE
·1090 PRINTTAB(12)"[YELLOW][DOWN]1[3"0"]
POINTS"                                                           LK
·1100 PRINTTAB(5)"[WHITE][DOWN]GRAND TOTA
L  [YELLOW][4"-"]";T                                              IJ
·1110 IFT>HSTHENHS=T                                              ID
·1120 FORX=1TO10000:NEXT                                          BO
·1130 GOTO45                                                      PP
·10100 POKE53280,0:POKE53281,0:PRINT"[CLE
AR]"                                                              AD
·10110 PRINT"[c 7][4" "][4"[c @]"][4" "][
6"[c @]"][16" "][3"[c @]"]"                                       DD
·10120 PRINT"[3" "][s N][3" "][s N][s M]
 [s N][5" "][s N][s M][5" "][s N][s M][7
" "][s N]  [s N][s M]"                                            EC
·10130 PRINT"  [RVSON][WHITE][sEP][4" "][
c *][RVSOFF][c 7][s N] [RVSON][WHITE][sE
```

```
P][6" "][c *][RVSOFF][c 7][s N][4" "][RV
SON][WHITE][sEP][c *][RVSOFF][c 7] [s M]
[5" "][RVSON][WHITE][sEP][3" "][c *][RVS
OFF][c 7][s N][c G]"                          MN
·10140 PRINT" [RVSON][WHITE] [RVSOFF][c
 7][s N] [s N][s M][4" "][RVSON][WHITE]
  [RVSOFF][c 7] [c G][5" "][RVSON][WHITE
][sEP] [c *][RVSOFF][c 7] [s M][4" "][R
VSON][WHITE] [RVSOFF][sEP] [c *][RVSON]
[RVSOFF][c 7][s N]"                           FE
·10150 PRINT" [WHITE][c *][RVSON][4" "][
c *][RVSOFF][c 7][s N][c G][3" "][RVSON]
[WHITE] [RVSOFF][c 7] [c G][4" "][RVSON
][WHITE][sEP] [RVSOFF][sEP][c *][RVSON]
[c *][RVSOFF][c 7] [s M][3" "][RVSON][WH
ITE][4" "][RVSOFF][sEP][c 7][s M]"            MC
·10160 PRINT" [s N] [RVSON][WHITE][sEP]
  [RVSOFF][c 7][s N][4" "][RVSON][WHITE]
  [RVSOFF][c 7] [c G][3" "][RVSON][WHITE
][sEP][6" "][c *][RVSOFF][c 7] [s M] [R
VSON][WHITE] [RVSOFF][c *][RVSON] [c *]
[RVSOFF][c 7][s N][c G]"                      IN
·10170 PRINT" [WHITE][c *][RVSON][4" "][
RVSOFF][sEP][5" "][RVSON] [RVSOFF][c 7]
[s N][3" "][RVSON][WHITE][sEP] [RVSOFF][
sEP][4" "][c *][RVSON] [c *][RVSOFF][c 7
][s N] [RVSON][WHITE] [RVSOFF][c 7][s
N][RVSON][WHITE] [RVSOFF][c 7][s N]"          MN
·10190 PRINT"[DOWN][3" "][c 7][4"[c @]"][
3" "][6"[c @]"] [3"[c @]"][3" "][c @]
[c @][c @] [c @] [5"[c @]"]"                  FH
·10200 PRINT" [s N][3" "][s N][s M] [s N
][5" "][s N][c G][s N] [s N][s M] [s N]
[s N][c G][s N] [s N][c G][s N][s N] [s
N][4" "][s N][c G]"                           IC
·10210 PRINT" [UP][WHITE][RVSON][sEP][4"
"][c *][c 7][RVSOFF][s N] [RVSON][WHITE]
[6" "][RVSOFF][c 7][s N][RVSON][WHITE][s
EP][3" "][c *][RVSOFF][c 7][s N][c G][RV
SON][WHITE] [RVSOFF][c 7] [c G][RVSON][W
HITE] [RVSOFF][c 7] [RVSON][WHITE][sEP]
[RVSOFF][sEP] [RVSON][5" "][RVSOFF][c 7
][s N]"                                       KE
·10220 PRINT" [RVSON][WHITE] [RVSOFF][c
 7][s N] [s N][s M][3" "][RVSON][WHITE]
  [RVSOFF] [c 7][c G] [RVSON][WHITE] [RVS
OFF][sEP] [c *][RVSON] [RVSOFF][c 7][s N
] [RVSON][WHITE] [RVSOFF] [c 7][c G][RVS
ON][WHITE] [sEP][RVSOFF][sEP][c 7][c G]
  [RVSON][WHITE] [RVSOFF] [c 7][s N][c
G]"                                           BB
·10230 PRINT" [WHITE][c *][RVSON][4" "][c
 *][RVSOFF][c 7][s N][c G] [RVSON][WHIT
E] [RVSOFF] [c 7][c G] [RVSON][WHITE][4
" "][RVSOFF][sEP][c 7][s M] [RVSON][WHIT
E] [RVSOFF][c 7] [c G][RVSON][WHITE][3"
"][RVSOFF][c 7][s N][s M] [RVSON][WHITE
][3" "][RVSOFF][c 7][s N][c @][c @]"          MP
·10240 PRINT" [c 7][s N] [RVSON][WHITE][
sEP] [RVSOFF][c 7][s N][3" "][RVSON][WH
ITE] [RVSOFF][c 7] [c G] [RVSON][WHITE]
  [RVSOFF]";                                  IB
·10245 PRINT"[c *][RVSON] [c *][RVSOFF][c
 7][s N][c G][RVSON][WHITE] [RVSOFF] [c
7][c G][RVSON][WHITE] [RVSOFF][c *][RVS
ON][c *][RVSOFF] [c 7][s M] [RVSON][WHIT
E] [RVSOFF][c 7][s N][c T] [s N][c G]";  HB
·10250 PRINT"[DOWN][UP] [WHITE][c *][RVSO
N][4" "][RVSOFF][sEP][4" "][RVSON] [RVS
OFF][c 7][s N] [RVSON][WHITE] [RVSOFF]
[c 7][s N]";                                  KA
·10255 PRINT"[RVSON][WHITE] [RVSOFF][c 7
][s N] [RVSON][WHITE] [RVSOFF][c 7][s N]
 [RVSON][WHITE] [RVSOFF][c 7][s N][WHIT
E][c *][RVSON][c *][RVSOFF][c 7][s N] [R
VSON][WHITE][5" "][RVSOFF][c 7][s N]"         CA
·10260 PRINT"[DOWN]"TAB(19)"[YELLOW]BY":P
RINTTAB(16)"BOB EATON"                        ED
·10265 PRINTTAB(12)"[DOWN][WHITE]HI SCORE
[3" "]";HS                                    JO
·10270 PRINT"[DOWN][YELLOW][3" "]PRESS A
KEY OR FIRE TO CONTINUE[HOME]"                HF
·10280 POKE198,0:SYS35478                     IM
·10300 GOTO50                                 PD
·15000 POKE56578,PEEK(56578)OR3               BN
·15010 POKE56576,(PEEK(56576)AND252)OR2       KG
·15020 POKE53272,PEEK(53272)OR8               ME
·15030 POKE53265,PEEK(53265)OR32              AL
·15040 RETURN                                 IM
·16000 POKE56578,PEEK(56578)OR3               BN
·16010 POKE56576,(PEEK(56576)AND252)OR3       KF
·16020 POKE53272,21:POKE53265,27              ID
·16030 RETURN                                 IM
·17000 POKE53281,6:PRINT"[3"[DOWN]"]"TAB(
12)"[WHITE] GET READY ! "                     GC
·17010 PRINT"[3"[DOWN]"]"TAB(8)"[YELLOW]P
RESS FIRE TO CONTINUE                         EF
·17020 POKE198,0:SYS35478                     IM
·17030 RETURN                                 IM
·19000 POKE53281,0:PRINT"[CLEAR][10"[DOWN
]"][YELLOW]"TAB(6)"YOU HAVE BEEN DESTROY
ED[3"!"]"                                     HM
·19010 FORX=1TO4000:NEXT                      NP
·19020 RETURN                                 IM
·21000 POKE53281,6:POKE53280,2                DD
·21010 PRINT"[CLEAR][WHITE][6"[DOWN]"]"TA
B(10)"CONGRATULATIONS[3"!"]"                  DO
·21030 PRINT"[5"[DOWN]"]"TAB(5)"YOU HAVE
COMPLETED YOUR MISSION.":M=1                  FP
·21040 FORX=1TO5000:NEXT                      AG
·21050 RETURN                                 IM
```

Beginning address in hex: C000
Ending address in hex: C43C


```
C000: A9 00 85 FB 8D 00 CA 8D 11
C008: 01 CA A8 A9 57 85 FC A9 A9
C010: 00 91 FB C8 C0 00 D0 F7 EF
C018: E6 FC A5 FC C9 61 D0 EF 8A
C020: A9 85 85 FB A9 A5 85 FD A3
C028: A9 00 85 A5 A9 C0 85 FC E9
C030: A9 C1 85 FE A9 57 85 A6 4D
C038: A0 00 A2 00 B1 FB 8D 02 B8
C040: CA 29 80 F0 03 20 7A C0 04
C048: E6 A5 D0 02 E6 A6 E0 07 1D
C050: F0 0A 0E 02 CA E8 AD 02 BE
C058: CA 4C 41 C0 E6 FB D0 02 27
C060: E6 FC AD 01 CA F0 07 AD 63
C068: 00 CA C9 1F F0 0B EE 00 07
C070: CA D0 C7 EE 01 CA 4C 3A 15
C078: C0 60 B1 FD 91 A5 E6 FD 65
C080: D0 02 E6 FE 60 24 92 5B AB
C088: 7F FF FF FE D2 01 24 92 91
C090: 40 70 12 49 24 00 2F FF EF
C098: 49 2F FF B4 00 00 00 BF 85
C0A0: 49 24 BF 00 00 00 00 02 CF
C0A8: 49 24 80 00 00 00 00 00 96
C0B0: 09 24 00 00 00 00 00 00 DD
C0B8: 01 20 00 00 00 00 00 00 D9
C0C0: 01 20 00 00 00 00 00 00 E1
C0C8: 00 20 00 00 00 00 00 00 E8
C0D0: 09 20 00 00 01 00 00 00 FA
C0D8: 0B A0 00 00 01 00 00 00 85
C0E0: 5F F4 00 00 01 00 00 00 36
C0E8: FF FE 00 00 01 00 00 00 E8
C0F0: 01 00 00 00 01 00 00 00 F2
C0F8: 01 20 00 00 01 00 04 10 2F
C100: 41 20 00 00 01 01 00 82 E5
C108: 49 24 00 00 01 08 20 90 2F
C110: 49 24 92 40 00 49 04 92 30
C118: 49 24 D3 FF B4 49 24 92 0E
C120: 4D 3D FF FF F4 00 00 00 9F
C128: 49 36 80 00 01 00 00 86 AF
C130: DB FF F6 C0 01 01 01 FF C6
C138: FF FF FF CA 81 F3 7F FF F7
C140: FF FF FF EF AF F3 FF ED C1
C148: B6 DB 6F FF EF E8 C8 4C 38
C150: 13 80 E8 93 C7 40 C0 0C 35
C158: 00 00 28 00 57 20 00 40 38
C160: 00 00 00 80 09 92 49 36 FB
C168: DF FF FF FE D8 00 01 FF 21
C170: E3 FF C0 00 01 00 00 00 16
C178: 1C 00 00 00 01 00 00 00 95
C180: 1C 20 00 00 01 00 00 00 BD
C188: 1C 00 00 00 01 49 24 92 A5
C190: 4B 6D B6 DB 2D 49 24 92 09
C198: 49 24 92 49 25 49 24 92 07
C1A0: 49 6C 96 DB 6D 02 02 02 3C
C1A8: 02 02 02 05 82 16 86 5A 2D
C1B0: 86 01 6A 06 05 A8 16 16 82
C1B8: A5 5A 16 95 6A 55 55 6B E4
C1C0: 7D AA AF 7D AA AF 7D AA 98
C1C8: AF 55 55 6B 55 0A 14 0A 0C
C1D0: 02 10 10 10 10 10 10 10 43
C1D8: FF 01 FF 10 10 10 10 10 2A
C1E0: 10 10 18 07 99 E0 07 66 08
C1E8: E0 03 A5 C0 01 E7 80 FF 9C
C1F0: 66 42 C3 01 66 80 02 FF 47
C1F8: 40 05 C3 A0 07 81 E0 07 13
C200: E0 06 60 18 01 99 80 01 7B
C208: E7 80 FF 3C 66 66 3C DB 91
C210: 01 C3 80 01 81 80 18 5A CA
C218: 3C 18 18 24 42 24 18 18 3F
C220: 24 18 18 18 18 10 04 16 CE
C228: 04 7F 14 01 56 80 14 7F 2B
C230: 56 05 55 A0 0F FF F0 05 86
C238: 55 A0 56 7F 01 55 80 15 EF
C240: 55 68 3F FF FC 15 55 68 0D
C248: 01 55 80 7F 18 FF 18 18 E6
C250: FF 08 04 08 1C 1C FF 04 A0
C258: 0A 14 02 1C 3E 3E 1C FF 2D
C260: 08 10 04 10 04 01 24 01 B6
C268: 3E 7F 7F 7F 3E 02 08 04 71
C270: 08 02 08 02 14 20 04 49 06
C278: 02 80 80 3E FF 80 01 FF 3B
C280: C0 01 FF C0 01 FF C0 FF C4
C288: 80 3E 08 20 02 08 02 20 9B
C290: 14 08 22 90 80 04 81 40 A5
C298: 02 7F 05 FF D0 03 FF E0 D3
C2A0: 03 FF E0 03 FF E0 03 FF 6B
C2A8: E0 03 FF E0 01 FF C0 7F AE
C2B0: 5E 2A 55 5C 80 76 80 3D 9F
C2B8: FC 10 01 F1 02 9F 03 FD 5B
C2C0: 02 F6 80 07 BC 80 14 EA 7D
C2C8: 90 04 FF 80 03 6C 01 80 CE
C2D0: 04 04 FF 10 02 FE C0 09 B3
C2D8: 09 20 03 FB E0 03 9F 20 A4
C2E0: 07 FF 20 03 F7 E0 07 BE A9
C2E8: B0 9C EF D4 04 FF F0 03 F2
C2F0: 6C D8 05 94 D8 0D 95 FE 4A
C2F8: 11 40 FF 01 10 20 20 08 A3
C300: 9C 01 BF A0 12 E9 B8 03 B5
C308: FB E0 2F 1F 60 0B FB F5 90
C310: 0B 8B 78 3F 45 2A 37 51 56
C318: F0 0D 84 B0 9E 51 B4 1D 0D
C320: 85 F0 1F 6C B8 05 B7 F9 91
C328: 8F DE B4 FF E0 11 C6 C4 C8
C330: FC 42 08 44 FF 01 10 20 EC
C338: 20 28 9C 02 01 A2 21 12 F5
C340: 49 38 43 1B E0 2E 20 2A 79
C348: 14 0A 18 BA 0A 34 10 10 97
C350: 31 10 34 10 30 50 18 04 72
C358: 01 D9 AA 02 B4 01 FC 60 F2
```

```
C360: 11 C6 C4 04 FC 02 28 40 68
C368: FF 04 06 10 40 09 20 80 6C
C370: 01 09 20 40 80 04 01 80 E0
C378: 01 20 10 04 20 08 44 12 2C
C380: 20 21 18 FF 41 08 80 08 AB
C388: 80 20 01 20 01 44 10 FF 9F
C390: 01 01 80 80 FF 80 80 80 15
C398: 80 80 80 82 50 92 94 92 A6
C3A0: A5 90 A9 40 94 2A 50 A5 75
C3A8: 5A 94 A9 56 94 E9 55 55 C0
C3B0: FA AA 7D FA AA 7D FA AA 9C
C3B8: 7D E9 55 55 A0 55 A0 14 75
C3C0: 80 1F FF F8 3F FF FC 7F 15
C3C8: FF FE FF FF FF FF FF FF C7
C3D0: 7F EF FE 3F FF FC 1F FF 9A
C3D8: F8 AA 92 49 24 09 49 24 F2
C3E0: 92 10 55 24 92 49 FE 10 E7
C3E8: 10 10 10 28 48 88 88 88 23
C3F0: 90 01 10 02 08 04 04 04 A8
C3F8: 02 04 02 02 04 01 08 01 11
C400: 08 01 04 82 01 01 01 10 A2
C408: 10 30 48 84 42 22 14 08 95
C410: 10 20 50 48 24 42 84 48 0C
C418: 84 88 50 28 55 10 10 30 43
C420: 48 48 28 18 14 22 42 84 ED
C428: 01 08 01 10 90 88 01 04 60
C430: 02 02 04 01 04 02 02 02 43
C438: 01 01 F6 FF 00 31
```

Beginning address in hex: 8000
Ending address in hex: 9216

SS

```
8000: A9 2F 8D 18 D4 A9 01 8D 8B
8008: 76 93 8D 7F 93 8D 77 93 4B
8010: 8D 83 93 A9 64 8D 72 93 56
8018: 8D 74 93 8D 7E 93 A9 C8 BF
8020: 8D 81 93 A9 00 8D 10 D0 DA
8028: 8D 17 D0 A9 12 8D 08 D4 C3
8030: A9 FA 8D 0D D4 8D 14 D4 BA
8038: 8D 06 D4 A9 F2 8D 17 D4 B6
8040: A9 AC 8D 04 D0 A9 B8 8D E8
8048: 02 D0 A9 88 8D 00 D0 A9 55
8050: 80 8D 05 D0 A9 E6 8D 01 53
8058: D0 8D 03 D0 A9 03 8D 1D E1
8060: D0 AD 1C D0 09 C3 8D 1C 42
8068: D0 A9 07 8D 27 D0 8D 28 25
8070: D0 8D 29 D0 8D 2D D0 8D E1
8078: 2E D0 A9 06 8D 25 D0 A9 54
8080: 00 8D 26 D0 A9 01 8D 2A 67
8088: D0 A9 08 8D 2B D0 8D 2C 4E
8090: D0 A9 5D 8D FA 47 A9 5C 3E
8098: 8D F8 47 A9 78 8D F9 47 57
80A0: 37 35 35 38 30 39 38 3A 56
80A8: 20 38 44 20 46 38 20 34 38
80B0: 37 20 41 39 20 37 38 20 32
80B8: 38 44 20 46 39 20 34 37 60
80C0: 20 38 30 39 38 3A 20 38 4D
80C8: 44 20 46 38 20 34 37 20 57
80D0: 41 39 20 37 38 20 38 44 77
80D8: 20 46 39 20 34 37 34 37 6F
80E0: 37 34 34 38 30 39 38 3A 94
80E8: 20 38 44 20 46 38 20 34 78
80F0: 37 20 41 39 20 37 38 20 72
80F8: 38 44 20 46 39 20 38 30 9D
8100: 39 38 3A 20 38 44 20 46 AE
8108: 38 20 34 37 20 41 39 20 86
8110: 37 38 20 38 44 20 46 39 BB
8118: 46 39 39 46 46 38 30 39 FE
8120: 38 3A 20 38 44 20 46 38 CD
8128: 20 34 37 20 41 39 20 37 A5
8130: 38 20 38 44 20 38 30 39 C6
8138: 38 3A 20 38 44 20 46 38 E5
8140: 20 34 37 20 41 39 20 37 BD
8148: 38 20 38 44 38 44 44 38 16
8150: 38 38 30 39 38 3A 20 38 F4
8158: 44 20 46 38 20 34 37 20 E6
8160: 41 39 20 37 38 20 38 30 F2
8168: 39 38 3A 20 38 44 20 46 17
8170: 38 20 34 37 20 41 39 20 EE
8178: 37 38 37 38 38 37 37 38 36
8180: 30 39 38 3A 20 38 44 20 19
8188: 46 38 20 34 37 20 41 39 2D
8190: 20 38 30 39 38 3A 20 38 1D
8198: 44 20 46 38 20 34 37 20 27
81A0: 41 39 41 39 39 41 41 38 89
81A8: 30 39 38 3A 20 38 44 20 41
81B0: 46 38 20 34 37 20 38 30 43
81B8: 39 38 3A 20 38 44 20 46 67
81C0: 38 20 34 37 34 37 37 34 5B
81C8: 34 38 30 39 38 3A 20 38 69
81D0: 44 20 46 38 20 38 30 39 75
81D8: 38 3A 20 38 44 20 46 38 86
81E0: 46 38 38 46 46 38 30 39 C5
81E8: 38 3A 20 38 44 20 38 30 80
81F0: 39 38 3A 20 38 44 38 44 B5
81F8: 44 38 38 38 30 39 38 3A C1
8200: 20 38 30 39 38 38 38 30 9A
8208: 39 39 38 30 30 38 38 38 BB
8210: 30 39 30 3A 20 44 30 20 98
8218: 41 39 20 35 44 20 38 44 C8
8220: 20 46 41 20 34 37 20 41 B4
8228: 39 20 35 43 20 33 45 33 C5
8230: 45 45 33 33 38 30 39 30 F2
8238: 3A 20 44 30 20 41 39 20 C1
8240: 35 44 20 38 44 20 46 41 FD
8248: 20 34 37 20 41 39 20 35 C3
8250: 43 20 38 30 39 30 3A 20 DF
8258: 44 30 20 41 39 20 35 44 01
8260: 20 38 44 20 46 41 20 34 F8
8268: 37 20 41 39 20 35 43 35 08
8270: 43 43 35 35 38 30 39 30 33
8278: 3A 20 44 30 20 41 39 20 02
```

```
8280: 35 44 20 38 44 20 46 41 3E
8288: 20 34 37 20 41 39 20 38 07
8290: 30 39 30 3A 20 44 30 20 19
8298: 41 39 20 35 44 20 38 44 49
82A0: 20 46 41 20 34 37 20 41 35
82A8: 39 41 39 39 41 41 38 30 80
82B0: 39 30 3A 20 44 30 20 41 4A
82B8: 39 20 35 44 20 38 44 20 48
82C0: 46 41 20 34 37 20 38 30 5C
82C8: 39 30 3A 20 44 30 20 41 62
82D0: 39 20 35 44 20 38 44 20 60
82D8: 46 41 20 34 37 34 37 37 8E
82E0: 34 34 38 30 39 30 3A 20 75
82E8: 44 30 20 41 39 20 35 44 91
82F0: 20 38 44 20 46 41 20 38 8D
82F8: 30 39 30 3A 20 44 30 20 81
8300: 41 39 20 35 44 20 38 44 B0
8308: 20 46 41 46 41 41 46 46 05
8310: 38 30 39 30 3A 20 44 30 B0
8318: 20 41 39 20 35 44 20 38 A4
8320: 44 20 38 30 39 30 3A 20 B0
8328: 44 30 20 41 39 20 35 44 D0
8330: 20 38 44 38 44 44 38 38 FD
8338: 38 30 39 30 3A 20 44 30 D8
8340: 20 41 39 20 35 44 20 38 CC
8348: 30 39 30 3A 20 44 30 20 D0
8350: 41 39 20 35 44 35 44 44 22
8358: 35 35 38 30 39 30 3A 20 EE
8360: 44 30 20 41 39 20 38 30 F7
8368: 39 30 3A 20 44 30 20 41 02
8370: 39 41 39 39 41 41 38 30 48
8378: 39 30 3A 20 44 33 37 38 23
8380: 3A 20 33 39 20 33 30 20 EA
8388: 33 41 20 32 30 20 34 34 08
8390: 34 34 34 34 34 38 33 37 38
8398: 38 3A 20 33 39 20 33 30 1B
83A0: 20 33 41 20 32 30 20 38 10
83A8: 33 37 38 3A 20 33 39 20 32
83B0: 33 30 20 33 41 20 32 30 2B
83B8: 32 30 30 32 32 38 33 37 52
83C0: 38 3A 20 33 39 20 33 30 43
83C8: 20 33 41 20 38 33 37 38 58
83D0: 3A 20 33 39 20 33 30 20 3B
83D8: 33 41 33 41 41 33 33 38 A1
83E0: 33 37 38 3A 20 33 39 20 6A
83E8: 33 30 20 38 33 37 38 3A 81
83F0: 20 33 39 20 33 30 33 30 64
83F8: 30 33 33 38 33 37 38 3A A4
8400: 20 33 39 20 38 33 37 38 87
8408: 3A 20 33 39 33 39 39 33 A7
8410: 33 38 33 37 38 3A 20 38 B0
8418: 33 37 38 38 38 33 37 37 CC
8420: 38 33 33 38 38 38 33 37 D1
8428: 30 3A 20 33 39 20 34 31 A4
8430: 20 33 39 20 33 39 20 34 9D
8438: 31 20 34 31 20 33 38 20 9A
8440: 33 30 20 34 38 34 38 38 D4
8448: 34 34 38 33 37 30 3A 20 DD
8450: 33 39 20 34 31 20 33 39 CE
8458: 20 33 39 20 34 31 20 34 BE
8460: 31 20 33 38 20 33 30 20 C0
8468: 38 33 37 30 3A 20 33 39 02
8470: 20 34 31 20 33 39 20 33 D5
8478: 39 20 34 31 20 34 31 20 DC
8480: 33 38 20 33 30 33 30 30 03
8488: 33 33 38 33 37 30 3A 20 1C
8490: 33 39 20 34 31 20 33 39 0F
8498: 20 33 39 20 34 31 20 34 FE
84A0: 31 20 33 38 20 38 33 37 20
84A8: 30 3A 20 33 39 20 34 31 25
84B0: 20 33 39 20 33 39 20 34 1E
84B8: 31 20 34 31 20 33 38 33 2E
84C0: 38 38 33 33 38 33 37 30 6A
84C8: 3A 20 33 39 20 34 31 20 35
84D0: 33 39 20 33 39 20 34 31 4F
84D8: 20 34 31 20 38 33 37 30 51
84E0: 3A 20 33 39 20 34 31 20 4D
84E8: 33 39 20 33 39 20 34 31 67
84F0: 20 34 31 34 31 31 34 34 75
84F8: 38 33 37 30 3A 20 33 39 92
8500: 20 34 31 20 33 39 20 33 65
8508: 39 20 34 31 20 38 33 37 89
8510: 30 3A 20 33 39 20 34 31 8C
8518: 20 33 39 20 33 39 20 34 85
8520: 31 34 31 31 34 34 38 33 BB
8528: 37 30 3A 20 33 39 20 34 AA
8530: 31 20 33 39 20 33 39 20 9A
8538: 38 33 37 30 3A 20 33 39 D1
8540: 20 34 31 20 33 39 20 33 A5
8548: 39 33 39 39 33 33 38 33 F8
8550: 37 30 3A 20 33 39 20 34 D2
8558: 31 20 33 39 20 38 33 37 D8
8560: 30 3A 20 33 39 20 34 31 DC
8568: 20 33 39 33 39 39 33 33 01
8570: 38 33 37 30 3A 20 33 39 0A
8578: 20 34 31 20 38 33 37 30 F0
8580: 3A 20 33 39 20 34 31 34 01
8588: 31 31 34 34 38 33 37 30 26
8590: 3A 20 33 39 20 38 33 37 1A
8598: 30 3A 20 33 39 33 39 39 35
85A0: 33 33 38 33 37 30 3A 20 34
85A8: 38 33 37 30 30 38 33 37 4E
85B0: 37 38 33 33 38 38 38 33 62
85B8: 36 38 3A 20 33 39 20 33 41
85C0: 30 20 33 41 20 32 30 20 28
85C8: 34 34 20 33 30 20 32 30 37
85D0: 20 34 31 20 30 32 30 32 3B
85D8: 32 30 30 38 33 36 38 3A 7F
85E0: 20 33 39 20 33 30 20 33 44
85E8: 41 20 32 30 20 34 34 20 55
85F0: 33 30 20 32 30 20 34 31 5C
85F8: 20 38 33 36 38 3A 20 33 80
8600: 39 20 33 30 20 33 41 20 71
8608: 32 30 20 34 34 20 33 30 76
8610: 20 32 30 20 34 31 34 31 7D
8618: 31 34 34 38 33 36 38 3A C5
```

```
8620: 20 33 39 20 33 30 20 33 83
8628: 41 20 32 30 20 34 34 20 94
8630: 33 30 20 32 30 20 38 33 A1
8638: 36 38 3A 20 33 39 20 33 C0
8640: 30 20 33 41 20 32 30 20 A7
8648: 34 34 20 33 30 20 32 30 B6
8650: 32 30 30 32 32 38 33 36 E8
8658: 38 38 45 45 38 36 35 30 27
8660: 3A 20 33 32 20 33 30 20 C3
8668: 33 30 20 33 32 20 33 32 D6
8670: 20 33 38 20 33 33 20 33 D5
8678: 36 20 38 36 35 30 3A 20 FC
8680: 33 32 20 33 30 20 33 30 EC
8688: 20 33 32 20 33 32 20 33 E6
8690: 38 20 33 33 20 33 36 33 0C
8698: 36 36 33 33 38 36 35 30 3F
86A0: 3A 20 33 32 20 33 30 20 04
86A8: 33 30 20 33 32 20 33 32 17
86B0: 20 33 38 20 33 33 20 38 1B
86B8: 36 35 30 3A 20 33 32 20 34
86C0: 33 30 20 33 30 20 33 32 2D
86C8: 20 33 32 20 33 38 20 33 2D
86D0: 33 33 33 33 33 33 38 36 72
86D8: 35 30 3A 20 33 32 20 33 51
86E0: 30 20 33 30 20 33 32 20 3A
86E8: 33 32 20 33 38 20 38 36 68
86F0: 35 30 3A 20 33 32 20 33 69
86F8: 30 20 33 30 20 33 32 20 52
8700: 33 32 20 33 38 33 38 38 94
8708: 33 33 38 36 35 30 3A 20 9C
8710: 33 32 20 33 30 20 33 30 7C
8718: 20 33 32 20 33 32 20 38 7B
8720: 36 35 30 3A 20 33 32 20 9B
8728: 33 30 20 33 30 20 33 32 94
8730: 20 33 32 33 32 32 33 33 B3
8738: 38 36 35 30 3A 20 33 32 CB
8740: 20 33 30 20 33 30 20 33 9A
8748: 32 20 38 36 35 30 3A 20 C8
8750: 33 32 20 33 30 20 33 30 BC
8758: 20 33 32 33 32 32 33 33 DB
8760: 38 36 35 30 3A 20 33 32 F3
8768: 20 33 30 20 33 30 20 38 C7
8770: 36 35 30 3A 20 33 32 20 EB
8778: 33 30 20 33 30 33 30 30 F2
8780: 33 33 38 36 35 30 3A 20 15
8788: 33 32 20 33 30 20 38 36 FF
8790: 35 30 3A 20 33 32 20 33 09
8798: 30 33 30 30 33 33 38 36 31
87A0: 35 30 3A 20 33 32 20 38 1E
87A8: 36 35 30 3A 20 33 32 33 37
87B0: 32 32 33 33 38 36 35 30 4F
87B8: 3A 20 38 36 35 30 30 38 4F
87C0: 36 35 35 38 36 36 38 38 76
87C8: 38 36 34 38 3A 20 33 34 65
87D0: 20 33 34 20 32 30 20 33 2E
87D8: 33 20 33 30 20 32 30 20 32
87E0: 33 32 20 33 30 20 42 36 62
87E8: 42 36 36 42 42 38 36 34 BE
87F0: 38 3A 20 33 34 20 33 34 72
87F8: 20 32 30 20 33 33 20 33 55
8800: 30 20 32 30 20 33 32 20 58
8808: 33 30 20 38 36 34 38 3A A0
8810: 20 33 34 20 33 34 20 32 71
8818: 30 20 33 33 20 33 30 20 72
8820: 32 30 20 33 32 20 33 30 8B
8828: 33 30 30 33 33 38 36 34 C4
8830: 38 3A 20 33 34 20 33 34 B1
8838: 20 32 30 20 33 33 20 33 94
8840: 30 20 32 30 20 33 32 20 98
8848: 38 36 34 38 3A 20 33 34 E4
8850: 20 33 34 20 32 30 20 33 AD
8858: 33 20 33 30 20 32 30 20 B1
8860: 33 32 33 32 32 33 33 38 FB
8868: 36 34 38 3A 20 33 34 20 EC
8870: 33 34 20 32 30 20 33 33 E0
8878: 20 33 30 20 32 30 20 38 D6
8880: 36 34 38 3A 20 33 34 20 05
8888: 33 34 20 32 30 20 33 33 F8
8890: 20 33 30 20 32 30 32 30 F8
8898: 30 32 32 38 36 34 38 3A 42
88A0: 20 33 34 20 33 34 20 32 02
88A8: 30 20 33 33 20 33 30 20 03
88B0: 38 36 34 38 3A 20 33 34 4D
88B8: 20 33 34 20 32 30 20 33 16
88C0: 33 20 33 30 33 30 30 33 3E
88C8: 33 38 36 34 38 3A 20 33 64
88D0: 34 20 33 34 20 32 30 20 2F
88D8: 33 33 20 38 36 34 38 3A 74
88E0: 20 33 34 20 33 34 20 32 42
88E8: 30 20 33 33 33 33 33 33 6C
88F0: 33 38 36 34 38 3A 20 33 8C
88F8: 34 20 33 34 20 32 30 20 57
8900: 38 36 34 38 3A 20 33 34 9C
8908: 20 33 34 20 32 30 32 30 74
8910: 30 32 32 38 36 34 38 3A B9
8918: 20 33 34 20 33 34 20 38 7F
8920: 36 34 38 3A 20 33 34 20 A4
8928: 33 34 33 34 34 33 33 38 C9
8930: 36 34 38 3A 20 3A 20 33 BA
8938: 36 20 33 34 20 33 38 20 A1
8940: 33 41 20 32 30 20 38 39 C8
8948: 33 30 3A 20 33 36 20 33 C2
8950: 34 20 33 38 20 33 41 20 C4
8958: 32 30 32 30 30 32 32 38 E9
8960: 39 33 30 3A 20 33 36 20 E0
8968: 33 34 20 33 38 20 33 41 EF
8970: 20 38 39 33 30 3A 20 33 F2
8978: 36 20 33 34 20 33 38 20 E1
8980: 33 41 33 41 41 33 33 38 49
8988: 39 33 30 3A 20 33 36 20 09
8990: 33 34 20 33 38 20 38 39 15
8998: 33 30 3A 20 33 36 20 33 13
89A0: 34 20 33 38 33 38 38 33 37
89A8: 33 38 39 33 30 3A 20 33 3E
89B0: 36 20 33 34 20 38 39 33 33
89B8: 30 3A 20 33 36 20 33 34 34
```

```
89C0: 33 34 34 33 33 38 39 33 67
89C8: 30 3A 20 33 36 20 38 39 4E
89D0: 33 30 3A 20 33 36 33 36 61
89D8: 36 33 33 38 39 33 30 3A 84
89E0: 20 38 39 33 30 30 38 39 77
89E8: 33 33 38 39 39 38 38 38 A2
89F0: 39 32 38 3A 20 33 33 20 75
89F8: 33 34 20 33 33 20 33 34 6E
8A00: 20 33 34 20 33 33 20 33 61
8A08: 33 20 33 38 20 43 39 43 A6
8A10: 39 39 43 43 38 39 32 38 E4
8A18: 3A 20 33 33 20 33 34 20 80
8A20: 33 33 20 33 34 20 33 34 95
8A28: 20 33 33 20 33 33 20 33 88
8A30: 38 20 38 39 32 38 3A 20 BE
8A38: 33 33 20 33 34 20 33 33 AC
8A40: 20 33 34 20 33 34 20 33 A2
8A48: 33 20 33 33 20 33 38 33 C0
8A50: 38 38 33 33 38 39 32 38 03
8A58: 3A 20 33 33 20 33 34 20 C0
8A60: 33 33 20 33 34 20 33 34 D5
8A68: 20 33 33 20 33 33 20 38 CD
8A70: 39 32 38 3A 20 33 33 20 F4
8A78: 33 34 20 33 33 20 33 34 ED
8A80: 20 33 34 20 33 33 20 33 E1
8A88: 33 33 33 33 33 33 38 39 2D
8A90: 32 38 3A 20 33 33 20 33 0F
8A98: 34 20 33 33 20 33 34 20 FA
8AA0: 33 34 20 33 33 20 38 39 20
8AA8: 32 38 3A 20 33 33 20 33 27
8AB0: 34 20 33 33 20 33 34 20 13
8AB8: 33 34 20 33 33 33 33 33 40
8AC0: 33 33 38 39 32 38 3A 20 5D
8AC8: 33 33 20 33 34 20 33 33 3D
8AD0: 20 33 34 20 33 34 20 38 38
8AD8: 39 32 38 3A 20 33 33 20 5D
8AE0: 33 34 20 33 33 20 33 34 56
8AE8: 20 33 34 33 34 34 33 33 72
8AF0: 38 39 32 38 3A 20 33 33 8D
8AF8: 20 33 34 20 33 33 20 33 5A
8B00: 34 20 38 39 32 38 3A 20 8A
8B08: 33 33 20 33 34 20 33 33 7C
8B10: 20 33 34 33 34 34 33 33 99
8B18: 38 39 32 38 3A 20 33 33 B4
8B20: 20 33 34 20 33 33 20 38 86
8B28: 39 32 38 3A 20 33 33 20 AC
8B30: 33 34 20 33 33 33 33 33 B7
8B38: 33 33 38 39 32 38 3A 20 D4
8B40: 33 33 20 33 34 20 38 39 BF
8B48: 32 38 3A 20 33 33 20 33 C6
8B50: 34 33 34 34 33 33 38 39 F7
8B58: 32 38 3A 20 33 33 20 38 DB
8B60: 39 32 38 3A 20 33 33 33 F7
8B68: 33 33 33 33 38 39 32 38 11
8B70: 3A 20 38 39 32 38 38 38 17
8B78: 39 32 32 38 39 39 38 38 31
8B80: 38 39 32 30 3A 20 33 36 18
8B88: 20 33 34 20 33 38 20 33 EE
8B90: 20 33 41 33 41 41 33 33 41
8B98: 39 31 45 38 3A 20 33 38 46
8BA0: 20 39 31 45 38 3A 20 33 36
8BA8: 38 33 38 38 33 33 39 31 55
8BB0: 45 38 3A 20 39 31 45 38 70
8BB8: 38 39 31 45 45 39 31 31 81
8BC0: 39 39 39 31 45 30 3A 20 6D
8BC8: 33 41 20 32 30 20 33 33 46
8BD0: 20 33 33 20 32 30 20 33 2D
8BD8: 39 20 33 31 20 34 33 20 3E
8BE0: 36 46 36 46 46 36 36 39 C5
8BE8: 31 45 30 3A 20 33 41 20 7E
8BF0: 32 30 20 33 33 20 33 33 60
8BF8: 32 20 33 30 20 32 30 20 51
8C00: 33 33 20 33 33 20 32 30 6F
8C08: 20 33 33 33 33 33 33 33 8E
8C10: 38 42 46 30 3A 20 33 32 C0
8C18: 20 33 30 20 32 30 20 33 71
8C20: 33 20 33 33 20 32 30 20 7C
8C28: 38 42 46 30 3A 20 33 32 D8
8C30: 20 33 30 20 32 30 20 33 89
8C38: 33 20 33 33 20 32 30 32 A6
8C40: 30 30 32 32 38 42 46 30 F5
8C48: 3A 20 33 32 20 33 30 20 AB
8C50: 32 30 20 33 33 20 33 33 BF
8C58: 20 38 42 46 30 3A 20 33 F6
8C60: 32 20 33 30 20 32 30 20 B8
8C68: 33 33 20 33 33 33 33 33 EE
8C70: 33 33 38 42 46 30 3A 20 22
8C78: 33 32 20 33 30 20 32 30 E3
8C80: 20 33 33 20 38 42 46 30 18
8C88: 3A 20 33 32 20 33 30 20 EB
8C90: 32 30 20 33 33 33 33 33 13
8C98: 33 33 38 42 46 30 3A 20 4A
8CA0: 33 32 20 33 30 20 32 30 0C
8CA8: 20 38 42 46 30 3A 20 33 47
8CB0: 32 20 33 30 20 32 30 32 1B
8CB8: 30 30 32 32 38 42 46 30 6E
8CC0: 3A 20 33 32 20 33 30 20 24
8CC8: 38 42 46 30 3A 20 33 32 79
8CD0: 20 33 30 33 30 30 33 33 4E
8CD8: 38 42 46 30 3A 20 33 32 89
8CE0: 20 38 42 46 30 3A 20 33 7F
8CE8: 32 33 32 32 33 33 38 42 93
8CF0: 46 30 3A 20 38 42 46 30 B2
8CF8: 30 38 42 46 46 38 42 42 EC
8D00: 38 38 38 42 45 38 3A 20 C2
8D08: 33 31 20 34 35 20 33 30 79
8D10: 20 33 41 20 32 30 20 33 7A
8D18: 33 20 34 31 20 32 30 20 73
8D20: 37 45 37 45 45 37 37 38 05
8D28: 42 45 38 3A 20 33 31 20 C6
8D30: 34 35 20 33 30 20 33 41 B1
8D38: 20 32 30 20 33 33 20 34 95
8D40: 31 20 32 30 20 38 42 45 D3
8D48: 38 3A 20 33 31 20 34 35 C8
8D50: 20 33 30 20 33 41 20 32 BA
8D58: 30 20 33 33 20 34 31 20 B4
```

```
8D60: 32 30 32 30 30 32 32 38 F1
8D68: 42 45 38 3A 20 33 31 20 07
8D70: 34 35 20 33 30 20 33 41 F1
8D78: 20 32 30 20 33 33 20 34 D5
8D80: 31 20 38 42 45 38 3A 20 24
8D88: 33 31 20 34 35 20 33 30 F9
8D90: 20 33 41 20 32 30 20 33 FA
8D98: 33 20 34 31 34 31 31 34 1C
8DA0: 34 38 42 45 38 3A 20 33 5A
8DA8: 31 20 34 35 20 33 30 20 07
8DB0: 33 41 20 32 30 20 33 33 2E
8DB8: 20 38 42 45 38 3A 20 33 5E
8DC0: 31 20 34 35 20 33 30 20 1F
8DC8: 33 41 20 32 30 20 33 33 46
8DD0: 33 33 33 33 33 38 42 45 90
8DD8: 38 3A 20 33 31 20 34 35 59
8DE0: 20 33 30 20 33 41 20 32 4B
8DE8: 30 20 38 42 45 38 3A 20 8B
8DF0: 33 31 20 34 35 20 33 30 62
8DF8: 20 33 41 20 32 30 32 30 72
8E00: 30 32 32 38 42 45 38 3A C6
8E08: 20 33 31 20 34 35 20 33 69
8E10: 30 20 33 41 20 38 42 45 B4
8E18: 38 3A 20 33 31 20 34 35 98
8E20: 20 33 30 20 33 41 33 41 AC
8E28: 41 33 33 38 42 45 38 3A 02
8E30: 20 33 31 20 34 35 20 33 91
8E38: 30 20 38 42 45 38 3A 20 DA
8E40: 33 31 20 34 35 20 33 30 B1
8E48: 33 30 30 33 33 38 42 45 02
8E50: 38 3A 20 33 31 20 34 35 D0
8E58: 20 38 42 45 38 3A 20 33 FD
8E60: 31 20 34 35 34 35 35 34 ED
8E68: 34 38 42 45 38 3A 20 33 22
8E70: 31 20 38 42 45 38 3A 20 14
8E78: 33 31 33 31 31 33 33 38 11
8E80: 42 45 38 3A 20 38 42 45 5A
8E88: 38 38 38 42 45 45 38 42 78
8E90: 42 38 38 38 42 45 30 3A 6D
8E98: 20 33 36 20 34 36 20 33 FF
8EA0: 36 20 34 36 20 34 36 20 0C
8EA8: 33 36 20 33 36 20 33 39 28
8EB0: 20 43 35 43 35 35 43 43 7D
8EB8: 38 42 45 30 3A 20 33 36 6C
8EC0: 20 34 36 20 33 36 20 34 29
8EC8: 36 20 34 36 20 33 36 20 33
8ED0: 33 36 20 33 39 39 33 33 66
8ED8: 38 45 44 30 3A 20 33 33 8B
8EE0: 20 33 36 20 32 30 20 33 40
8EE8: 33 20 38 45 44 30 3A 20 88
8EF0: 33 33 20 33 36 20 32 30 63
8EF8: 20 33 33 33 33 33 33 33 7F
8F00: 38 45 44 30 3A 20 33 33 B2
8F08: 20 33 36 20 32 30 20 38 6C
8F10: 45 44 30 3A 20 33 33 20 AA
8F18: 33 36 20 32 30 32 30 30 96
8F20: 32 32 38 45 44 30 3A 20 D0
8F28: 33 33 20 33 36 20 38 45 B5
8F30: 44 30 3A 20 33 33 20 33 B8
8F38: 36 33 36 36 33 33 38 45 F1
8F40: 44 30 3A 20 33 33 20 38 CD
8F48: 45 44 30 3A 20 33 33 33 F5
8F50: 33 33 33 33 38 45 44 30 0F
8F58: 3A 20 38 45 44 30 30 38 0D
8F60: 45 44 44 38 45 45 38 38 61
8F68: 38 45 43 38 3A 20 33 36 25
8F70: 20 32 30 20 33 34 20 33 CD
8F78: 36 20 32 30 20 33 33 20 D7
8F80: 33 36 20 32 30 20 33 33 F2
8F88: 33 33 33 33 33 38 45 43 49
8F90: 38 3A 20 33 36 20 32 30 0F
8F98: 20 33 34 20 33 36 20 32 FB
8FA0: 30 20 33 33 20 33 36 20 01
8FA8: 32 30 20 38 45 43 38 3A 5E
8FB0: 20 33 36 20 32 30 20 33 10
8FB8: 34 20 33 36 20 32 30 20 19
8FC0: 33 33 20 33 36 20 32 30 33
8FC8: 32 30 30 32 32 38 45 43 80
8FD0: 38 3A 20 33 36 20 32 30 4F
8FD8: 20 33 34 20 33 36 20 32 3C
8FE0: 30 20 33 33 20 33 36 20 41
8FE8: 38 45 43 38 3A 20 33 36 A5
8FF0: 20 32 30 20 33 34 20 33 4E
8FF8: 36 20 32 30 20 33 33 20 58
9000: 33 36 33 36 36 33 33 38 A7
9008: 45 43 38 3A 20 33 36 20 AC
9010: 32 30 20 33 34 20 33 36 83
9018: 20 32 30 20 33 33 20 38 79
9020: 45 43 38 3A 20 33 36 20 C4
9028: 32 30 20 33 34 20 33 36 9B
9030: 20 32 30 20 33 33 33 33 9F
9038: 33 33 33 38 45 43 38 3A 05
9040: 20 33 36 20 32 30 20 33 9F
9048: 34 20 33 36 20 32 30 20 A8
9050: 38 45 43 38 3A 20 33 36 0D
9058: 20 32 30 20 33 34 20 33 B5
9060: 36 20 32 30 32 30 30 32 DD
9068: 32 38 45 43 38 3A 20 33 21
9070: 36 20 32 30 20 33 34 20 D0
9078: 33 36 20 38 45 43 38 3A 35
9080: 20 33 36 20 32 30 20 33 DF
9088: 34 20 33 36 33 36 36 33 19
9090: 33 38 45 43 38 3A 20 33 4A
9098: 36 20 32 30 20 33 34 20 F8
90A0: 38 45 43 38 3A 20 33 36 5D
90A8: 20 32 30 20 33 34 33 34 1A
90B0: 34 33 33 38 45 43 38 3A 7E
90B8: 20 33 36 20 32 30 20 38 1D
90C0: 45 43 38 3A 20 33 36 20 65
90C8: 32 30 32 30 30 32 32 38 5A
90D0: 45 43 38 3A 20 33 36 20 75
90D8: 38 45 43 38 3A 20 33 36 95
90E0: 33 36 36 33 33 38 45 43 A7
90E8: 38 3A 20 38 45 43 38 38 AC
90F0: 38 45 43 43 38 45 45 38 EF
90F8: 38 38 45 43 30 3A 20 32 AE
```

```
9100: 30 20 33 34 20 33 36 20 61
9108: 32 30 20 33 33 20 33 36 7A
9110: 20 32 30 20 33 34 20 32 6C
9118: 39 32 39 39 32 32 38 45 D7
9120: 43 30 3A 20 32 30 20 33 A3
9128: 34 20 33 36 20 32 30 20 88
9130: 33 33 20 33 36 20 32 30 A2
9138: 20 33 34 20 38 45 43 30 D0
9140: 3A 20 32 30 20 33 34 20 A4
9148: 33 36 20 32 30 20 33 33 BA
9150: 20 33 36 20 32 30 20 33 AF
9158: 34 33 34 34 33 33 38 45 0C
9160: 43 30 3A 20 32 30 20 33 E3
9168: 34 20 33 36 20 32 30 20 C8
9170: 33 33 20 33 36 20 32 30 E2
9178: 20 38 45 43 30 3A 20 32 16
9180: 30 20 33 34 20 33 36 20 E1
9188: 32 30 20 33 33 20 33 36 FA
9190: 20 32 30 32 30 30 32 32 0A
9198: 38 45 43 30 3A 20 32 30 46
91A0: 20 33 34 20 33 36 20 32 04
91A8: 30 20 33 33 20 33 36 20 09
91B0: 38 45 43 35 20 34 33 34 62
91B8: 33 33 34 34 39 31 42 30 64
91C0: 3A 20 33 38 20 34 35 20 30
91C8: 39 31 42 30 3A 20 33 38 6B
91D0: 20 34 35 34 35 35 34 34 61
91D8: 39 31 42 30 3A 20 33 38 7B
91E0: 20 39 31 42 30 3A 20 33 6B
91E8: 38 33 38 38 33 33 39 31 95
91F0: 42 30 3A 20 39 31 42 30 9A
91F8: 30 39 31 42 42 39 31 31 B3
9200: 39 39 39 31 41 38 3A 20 B0
9208: 33 30 20 32 30 20 33 33 74
9210: 20 33 33 20 32 30 20 39
```

LAZYBASIC
FROM PAGE 26

Beginning address in hex: C000
Ending address in hex: C6C6
SYS to start: 49152
***Flankspeed* required for entry! See page 85.**

```
C000: 78 A9 3F 8D 14 03 A9 C0 70
C008: 8D 15 03 A9 21 8D 02 03 0B
C010: A9 C0 8D 03 03 58 60 20 E6
C018: 9F FF 4C 02 C1 18 4C 31 5D
C020: EA A9 CE 85 5F A9 C3 85 5B
C028: 60 A9 C6 85 5A A9 C6 85 CE
C030: 5B A9 F8 85 58 A9 06 85 41
C038: 59 20 BF A3 4C 83 A4 A5 2F
C040: C5 C9 40 D0 06 8D EA C2 22
C048: 4C AF C0 CD EA C2 F0 5F D0
C050: 8D EA C2 A2 03 DD EB C2 BD
C058: F0 05 CA 10 F8 30 50 8A 2D
C060: AE 8D 02 E0 01 D0 10 C9 2B
C068: 03 F0 3B C9 02 F0 34 C9 52
C070: 01 F0 2A C9 00 F0 29 C9 3A
C078: 03 F0 0C C9 02 F0 1B C9 1A
C080: 01 F0 14 C9 00 F0 0D A9 F7
C088: 7B 8D 23 C1 A9 11 8D 1C DA
C090: C1 4C 02 C1 4C 88 C1 4C 45
C098: 95 C1 4C 9C C1 4C B7 C1 60
C0A0: 4C A3 C1 4C CB C1 4C D8 51
C0A8: C1 20 9F FF 4C 02 C1 4C 86
C0B0: 31 EA 38 E9 7F AA A0 FF B9
C0B8: CA F0 08 C8 B9 9E A0 10 4E
C0C0: FA 30 F5 C8 B9 9E A0 30 D3
C0C8: 05 20 D6 C0 D0 F5 29 7F F4
C0D0: 20 EF C0 4C 31 EA E0 00 EA
C0D8: D0 0A A2 20 8E 77 02 A2 21
C0E0: 14 8E 78 02 8D 79 02 EE F5
C0E8: E5 C0 EE EE C0 60 02 20 B0
C0F0: E4 C0 A9 79 8D E5 C0 AD 9B
C0F8: EE C0 85 C6 A9 02 8D EE 1D
C100: C0 60 A5 C5 C9 40 D0 06 6D
C108: 8D EA C2 4C 2B C1 CD EA 35
C110: C2 F0 18 8D EA C2 A2 12 CB
C118: DD F8 C2 F0 11 CA 10 F8 87
C120: 30 5F BD 7B C3 4C B2 C0 6C
C128: 4C 31 EA 4C A9 C0 E0 07 2F
C130: 10 03 4C 22 C1 E0 10 F0 55
C138: 08 A9 20 8D 77 02 4C 6D CA
C140: C1 A9 83 A0 C3 20 1E AB 7D
C148: A9 00 85 C6 A9 31 8D 14 BA
C150: 03 A9 EA 8D 15 03 A9 83 BA
C158: 8D 02 03 A9 A4 8D 03 03 CC
C160: A9 57 8D 24 03 A9 F1 8D 3F
C168: 25 03 4C 31 EA A9 14 8D 44
C170: 78 02 EE E5 C0 EE EE C0 1F
C178: BD E8 C2 20 EF C0 4C 31 30
C180: EA A9 00 85 C6 4C 9F C2 10
C188: A9 48 8D 23 C1 A9 05 8D 29
C190: 1C C1 4C 02 C1 A9 59 8D 0F
C198: 23 C1 10 F1 A9 6A 8D 23 44
C1A0: C1 10 EA AD 21 D0 18 69 7E
C1A8: 01 C9 10 F0 06 8D 21 D0 F9
C1B0: 4C 31 EA A9 00 90 F6 AD F7
C1B8: 20 D0 18 69 01 C9 10 F0 F6
C1C0: 06 8D 20 D0 4C 31 EA A9 57
C1C8: 00 90 F6 A9 1C 20 FC C1 F4
C1D0: 8D 3F C3 A2 FF 6C 00 03 73
C1D8: A9 08 20 FC C1 8D 43 C3 FD
C1E0: 8D 3D C3 A5 15 8D 42 C3 BD
C1E8: 8D 3C C3 A9 1F 8D 24 03 F3
C1F0: A9 C2 8D 25 03 A9 00 8D 4A
C1F8: 45 C3 10 D7 A0 C3 20 1E 8C
C200: AB 20 60 A5 86 7A 84 7B D2
C208: 20 73 00 AA F0 F3 A2 FF CD
C210: 86 3A 90 01 18 20 6B A9 AF
C218: A9 00 85 C6 A5 14 60 20 48
C220: 57 F1 08 85 FB C9 0D F0 BA
C228: 04 A5 FB 28 60 E6 C8 A5 AB
C230: C8 CD 45 C3 F0 04 30 02 F6
C238: 10 0C A9 57 8D 24 03 A9 B3
C240: F1 8D 25 03 B0 E3 A9 0D 33
```

```
C248: 20 D2 FF A5 D6 8D 3B C3 44
C250: CE 3B C3 86 FC 84 FD AD D1
C258: 42 C3 AE 43 C3 85 62 86 82
C260: 63 8E 3D C3 8D 3C C3 A2 83
C268: 90 38 20 49 BC 20 DD BD 13
C270: A2 00 BD 01 01 F0 07 9D 68
C278: 77 02 E8 4C 72 C2 E8 86 CB
C280: C6 8E 45 C3 AD 43 C3 18 AB
C288: 6D 3F C3 8D 43 C3 90 03 21
C290: EE 42 C3 A6 FC A4 FD AD 79
C298: 3B C3 85 D6 4C 29 C2 AD D9
C2A0: AD C3 C9 99 D0 06 20 BF 2C
C2A8: C2 4C AF C2 20 D4 C2 A2 84
C2B0: 00 BD AD C3 E8 9D D0 06 3D
C2B8: E0 20 D0 F5 4C 31 EA A2 8B
C2C0: 00 BD AD C3 29 7F 9D AD E3
C2C8: C3 A9 1E 9D F8 06 E8 E0 BA
C2D0: 20 D0 EE 60 A2 00 BD AD 1F
C2D8: C3 18 69 80 9D AD C3 A9 57
C2E0: 20 9D F8 06 E8 E0 20 D0 58
C2E8: ED 60 3E 04 05 06 03 25 AC
C2F0: 28 29 23 24 22 FF 5B 5D 64
C2F8: 0A 1C 14 12 0E 15 1A 1D 9F
C300: 21 22 25 2A 24 27 26 29 2D
C308: 3E 57 48 41 54 27 53 20 16
C310: 59 4F 55 52 20 4C 49 4E 64
C318: 45 23 3A 00 0D 4A 55 4D B4
C320: 50 20 42 45 54 57 45 45 4E
C328: 4E 20 4C 49 4E 45 53 20 33
C330: 28 31 2D 32 35 35 29 3A B6
C338: 20 00 20 17 00 47 09 05 E4
C340: 04 40 00 4C 0D 03 02 F0 D3
C348: B6 AF C6 C1 C7 A0 9C 9D D9
C350: BE 83 96 86 80 BD 81 B8 28
C358: A1 8D 89 85 B5 C8 C3 9B 74
C360: 93 BC CA A2 82 A8 9F C2 AB
C368: 97 B9 98 87 8F 8C 8E C9 4E
C370: BB 8A 94 B4 BF A6 BA A9 CA
C378: 90 C4 9E A3 C0 A7 B7 C5 F5
C380: 95 92 A9 12 4F 4B 21 21 41
C388: 2D 2D 49 27 4D 20 44 45 4A
C390: 41 44 21 21 20 53 59 53 78
C398: 34 39 31 35 32 20 54 4F 62
C3A0: 20 52 45 56 49 56 45 20 B3
C3A8: 4D 45 21 92 00 99 8F 95 AD
C3B0: A0 88 89 94 A0 94 88 85 3B
C3B8: A0 97 92 8F 8E 87 A0 8B 55
C3C0: 85 99 AD 94 92 99 A0 81 70
C3C8: 87 81 89 8E A1 20 20 20 EB
C3D0: 20 86 B1 20 20 20 20 20 C9
C3D8: 86 B3 20 20 20 20 20 20 D3
C3E0: 20 86 B5 20 20 20 20 20 DD
C3E8: 20 20 20 20 86 B7 20 20 E7
C3F0: 20 20 20 20 20 20 81 2D 60
C3F8: 2D 01 02 13 20 20 20 20 BC
C400: 07 0F 13 15 02 20 20 81 02
C408: 20 10 12 09 0E 14 23 20 B8
C410: 20 20 20 20 14 01 02 28 CF
C418: 20 20 2D 2D 81 20 82 2D 04
C420: 2D 01 0E 04 20 20 20 20 E0
C428: 07 0F 14 0F 20 20 20 82 44
C430: 20 12 05 01 04 20 20 20 CC
C438: 20 20 20 20 14 01 0E 20 FB
C440: 20 20 2D 2D 82 20 83 2D 2E
C448: 2D 01 13 03 20 20 20 20 0D
C450: 09 0E 10 15 14 20 20 83 64
C458: 20 12 05 0D 20 20 20 20 1D
C460: 20 20 20 20 14 08 05 0E 10
C468: 20 20 2D 2D 83 20 84 2D 58
C470: 2D 01 14 0E 20 20 20 20 41
C478: 09 0E 14 20 20 20 20 84 A8
C480: 20 12 05 13 14 0F 12 05 05
C488: 20 20 20 20 15 13 12 20 63
C490: 20 20 2D 2D 84 20 85 2D 82
C498: 2D 03 08 12 24 20 20 20 67
C4A0: 0C 05 06 14 24 20 20 85 B5
C4A8: 20 12 05 14 15 12 0E 20 49
C4B0: 20 20 20 20 16 01 0C 20 74
C4B8: 20 20 2D 2D 85 20 86 2D AC
C4C0: 2D 03 0C 0F 13 05 20 20 64
C4C8: 0C 05 0E 20 20 20 20 86 EE
C4D0: 20 12 09 07 08 14 24 20 73
C4D8: 20 20 20 20 16 05 12 09 8F
C4E0: 06 19 2D 2D 86 20 87 2D B5
C4E8: 2D 03 0C 12 20 20 20 20 B7
C4F0: 0C 09 13 14 20 20 20 87 15
C4F8: 20 12 0E 04 20 20 20 20 BD
C500: 20 20 20 20 17 01 09 14 B5
C508: 20 20 2D 2D 87 20 88 2D FF
C510: 2D 03 0D 04 20 20 20 20 D1
C518: 0C 0F 01 04 20 20 20 88 21
C520: 20 12 15 0E 20 20 20 20 F5
C528: 20 20 20 20 25 20 20 20 2E
C530: 20 20 2D 2D 88 20 89 2D 2A
C538: 2D 03 0F 13 20 20 20 20 0B
C540: 0C 0F 07 20 20 20 20 89 6C
C548: 20 13 01 16 05 20 20 20 F7
C550: 20 20 20 20 28 20 20 20 59
C558: 20 20 2D 2D 89 20 8A 2D 54
C560: 2D 04 01 14 01 20 20 20 08
C568: 0D 09 04 24 20 20 20 8A 91
C570: 20 13 07 0E 20 20 20 20 39
C578: 20 20 20 20 29 20 20 20 82
C580: 20 20 2D 2D 8A 20 8B 2D 7E
C588: 2D 04 05 06 20 20 20 20 45
C590: 0E 05 17 20 20 20 20 8B C6
C598: 20 13 09 0E 20 20 20 20 63
C5A0: 20 20 20 20 23 20 20 20 A4
C5A8: 20 20 2D 2D 8B 20 8C 2D A8
C5B0: 2D 04 09 0D 20 20 20 20 78
C5B8: 0E 05 18 14 20 20 20 8C E4
C5C0: 20 13 10 03 28 20 20 20 8F
C5C8: 20 20 20 20 24 20 20 20 CD
C5D0: 20 20 2D 2D 8C 20 8D 2D D2
C5D8: 2D 05 0E 04 20 20 20 20 9D
C5E0: 0E 0F 14 20 20 20 20 8D 20
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 83 and 84 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
C5E8: 20 13 11 12 20 20 20 20 BF
C5F0: 20 20 20 20 22 20 20 20 F3
C5F8: 20 20 2D 2D 8D 20 8E 2D FC
C600: 2D 05 18 10 20 20 20 20 DA
C608: 0F 10 05 0E 20 20 20 8E 29
C610: 20 13 14 05 10 20 20 20 CC
C618: 20 20 20 20 5E 20 20 20 57
C620: 20 20 2D 2D 8E 20 8F 2D 26
C628: 2D 06 0F 12 20 20 20 20 FC
C630: 10 05 05 0B 20 20 20 8F 45
C638: 20 13 14 0F 10 20 20 20 FE
C640: 20 20 20 20 1B 20 20 20 3C
C648: 20 20 2D 2D 8F 20 90 2D 50
C650: 2D 06 12 05 20 20 20 20 1B
C658: 10 0F 0B 05 20 20 20 90 78
C660: 20 13 14 12 24 20 20 20 3E
C668: 20 20 20 20 1D 20 20 20 66
C670: 20 20 2D 2D 90 20 91 2D 7A
C678: 2D 07 05 14 20 20 20 20 46
C680: 10 0F 13 20 20 20 20 91 C4
C688: 20 13 19 13 20 20 20 20 68
C690: 20 20 20 A0 84 89 85 A1 C6
C698: A1 20 2D 2D 91 20 20 20 A6
C6A0: 20 86 B1 20 20 20 20 20 99
C6A8: 86 B3 20 20 20 20 20 20 A3
C6B0: 20 86 B5 20 20 20 20 20 AD
C6B8: 20 20 20 20 86 B7 20 20 B7
C6C0: 20 20 20 20 20 20 FF 81
```

QUEEN'S AND BISHOP'S TOURS

FROM PAGE 41

```
·10 REM - QUEEN'S & BISHOP'S TOURS                    JB
·20 REM - FOR THE COMMODORE 128                       BD
·30 REM - DANIEL MILLER                               DK
·40 REM - 2815 34 STREET                              OA
·50 REM - ASTORIA, NEW YORK   11103                   NM
·60 REM - 12/28/85                                    GG
·70 GOTO890                                           DF
·80 SPRITE CH,1,1,0,0,0,0:MOVSPR CH,40,14
0                                                     LP
·90 CHAR 1,5,22,"[BLACK]PLACE ":IF CH=1 T
HEN PRINT"QUEEN";:ELSE PRINT"BISHOP";                 FA
·100 PRINT" AT (ROW,[RVSON]COL[RVSOFF]):[
4" "][3"[LEFT]"]";                                    GF
·110 GETKEY R$                                        BH
·120 FOR X=1 TO 8:IF R$<>MID$("12345678",
X,1) THEN NEXT:GOTO110:ELSE PRINT R$;:R1
=VAL(R$)                                              MO
·130 GETKEY C1$                                       DI
·140 FOR X=1 TO 8:IF C1$<>MID$("ABCDEFGH"
,X,1) THEN NEXT:GOTO130:ELSE PRINT C1$:C
1=ASC(C1$)-64                                         DO
·150 IF CH=1 THEN170:ELSE RC=(R1-1)*8+C1:
IF MID$(B$,RC,1)="1" THEN170:ELSE MSG$="
INVALID LOCATION"                                     DF
·160 CHAR 1,12,24,MSG$:SLEEP3:CHAR 1,12,2
4,"[19" "]":GOTO90                                    FG
·170 DX=DX+(C1-1)*24:DY=DY+(R1-1)*16:MOVS
PR CH,DX,DY                                           CJ
·180 CHAR 1,5,22,"[30" "]":DT=0:RETURN                JB
·190 PRINT"[CLEAR]":PRINTTAB(12)"[RVSON][
BLACK]"HDG$(CH)"[RVSOFF]":COLOR0,16                   BF
·200 PRINT"[HOME][4"[DOWN]"]" TAB(9)"[BLA
CK][RVSON]A[RVSOFF] [RVSON]B[RVSOFF] [
RVSON]C[RVSOFF] [RVSON]D[RVSOFF] [RVSO
N]E[RVSOFF] [RVSON]F[RVSOFF] [RVSON]G[
RVSOFF] [RVSON]H[RVSOFF]"                             CH
·210 PRINTTAB(6)"[BLACK]1 ";:R=1:GOSUB290 PE
·220 PRINTTAB(6)"[BLACK]2 ";:R=2:GOSUB290 OG
·230 PRINTTAB(6)"[BLACK]3 ";:R=3:GOSUB290
:CHAR 1,34,9,"[BLACK]MOVE":PRINT"[DOWN]" ID
·240 PRINTTAB(6)"[BLACK]4 ";:R=4:GOSUB290 MO
·250 PRINTTAB(6)"[BLACK]5 ";:R=5:GOSUB290 PE
·260 PRINTTAB(6)"[BLACK]6 ";:R=6:GOSUB290 OG
·270 PRINTTAB(6)"[BLACK]7 ";:R=7:GOSUB290 BM
·280 PRINTTAB(6)"[BLACK]8 ";:R=8:GOSUB290
:IF DT=0 THEN300:ELSE GOSUB80:GOTO300                 IL
·290 FOR C=1 TO 8:PRINTA$(RC(R,C));U$;:NE
XT:PRINT"[DOWN]":RETURN                               AO
·300 IF F1=0 THEN IF (CH=1 AND SLV=192) O
R (CH=2 AND SLV=158) THEN730:ELSE IF (CH
=1 AND SLV=192) OR (CH=2 AND SLV=158) TH
EN YN$="N":GOTO790                                    HC
·310 FR$=STR$(R1)+C1$:FR=(R1*10)+(ASC(C1$
)-64):C1=ASC(C1$)-64                                  PO
·320 CHAR 1,12,22,"[BLACK]FROM: ":CHAR 1,
17,22,FR$                                             DL
·330 CHAR 1,24,22,"TO:[3" "][4"[LEFT]"]"              HL
·340 IF F1=1 THEN READ TU$:R2=VAL(LEFT$(T
U$,1)):C2$=RIGHT$(TU$,1):C2=ASC(C2$)-64:
CHAR 1,28,22,TU$:GOTO400                              IJ
·350 GETKEY R2$                                       EG
·360 IF R2$=CHR$(133) THEN MSG$="[BLACK]C
OMPUTER SOLUTION (Y/N): ":GOTO760                     PE
·370 FOR X=1 TO 8:IF R2$<>MID$("12345678"
,X,1) THEN NEXT X:R2$="":GOTO350:ELSE R2
=VAL(R2$):CHAR 1,28,22,R2$                            FL
·380 GETKEY C2$                                       DP
·390 FOR X=1 TO 8:IF C2$<>MID$("ABCDEFGH"
,X,1) THEN NEXT X:C2$="":GOTO380:ELSE CH
AR 1,29,22,C2$:C2=ASC(C2$)-64                         OB
·400 TU=(R2*10)+C2:IF CH=1 THEN410:ELSE I
F RC(R2,C2)<>3 THEN410:ELSE MSG$="SPACE
OCCUPIED":GOTO730                                     IJ
·410 FT=ABS(FR-TU):ON CH GOTO420,440                  EB
·420 IF FT=9 OR FT=11 OR FT<=7 OR FT<=77
THEN430:ELSE MSG$="INVALID MOVE":GOTO730              BF
·430 IF FT<=7 THEN XY=FT:GOTO460:ELSE IF
FT/10=INT(FT/10) THEN XY=INT(FT/10):GOTO
460                                                   EA
```

```
·440 IF (FT/11<>INT(FT/11)) AND (FT/9<>IN
T(FT/9)) THEN MSG$="INVALID MOVE":GOTO73
0                                          ON
·450 IF FT/9=INT(FT/9) THEN XY=FT/9:GOTO4
60:ELSE XY=FT/11                           OC
·460 RO=R1:CO=C1                           MD
·470 IF R1>R2 THEN IF C1>C2 THEN X1=1:Y1=
-1:XZ=1:GOTO550                            II
·480 IF R1>R2 THEN IF C1<C2 THEN X1=-1:Y1
=-1:XZ=2:GOTO550                           FL
·490 IF R1<R2 THEN IF C1<C2 THEN X1=-1:Y1
=1:XZ=3:GOTO550                            BA
·500 IF R1<R2 THEN IF C1>C2 THEN X1=1:Y1=
1:XZ=4:GOTO550                             JK
·510 IF R1=R2 THEN IF C1<C2 THEN X1=-1:Y1
=0:XZ=5:GOTO550                            DM
·520 IF R1<R2 THEN IF C1=C2 THEN X1=0:Y1=
1:XZ=6:GOTO550                             KE
·530 IF R1>R2 THEN IF C1=C2 THEN X1=0:Y1=
-1:XZ=7:GOTO550                            HC
·540 IF R1=R2 THEN IF C1>C2 THEN X1=1:Y1=
0:XZ=8                                     OG
·550 L=0:LL=1:LP=1:DO UNTIL LP>XY          KH
·560 MOVSPR CH,DX-24*X1,DY+16*Y1           IE
·570 DX=DX-24*X1:DY=DY+16*Y1               FE
·580 RC(RO,CO)=3                           CH
·590 ON XZ GOTO600,610,620,630,640,650,66
0,670                                      BH
·600 RO=RO-1:CO=CO-1:GOTO680               FE
·610 RO=RO-1:CO=CO+1:GOTO680               EP
·620 RO=RO+1:CO=CO+1:GOTO680               FC
·630 RO=RO+1:CO=CO-1:GOTO680               GP
·640 CO=CO+1:GOTO680                       AH
·650 RO=RO+1:GOTO680                       EF
·660 RO=RO-1:GOTO680                       BC
·670 CO=CO-1                               MP
·680 LP=LP+1:LOOP                          AF
·690 MV=MV+1:MV$=STR$(MV):CHAR 1,33,11,MV
$                                          JO
·700 SLV=0:FOR R=1 TO 8:FOR C=1 TO 8:SLV=
SLV+RC(R,C):NEXTC,R:IF (CH=1 AND SLV=192
) OR (CH=2 AND SLV=158) THEN MSG$="[c 3]
CONGRATULATIONS!!"                         OJ
·710 R1=R2:C1$=C2$:FR$="":TU$="":CT=FRE(0
):GOTO200                                  BL
·720 REM - MESSAGE RTN.                    OP
·730 T=(20-LEN(MSG$)/2):FORX=1TO5:CHAR 1,
T,24,MSG$,1:SLEEP1:CHAR 1,T,24,MSG$,0:SL
EEP1:NEXT                                  CB
·740 CHAR 1,T,24,"[17" "]":IF (CH=1 AND S
LV=192) OR (CH=2 AND SLV=158) THEN YN$="
N":GOTO790:ELSE GOTO200                    KL
·750 REM - COMPUTER SOLUTION               NO
·760 F1=1:T=(20-LEN(MSG$)/2):CHAR 1,T,24,
MSG$                                       IA
·770 GETKEY YN$                            HB
·780 IF YN$<>"Y" AND YN$<>"N" THEN770:ELS
E CHAR 1,T,24,"[25" "]"                    KG
·790 IF YN$="Y" THEN830:ELSE MSG$="[BLACK
]TRY AGAIN (Y/N): ":KEY1,"GRAPHIC"         KL
·800 T=(20-LEN(MSG$)/2):CHAR 1,T,24,MSG$   NI
·810 GETKEY YN$                            HB
·820 IF YN$<>"Y" AND YN$<>"N" THEN810:ELS
E IF YN$="Y" THEN SPRITE CH,0:RUN:ELSE C
HAR 1,11,24," [BLACK]THANKS FOR PLAYING"
:SLEEP 3:SPRITE CH,0:PRINT"[CLEAR]":END    DF
·830 MV=0:CHAR 1,33,11,"[4" "]":ON CH GOT
O850,870:REM - AUTOSOLVE MODE              FJ
·840 REM - QUEEN'S TOUR                    BI
·850 RESTORE1190:DX=88:DY=89:R1=1:C1$="A"
:GOTO1080                                  NH
·860 REM - BISHOP'S TOUR                   GD
·870 RESTORE1220:DX=256:DY=201:R1=8:C1$="
H":GOTO1080                                MH
·880 REM - INTRO & INIT                    KL
·890 DIM A$(3),HDG$(2),RC(8,8)             NN
·900 PRINT"[CLEAR]"TAB(8)"[WHITE]CHESSBOA
RD TOURS - C128":PRINT:PRINT"  LEAD THE
QUEEN OR THE BISHOP ON A TOUR":PRINT" OF
 THE CHESSBOARD."                          PN
·910 PRINT:PRINT"  THE QUEEN MAY MOVE PAR
ALLEL TO THE":PRINT" SIDES OF THE BOARD
OR DIAGONALLY FOR":PRINT" ANY NUMBER OF
SQUARES.  THE QUEEN MUST  FINISH ON";      PP
·920 PRINT" THE SAME SQUARE ON WHICH SHE"
:PRINT" STARTED.  VISIT ALL THE SQUARES
IN":PRINT" 14 MOVES.":PRINT                EO
·930 PRINT"  THE BISHOP MUST VISIT ALL TH
E WHITE":PRINT" SQUARES IN 17 MOVES.  TH
E BISHOP MOVES"                            EL
·940 PRINT" DIAGONALLY AND MAY BEGIN AND
END ON":PRINT" DIFFERENT SQUARES."         KM
·950 PRINT:PRINT"  PRESS 'F1' TO END EITH
ER PUZZLE.":PRINT" YOU MAY ALSO SEE THE
COMPUTER SOLVE":PRINT" THE PUZZLES."       NF
·960 CHAR 1,7,24,"PRESS <RETURN> TO CONTI
NUE"                                       KD
·970 GETKEY RT$                            GE
·980 IF RT$<>CHR$(13) THEN RT$="":GOTO970  BM
·990 PRINT"[CLEAR]"TAB(12)"[WHITE]CHESSBO
ARD TOURS":CHAR 1,10,7,"1. QUEEN'S TOUR"
:CHAR 1,10,8,"2. BISHOP'S TOUR":CHAR 1,1
0,9,"3. END PROGRAM"                       HP
·1000 CHAR 1,14,12,"ENTER CHOICE: "        EE
·1010 GETKEY CH$                           FB
·1020 IF CH$<"1" OR CH$>"3" THEN CH$="":G
OTO1010:ELSE CH=VAL(CH$):IF CH=3 THEN KE
Y1,"GRAPHIC":END                           BN
·1030 CHAR 1,28,12,CH$                     AG
·1040 A$(1)="[RVSON][WHITE][3" "][DOWN][3
"[LEFT]"][3" "][RVSOFF]":A$(2)="[RVSON][
RED][3" "][DOWN][3"[LEFT]"][3" "][RVSOFF
]":A$(3)="[RVSON][BLUE][3"[c +]"][DOWN][
3"[LEFT]"][3"[c +]"][RVSOFF]"              JH
·1050 IF CH=1 THEN A$(3)="[RVSON][YELLOW]
[3" "][DOWN][3"[LEFT]"][3" "][RVSOFF]"     LC
```

```
·1060 U$="[UP]":F1=0                                          KG
·1070 HDG$(1)=" THE QUEEN'S TOUR ":HDG$(2
 )="THE BISHOP'S TOUR"                                        ON
·1080 B$="121212122121212112121212212121212
 112121212221212121121212122121212121"                       BO
·1090 X=1:FOR R=1 TO 8:FOR C=1 TO 8:RC(R,
 C)=VAL(MID$(B$,X,1)):X=X+1:NEXTC,R                           EN
·1100 IF F1=1 THEN MOVSPR CH,DX,DY:GOTO20
 0                                                            GA
·1110 IF CH=1 THEN RESTORE1180:ELSE RESTO
 RE1210                                                       IP
·1120 FOR X=(3584+((CH-1)*64)) TO (3646+(
 (CH-1)*64)):READ DT:POKE X,DT:NEXT                           IP
·1130 DT=1:DX=89:DY=89                                        IJ
·1140 KEY1,CHR$(133):REM - 'F1'                               LD
·1150 GOTO190                                                 CK
·1160 REM - SPRITE DATA & SOLUTIONS                           PP
·1170 REM - QUEEN                                             DH
·1180 DATA ,,,,,,,,,,,,,32,,128,112,8,80,
 248,80,43,254,160,21,37,64,10,170,128,7,
 255,,,112,,,112,,,112,,1,252,,7,255,,,,,
 ,,,,,,,,,,,,255                                              BF
·1190 DATA 1H,8H,2B,2H,8B,4B,8F,8C,4G,8G,
 3B,3F,8A,1A                                                  LK
·1200 REM - BISHOP                                            IA
·1210 DATA ,,,,,,,32,,,32,,1,252,,,32,,,3
 2,,2,34,,1,36,,,168,,,112,,,112,,,112,,,
 112,,1,252,,7,255,,,,,,,,,,,,,,,0                           PO
·1220 DATA 4D,7A,8B,2H,1G,3E,6H,8F,3A,1C,
 2D,1E,4H,8D,5A,3C,1A                                         AC
```

SHAKER
FROM PAGE 45

Starting address in hex: C000
Ending address in hex: C878
SYS to start: 49152

```
C000: 4C 77 C7 A9 00 8D 20 D0 B3
C008: 8D 21 D0 8D 15 D0 8D 10 98
C010: D0 AA BD EE C0 20 D2 FF EB
C018: E8 E0 2E D0 F5 A0 00 8C 04
C020: 3C 03 8C 3D 03 8C 3E 03 F9
C028: A2 03 8E 40 03 A0 01 B9 FA
C030: CE 04 09 80 20 4A C1 AD 66
C038: 00 DC 29 0F 49 0F 85 FB 27
C040: B9 CE 04 29 7F 99 CE 04 E1
C048: A5 FB 29 04 F0 07 88 C0 58
C050: 00 D0 02 A0 05 A5 FB 29 93
C058: 08 F0 07 C8 C0 06 D0 02 BA
C060: A0 01 84 FC A2 07 A0 07 D4
C068: 18 20 F0 FF A4 FC B9 1B 08
C070: C1 4A 4A 4A 4A 18 69 30 0D
C078: 20 D2 FF B9 1B C1 29 0F 3A
C080: 18 69 30 20 D2 FF B9 20 FE
C088: C1 4A 4A 4A 4A 18 69 30 25
C090: 20 D2 FF B9 20 C1 29 0F 57
C098: 18 69 30 20 D2 FF AD 00 EA
C0A0: DC 29 10 D0 8A 8C 3F 03 E0
C0A8: B9 1B C1 8D 43 03 B9 20 EC
C0B0: C1 8D 42 03 A2 00 BD 26 CB
C0B8: C1 20 D2 FF E8 E0 23 D0 2B
C0C0: F5 AD 3F 03 4A 4A 4A 4A CF
C0C8: 18 69 30 20 D2 FF AD 3F 5A
C0D0: 03 29 0F 18 69 30 20 D2 B0
C0D8: FF A9 0A 85 FB A2 00 A0 51
C0E0: 00 88 D0 FD CA D0 FA C6 95
C0E8: FB A5 FB D0 F0 60 93 05 41
C0F0: 53 48 41 4B 45 52 11 11 D2
C0F8: 42 59 20 4A 4F 48 4E 20 05
C100: 46 45 44 4F 52 0D 11 11 A0
C108: 4C 45 56 45 4C 3A 20 31 0D
C110: 32 33 34 35 0D 11 42 4F 8E
C118: 4E 55 53 3A 00 02 05 07 57
C120: 10 00 60 20 80 90 93 0D 62
C128: 0D 0D 0D 0D 0D 0D 0D 0D 90
C130: 0D 0D 0D 20 20 20 20 20 F7
C138: 20 20 20 20 20 20 20 20 39
C140: 20 20 20 4C 45 56 45 4C 1A
C148: 3A 20 99 CE 04 84 FC A0 31
C150: 40 A2 00 CA D0 FD 88 D0 26
C158: FA A4 FC 60 AD 3F 03 4A 8F
C160: 4A 4A 4A 0A 85 FB 0A 0A DE
C168: 18 65 FB 85 FB AD 3F 03 53
C170: 29 0F 18 65 FB AA E0 0B B8
C178: 90 02 A2 0B A9 BF 38 E9 44
C180: 10 CA D0 FA 8D 41 03 60 59
C188: A0 0A AE 41 03 CA D0 FD BF
C190: 88 D0 F7 60 78 A2 00 A9 07
C198: 32 9D 00 D0 18 69 1E E8 C1
C1A0: E8 E0 0E D0 F4 A2 00 A9 8A
C1A8: 8B 9D 01 D0 E8 E8 E0 0E 64
C1B0: D0 F7 58 A9 7F 8D 15 D0 6E
C1B8: 8D 1C D0 A9 00 8D 10 D0 4B
C1C0: 8D 17 D0 8D 1D D0 AA A9 06
C1C8: FF 9D F8 07 A9 02 9D 27 D6
C1D0: D0 E8 E0 08 D0 F1 A9 01 E0
C1D8: 8D 25 D0 60 A2 00 8A 9D 87
C1E0: 44 03 E8 E0 08 D0 F8 60 24
C1E8: A2 00 8A 9D 00 D4 E8 E0 52
C1F0: 18 D0 F8 A9 0F 8D 18 D4 06
C1F8: 60 AD 04 DC 85 8B 6D 05 6B
C200: DC 85 8C 6D 06 DC 85 8D 52
C208: 6D 07 DC 85 8E 66 8C 66 C6
C210: 8E 26 8D 26 8B 26 8E 66 1F
C218: 8D 26 8C 66 8B 66 8D EA 29
C220: A2 00 B5 8B C9 07 90 08 6D
C228: E8 E0 05 D0 F5 4C F9 C1 C5
C230: AA 60 A2 00 BD DD C2 20 5C
C238: D2 FF E8 E0 16 D0 F5 20 D1
C240: DC C1 20 94 C1 A0 00 84 7A
C248: FB 20 F9 C1 BD 44 03 D0 F5
C250: F8 A9 01 9D 44 03 A9 F8 7B
C258: 8D 06 D4 A9 4C 8D 01 D4 1A
C260: 86 FC A2 00 A0 00 88 D0 80
```

```
C268: FD CA D0 FA A9 81 8D 04 B9
C270: D4 A2 01 86 FD A2 01 86 97
C278: FE A5 FC 0A AA FE 01 D0 9F
C280: 20 D2 C2 A6 FE E8 E0 0A AF
C288: D0 ED A2 01 86 FE A5 FC 13
C290: 0A AA DE 01 D0 20 D2 C2 AB
C298: A6 FE E8 E0 13 D0 ED A2 7C
C2A0: 01 86 FE A5 FC 0A AA FE 7D
C2A8: 01 D0 20 D2 C2 A6 FE E8 BE
C2B0: E0 0A D0 ED A6 FC A9 FF A7
C2B8: 9D F8 07 A6 FD E8 E0 03 C7
C2C0: D0 B1 A9 80 8D 04 D4 A4 78
C2C8: FB C8 C0 06 F0 03 4C 47 DB
C2D0: C2 60 A0 0A A2 00 CA D0 DC
C2D8: FD 88 D0 FA 60 93 05 53 77
C2E0: 48 41 4B 49 4E 47 20 53 08
C2E8: 49 58 20 43 41 4E 53 2E FE
C2F0: 20 20 0D 93 05 4D 49 58 C5
C2F8: 49 4E 47 20 54 48 45 20 F9
C300: 43 41 4E 53 2E 0D A2 00 04
C308: BD F3 C2 20 D2 FF E8 E0 39
C310: 13 D0 F5 A2 01 86 FB 20 30
C318: 94 C1 20 F9 C1 86 FC 20 ED
C320: F9 C1 86 FD A5 FC C5 FD C6
C328: B0 ED A6 FC BD 44 03 A8 18
C330: A6 FD BD 44 03 A6 FC 9D 1B
C338: 44 03 A6 FD 98 9D 44 03 A1
C340: A0 1A A5 FC 0A AA FE 01 52
C348: D0 A5 FD 0A AA DE 01 D0 22
C350: 88 84 02 20 88 C1 A4 02 70
C358: D0 E8 38 A5 FD E5 FC 85 56
C360: FE A0 1D 18 65 FE 88 D0 F2
C368: FA 85 FE A8 A5 FC 0A AA E7
C370: FE 00 D0 A5 FD 0A AA DE 77
C378: 00 D0 88 84 02 20 88 C1 C2
C380: A4 02 D0 E8 A0 1A A5 FC 3E
C388: 0A AA DE 01 D0 A5 FD 0A 9B
C390: AA FE 01 D0 88 84 02 20 3B
C398: 88 C1 A4 02 D0 E8 A6 FB E5
C3A0: E8 E0 10 F0 03 4C 15 C3 93
C3A8: 60 AA AA AA 80 00 02 80 0C
C3B0: 00 02 80 00 02 80 00 02 B7
C3B8: 80 00 02 80 00 02 80 00 3E
C3C0: 02 80 00 02 80 00 02 80 48
C3C8: 00 02 80 00 02 80 00 02 CF
C3D0: 80 00 02 80 00 02 80 00 56
C3D8: 02 80 00 02 80 00 02 80 60
C3E0: 00 02 80 00 02 AA AA AA 65
C3E8: FF 00 00 00 2A AA A8 2A 90
C3F0: 56 A8 2A 69 A8 2A 56 A8 55
C3F8: 2A 6A A8 2A 6A A8 2A AA 48
C400: A8 2A 55 A8 2A 69 A8 2A 37
C408: 69 A8 2A 69 A8 2A 55 A8 7E
C410: 2A AA A8 2A 56 A8 2A 69 4A
C418: A8 2A 56 A8 2A 6A A8 2A 51
C420: 6A A8 2A AA A8 00 00 00 B0
C428: A2 00 BD A9 C3 9D 80 3F 53
C430: E8 E0 80 D0 F5 60 93 05 3A
C438: 43 48 4F 4F 53 45 20 54 6F
C440: 48 45 20 43 4F 52 52 45 6A
C448: 43 54 20 43 41 4E 2E 0D 0E
C450: A2 00 BD 36 C4 20 D2 FF 9E
C458: E8 E0 1A D0 F5 20 94 C1 79
C460: A0 00 A9 FE 99 F8 07 AD F0
C468: 00 DC 29 0F 49 0F 85 FB 57
C470: 84 FC 20 81 C6 A4 FC A9 A5
C478: FF 20 24 C6 A5 FB 29 04 52
C480: F0 11 88 A9 21 8D 04 D4 3C
C488: A9 20 8D 04 D4 C0 FF D0 4A
C490: 02 A0 06 A5 FB 29 08 F0 FC
C498: 11 C8 A9 21 8D 04 D4 A9 4D
C4A0: 20 8D 04 D4 C0 07 D0 02 C1
C4A8: A0 00 AD 00 DC 29 10 D0 DD
C4B0: B1 84 FC B9 44 03 F0 16 EB
C4B8: A9 81 8D 04 D4 A9 05 8D 86
C4C0: 01 D4 20 E5 C7 20 11 C8 5E
C4C8: 20 48 C8 4C 5A C5 A9 21 31
C4D0: 8D 04 D4 A9 05 8D 01 D4 49
C4D8: 20 D2 C2 18 69 06 C9 F0 D0
C4E0: 90 F3 A9 20 20 8C C6 EA 8D
C4E8: EA EA A9 F8 8D 06 D4 A2 6C
C4F0: 00 86 FD A2 11 8E 04 D4 90
C4F8: CA 8E 04 D4 20 81 C6 20 B3
C500: 81 C6 20 81 C6 20 81 C6 19
C508: A6 FD E8 E0 05 90 E2 78 67
C510: F8 18 AD 3C 03 6D 42 03 C0
C518: 8D 3C 03 AD 3D 03 6D 43 83
C520: 03 8D 3D 03 AD 3E 03 69 49
C528: 00 8D 3E 03 18 AD 3C 03 FB
C530: 69 50 8D 3C 03 AD 3D 03 A4
C538: 69 02 8D 3D 03 AD 3E 03 60
C540: 69 00 8D 3E 03 AD 3F 03 68
C548: 69 01 8D 3F 03 D8 58 A9 5D
C550: 00 8D 42 03 8D 43 03 4C 43
C558: A7 C5 78 F8 38 AD 40 03 60
C560: E9 01 8D 40 03 D8 58 A9 F6
C568: 20 8D 04 D4 A9 F8 8D 06 25
C570: D4 A2 00 BD 44 03 F0 04 E1
C578: E8 4C 73 C5 86 FD A2 00 0E
C580: 86 FE A9 FE A6 FD 9D F8 E9
C588: 07 A9 21 8D 04 D4 20 D2 B3
C590: C2 A9 20 8D 04 D4 A6 FD 28
C598: A9 FF 9D F8 07 20 D2 C2 95
C5A0: A6 FE E8 E0 24 D0 D9 A9 88
C5A8: 00 8D 18 D4 8D 15 D0 A2 39
C5B0: 00 BD 2D C6 20 D2 FF E8 3E
C5B8: E0 30 D0 F5 A2 03 A0 07 DD
C5C0: 18 20 F0 FF A2 02 BD 3C 88
C5C8: 03 4A 4A 4A 4A 18 69 30 A6
C5D0: 20 D2 FF BD 3C 03 29 0F F8
C5D8: 18 69 30 20 D2 FF CA E0 29
C5E0: FF D0 E3 A2 05 A0 13 18 09
C5E8: 20 F0 FF AD 40 03 4A 4A 7F
C5F0: 4A 4A 18 69 30 20 D2 FF 2A
C5F8: AD 40 03 29 0F 18 69 30 D3
C600: 20 D2 FF A2 07 A0 0F 18 64
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 83 and 84 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
C608: 20 F0 FF AD 3F 03 4A 4A 9D
C610: 4A 4A 18 69 30 20 D2 FF 49
C618: AD 3F 03 29 0F 18 69 30 F1
C620: 20 D2 FF 60 99 F8 07 20 2D
C628: 81 C6 A4 FC 60 93 05 0D 18
C630: 0D 0D 53 43 4F 52 45 3A 02
C638: 0D 0D 43 48 41 4E 43 45 F5
C640: 53 20 52 45 4D 41 49 4E 71
C648: 49 4E 47 3A 0D 0D 43 55 14
C650: 52 52 45 4E 54 20 4C 45 8E
C658: 56 45 4C 3A 0D 20 03 C0 6B
C660: 20 E8 C1 20 28 C4 20 5C B4
C668: C1 20 32 C2 20 D2 C2 20 15
C670: D2 C2 20 06 C3 20 D2 C2 A5
C678: 20 D2 C2 20 50 C4 4C 92 42
C680: C6 A2 40 A0 00 88 D0 FD 22
C688: CA D0 FA 60 8D 04 D4 4C 32
C690: D2 C2 AD 40 03 F0 1F A2 C9
C698: 18 A0 05 18 20 F0 FF A2 22
C6A0: 00 BD 26 C7 20 D2 FF E8 28
C6A8: E0 1D D0 F5 AD 00 DC 29 21
C6B0: 10 D0 F9 4C 60 C6 AD 3E EA
C6B8: 03 CD 4E 03 90 2A F0 02 88
C6C0: B0 14 AD 3D 03 CD 4D 03 91
C6C8: 90 1E F0 02 B0 08 AD 3C 0D
C6D0: 03 CD 4D 03 90 12 AD 3C 7E
C6D8: 03 8D 4C 03 AD 3D 03 8D 34
C6E0: 4D 03 AD 3E 03 8D 4E 03 FE
C6E8: A2 00 BD 43 C7 20 D2 FF 47
C6F0: E8 E0 34 D0 F5 A2 0B A0 04
C6F8: 0C 18 20 F0 FF A2 02 BD 90
C700: 4C 03 4A 4A 4A 4A 18 69 F9
C708: 30 20 D2 FF BD 4C 03 29 61
C710: 0F 18 69 30 20 D2 FF CA 8E
C718: E0 FF D0 E3 AD 00 DC 29 61
C720: 10 D0 F9 4C 82 C7 50 52 34
C728: 45 53 53 20 46 49 52 45 5B
C730: 42 55 54 54 4F 4E 20 54 82
C738: 4F 20 54 52 59 20 41 47 50
C740: 41 49 4E 0D 0D 47 41 4D 09
C748: 45 2D 4F 56 45 52 0D 0D 12
C750: 48 49 47 48 20 53 43 4F 77
C758: 52 45 3A 0D 0D 50 52 45 2C
C760: 53 53 20 46 49 52 45 42 90
C768: 55 54 54 4F 4E 20 54 4F C7
C770: 20 53 54 41 52 54 0D A9 D6
C778: 00 8D 4C 03 8D 4D 03 8D C0
C780: 4E 03 AD 00 DC 29 10 F0 86
C788: F9 4C D6 C7 00 00 00 00 6D
C790: 00 00 00 00 00 00 0C 00 9C
C798: 00 E2 C0 03 1C 90 01 BB A8
C7A0: 60 0D DD 98 26 3A CE 1D D0
C7A8: DD 9A 3A 88 76 07 77 A0 79
C7B0: 0A E1 D0 0E 6E A0 01 DB 67
C7B8: 40 03 76 C0 00 4D 00 00 80
C7C0: E6 00 00 1C 00 00 24 00 E7
C7C8: 00 3C 00 00 AE 26 D0 E8 93
C7D0: 8E 26 D0 4C 31 EA 78 A9 E0
C7D8: CC 8D 14 03 A9 C7 8D 15 5E
C7E0: 03 58 4C 5D C6 A9 77 8D 5B
C7E8: 0F D0 A6 FC E8 A9 14 18 2B
C7F0: 69 1E CA D0 FA 8D 0E D0 7B
C7F8: A9 FC 8D FF 07 A2 00 8A 61
C800: 9D 00 3F E8 E0 40 D0 F8 B0
C808: A9 FF 8D 1C D0 8D 15 D0 9F
C810: 60 A0 14 A9 05 84 02 85 DF
C818: FF 98 18 65 02 65 02 A8 40
C820: B9 8C C7 99 00 3F B9 8D 4E
C828: C7 99 01 3F B9 8E C7 99 73
C830: 02 3F 20 D2 C2 20 D2 C2 DC
C838: A4 02 88 A5 FF 8D 01 D4 70
C840: 18 69 05 C0 FF D0 CE 60 87
C848: A0 00 A5 FF 84 02 85 FF 9A
C850: 98 18 65 02 65 02 A8 A9 22
C858: 00 99 00 3F 99 01 3F 99 A4
C860: 02 3F 20 D2 C2 20 D2 C2 0D
C868: A4 02 C8 A5 FF 8D 01 D4 E0
C870: 38 E9 05 C0 15 D0 D5 60 74
C878: 00 78
```

TRACKDOWN
FROM PAGE 80

C-64 VERSION

```
·10 REM *** TRACKDOWN (64) *** BUCK CHILD
 RESS (11/07/85) ***                          LM
·20 REM *** P.O. BOX 13575 SALEM, OR 9730
 9 ***                                        DC
·30 PRINTCHR$(147)"LOADING AND CHECKING D
 ATA.":PRINT                                  BG
·40 FORJ=53000TO53157:READA:POKEJ,A:X=X+A
 :NEXTJ                                       GO
·50 IFX<>24385THENPRINT"ERROR IN DATA.":E
 ND                                           FC
·60 PRINT"DATA OK.":PRINT:PRINT"SYS 53[3"
 0"] TO ACTIVATE.":END                        BO
·70 DATA162,0,172,1,8,200,200,132,253,169
 ,8,133                                       PF
·80 DATA254,161,253,141,166,207,230,253,1
 61,253,141,167                               GC
·90 DATA207,230,253,169,5,141,168,207,169
 ,8,133,252                                   FD
·100 DATA162,0,173,168,207,133,251,173,16
 8,207,197,251                                OM
·110 DATA208,22,201,6,240,18,161,251,201,
 34,240,4                                     AH
·120 DATA201,35,208,8,169,6,141,168,207,7
 6,44,207                                     OG
·130 DATA161,253,240,7,193,251,240,39,76,
 153,207,161                                  ML
·140 DATA251,240,44,32,159,207,32,159,207
```

```
,161,253,240                                                    NB
·150 DATA60,32,159,207,161,253,141,166,20
7,32,159,207                                                    FH
·160 DATA161,253,141,167,207,32,159,207,7
6,44,207,230                                                    AA
·170 DATA251,161,251,240,6,32,159,207,76,
51,207,174                                                      NF
·180 DATA166,207,173,167,207,32,205,189,1
69,13,32,210                                                    BP
·190 DATA255,32,159,207,76,44,207,230,253
,208,2,230,254,96                                               BC
```

VIC 20 Bug Repellent required for proofreading. See April '86 *Ahoy!* or any previous issue.

VIC 20 VERSION

```
·10 REM *** TRACKDOWN (VIC-20) *** BUCK C
HILDRESS (11/07/85) ***                                         KE
·20 REM *** P.O. BOX 13575 SALEM, OR 9730
9 ***                                                           HH
·30 POKE55,76:POKE56,29:CLR                                     JK
·40 PRINTCHR$(147)"LOADING AND":PRINT"CHE
CKING DATA.":PRINT                                              BJ
·50 FORJ=7500TO7657:READA:POKEJ,A:X=X+A:N
EXTJ                                                            NJ
·60 IFX<>22021THENPRINT"ERROR IN DATA.":E
ND                                                              IA
·70 PRINT"DATA OK.":PRINT:PRINT"SYS 7500
TO ACTIVATE.":END                                               MP
·80 DATA162,0,172,1,16,200,200,132,253,16
9,16,133                                                        PK
·90 DATA254,161,253,141,234,29,230,253,16
1,253,141,235                                                   DI
·100 DATA29,230,253,169,5,141,236,29,169,
16,133,252                                                      FC
·110 DATA162,0,173,236,29,133,251,173,236
,29,197,251                                                     LJ
·120 DATA208,22,201,6,240,18,161,251,201,
34,240,4                                                        AH
·130 DATA201,35,208,8,169,6,141,236,29,76
,112,29                                                         NN
·140 DATA161,253,240,7,193,251,240,39,76,
221,29,161                                                      MJ
·150 DATA251,240,44,32,227,29,32,227,29,1
61,253,240                                                      JI
·160 DATA60,32,227,29,161,253,141,234,29,
32,227,29                                                       BP
·170 DATA161,253,141,235,29,32,227,29,76,
112,29,230                                                      AJ
·180 DATA251,161,251,240,6,32,227,29,76,1
19,29,174                                                       HH
·190 DATA234,29,173,235,29,32,205,221,169
,13,32,210                                                      MF
·200 DATA255,32,227,29,76,112,29,230,253,
208,2,230,254,96                                                PA
```

SCUTTLEBUTT

Continued from page 14

fuel pump problems actual pilots faced while diving. Both simulator and game scenarios are provided, the latter giving any number of players a chance to shoot down enemy aircraft. Number of kills and flight hours are recorded on a separate disk so that succeeding flights can become tougher.

Macbeth ($25.00) consists of separate text adventures covering four stages of Shakespeare's play, from the young Macbeth's attempt to suppress the rebels in the service of his king to the desperation of the tyrant trapped in his fiery castle. In between, you'll help the three witches concoct their evil brew and, as Lady Macbeth, determine how to murder the king in his bed. Each stage is accompanied by a psychological program in which you try to determine what motivated the characters' murderous acts.

Mission on Thunderhead ($25.00), a futuristic bivouac with over 50 rooms and 4 mazes, contains two scenarios: Operation Tempest (find the device needed to destroy the complex and free the human race) and The Final Appeal (a planetwide scavenger hunt to find the necessary objects to open the Freedom Gate).

Previously available on Atari, *Gulf Strike* places you in far-off 1987, following a Russian invasion of Iran. As the U.S. commander, you must direct a multinational force to repel the invasion; or, as the Soviet commander, use your momentum to capture the oil fields in northern Iran before the American army and airpower push you back. Featured are air strikes, ranger drops, anti-sub warefare, and solitaire and two-player modes.

The Avalon Hill Game Company, Microcomputer Games Division, 301-254-9200 or 800-638-9292 (see address list, page 82).

First called Diablotin in Europe, where it was invented over 50 years ago, *Diablo* for the Amiga involves moving a ball along 232 sections of constantly shifting tracks arranged on 116 moving panels. Price is under $50.

Classic Image Inc., 201-389-3633 (see address list, page 82).

...COMING IN THE JULY ISSUE OF *AHOY!* (ON SALE JUNE 3)...

INSIDE THE AMIGA
DETAILED HARDWARE REVIEW

LOOPS GALORE
A LOOK AT CONDITIONAL BRANCHING

CHESS PROGRAMS
FOR THE 64 AND 128

The Infinity Machine holds the secret of eternal life!



This could be the most exciting product for the C64 in 1986!

MAKES ALMOST IMPOSSIBLE ARCADE GAMES EASY TO MASTER . . .

An innovative 'hi tech' import that will shock some U.S. software publishers . . .

Q: What is the Infinity Machine?
A: *A unique* **and revolutionary accessory for the** *Commodore 64 and 128.* **This powerful cartridge now lets you effortlessly play all those impossible games without being killed!**
Q: Sounds difficult.
A: **It's Simple – Just plug into your C64/128 and press a button to activate the Infinity Shield.**
Q: How does it work?
A: **All the thousands of published action and animated games that use a programming device called "Sprite collision detection", are disabled by the Infinity Machine and the Infinity Shield protects the player from being shot or crashing!**
Q: What can I now do in a game that I couldn't before?
A: **Activating the cartridge enables you to:– "Enter a game at any level you choose". "Explore all the areas and levels of the game and find the parts of the game you didn't know existed without being killed." Deactivating the cartridge at any point you choose enables you to continue to play the game totally normally.**

The Infinity Machine is brought to you at $24.99 by Mastertronic, producers of incredible value Commodore 64/128K software such as Slugger, 5-a-side Soccer and The Last V8 all available at $9.99.



Reader Service No. 275

Contact the Mastertronic hot line for the secret of eternal life on 301-695 8877.
Mastertronic International Inc., 7311b Grove Road, Frederick, Maryland 21701

LEADER BOARD™

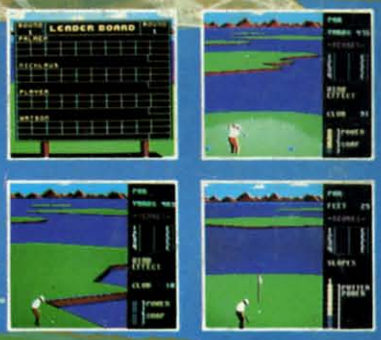
"Pro Golf Simulator"
By Bruce & Roger Carver

Access welcomes you to the exciting world of professional golf with **LEADER BOARD**. With amazingly realistic 3-D animation, golfers will face multiple 18-hole golf courses that demand strategy, total concentration and control to come in under par.

LEADER BOARD is the most realistic golf game available because it is actually a simulator that gives you a true perspective view of your golf game.

There are three levels of play so you can compete from amateur to touring professional. You'll get all the fun, aggravation and stimulation of true golf competition!

- **Suggested Retail Price $39.95**
- **1 to 4 Players**
- **Choice of Club, Distance, Type of Shot (hook, slice, putting) and More**
- **Realistic Sound**
- **Joystick Controlled**
- **Multiple 18-Hole Golf Courses**
- **Automatic Scoring**
- **Disk: Commodore 128/64, Amiga, Atari 520ST**
- **Practice Driving Range**



FEATURES
- SECURITY KEY
- UNLIMITED BACKUPS
- FAST LOAD OPTION
- WORKS ON ALL DISK DRIVES

ALSO NEW FROM ACCESS

MACH128™

Commodore 128/1571

MACH 128 is a multi-featured enhancement package for the Commodore 128 computer in either the native 128 or C-64 emulation mode. The easy-to-use cartridge inserts into the expansion port of the Commodore 128 and provides a switch to select the operational mode. A handy reset button is also provided on the cartridge for "warm starts" of the computer.

MACH 128 speeds program loading by as much as 500% on the 1541 disk drive or the 1571 disk drive in 1541 mode. In special "warp drive" mode, program loads may be increased up to 700% faster, and "warp" mode may be engaged or disengaged at will. MACH 128 also performs program loads at "burst" speed with the 1571 drive in 128 native operational mode.

- Auto Boot on Reset
- Loads 95% of all Software Including Copy Protected Games
- Full Help Menu at the Touch of a Key
- Eliminate 1541 Disk Rattle
- Print Screen (screen dump to printer)
- Restore Basic Program (old)
- Auto Run any Basic Program
- Open and Close Printer Channels with a Single Key
- Send DOS Command
- Hex, Decimal, Binary Converter
- Mode Select Switch

Suggested Retail Price: $49.95

ACCESS™
Software Incorporated

For mail orders, enclose check or money order, plus $1.00 shipping and handling, and specify machine version desired. Order by phone on VISA, MasterCharge or C.O.D. by calling (801) 298-9077.

ACCESS SOFTWARE, INC. 2561 South 1560 West
Woods Cross, UT 84087

Reader Service No. 274

DON'T MISS THE BOAT!



SUBSCRIBE TO AHOY!

☐ Send me twelve issues of AHOY! for $21.95 ($29.25 Canada & elsewhere). I understand that I will be billed later.

☐ Send me twenty-four issues of AHOY! for $41.75 ($54.25 Canada and elsewhere). I understand that I will be billed later.

NAME_____

ADDRESS_____

CITY_____

STATE_____ ZIP_____

DON'T MISS THE BOAT!



SUBSCRIBE TO THE AHOY! DISK MAGAZINE

☐ Send me 12 issues of the AHOY! Disk Magazine for $88.00 ($115.00 Canada and elsewhere). I understand that I will be billed later.

☐ Send me 24 issues of the AHOY! Disk Magazine for $165.00 ($214.00 Canada and elsewhere). I understand that I will be billed later.

NAME_____

ADDRESS_____

CITY_____

STATE_____ ZIP_____

June 1986 *Ahoy!* Void after June 2, 1986

READER SERVICE CARD

To request additional information on any product advertised or otherwise pictured in this issue of *Ahoy!* that is accompanied by a reader service number, circle the corresponding number below and mail this card. We will promptly forward your request to the designated companies.

101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	210
211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300

A. Please check whether you are...
1. ☐ male 2. ☐ female

B. What is your age?
1. ☐ under 18 2. ☐ 18-24 3. ☐ 25-34
4. ☐ 35-44 5. ☐ 45-54 6. ☐ 55-64 7. ☐ 65+

C. Education level completed
1. ☐ elementary 2. ☐ high school
3. ☐ junior college 4. ☐ college graduate
5. ☐ master's degree 6. ☐ PhD

D. From which of the following sources did you obtain your copy of *Ahoy!*?
1. ☐ newsstand 2. ☐ subscription (mail)
3. ☐ from a friend or family member
4. ☐ other_____

If not currently a subscriber, do you plan to become one?
1. ☐ yes 2. ☐ no

Name_____

Street_____

City_____ State_____ Zip_____

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 65 MT. MORRIS, ILL.

POSTAGE WILL BE PAID BY ADDRESSEE

Ahoy!

P.O. BOX 341
MT. MORRIS, ILL. 61054

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 65 MT. MORRIS, ILL.

POSTAGE WILL BE PAID BY ADDRESSEE

Ahoy!

P.O. BOX 341
MT. MORRIS, ILL. 61054

PLACE
STAMP
HERE

AHOY! MAGAZINE
P.O. Box 2501
Clinton, Iowa 52735