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JANUARY 1985
USA \$2.95 CAN \$3.50

HOT CoCo

THE MAGAZINE FOR TRS-80 COLOR COMPUTER® AND MC-10® USERS.

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Inside

Homespread—A Spreadsheet Anyone Can Use

Reviewed

Dennis Kitz's *Learning the 6809*

Plus: Advice, Utilities, And Tips for Every Color Computer Owner



Enjoy Holiday Savings on All of Our Popular Color Computers

And Start Educational Computing at Home!



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Put Radio Shack's exciting Color Computer 2 and the best in children's software under your tree this Christmas. You'll save money now and delight your family throughout the year!

The Perfect Gift at the Perfect Price

Now you can save up to \$60 on the remarkable Color Computer 2 and enjoy home computing with your children anytime. Just attach the Color Computer 2 to your television set and Radio Shack's easy-to-understand instructions will have you and your children programming right away—even if you've never used a computer before. Or select from dozens of useful programs and colorful game packs to make the Color Computer 2 the perfect computer for everyone at home!

Choose the Model Right for Your Family

Radio Shack offers three affordable models of the Color Computer 2. The 16K Standard BASIC Color Computer 2 includes a typewriter-quality keyboard, compact styling and built-in BASIC language capability. BASIC is a versatile computer language your children may already have used in school. Now they can write their own programs and create spectacular eight-color

graphics at home. And the 16K Standard Color Computer 2 is supported by a full line of quality Radio Shack accessories, so you can expand as your children's interest and skills grow.

The 16K Extended BASIC Color Computer 2 includes the features of the Standard Color Computer 2, plus advanced programming capabilities made possible by the Extended BASIC language. You'll be able to write more sophisticated programs and create high-resolution color graphics using simple one-line commands.

Color Computing for Advanced Programmers

The 64K Extended BASIC Color Computer 2 has the power and performance for advanced home and small-business use. The 64K Extended Color Computer 2 can easily see your children through high school, college and beyond, or stay at home with you to help out with investment analysis, home budgeting, business records and more. With the built-in Extended BASIC, your family can take advantage of 32K memory, enough for many advanced programs and computer games. Add an optional disk drive and operating system and your family can access 64K.

A Terrific Gift to Give or Get!

Take advantage of Radio Shack's special holiday savings on the Color Computer 2. It's a gift your children will use and enjoy, and a handy tool you can use at home or work.

Bring Home the Best in Educational Software

Your children will enjoy Radio Shack's selection of educational software as much as the Color Computer 2. You'll enjoy knowing they're using carefully prepared educational software from the names you can trust: Children's Computer Workshop (a division of CTW—the creators of Sesame Street™), Walt Disney and Spinnaker. Choose from programs to help improve reading, writing, math and science skills for children age 3 and older.

Start Home Computing This Christmas

Radio Shack makes it easy to start computing with your family. Just visit your nearest Radio Shack Computer Center, participating store or dealer for a demonstration of the exciting Color Computer 2 and accessories like printers, cassette recorders, joysticks—even disk drives. And don't forget the software!

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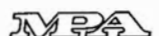
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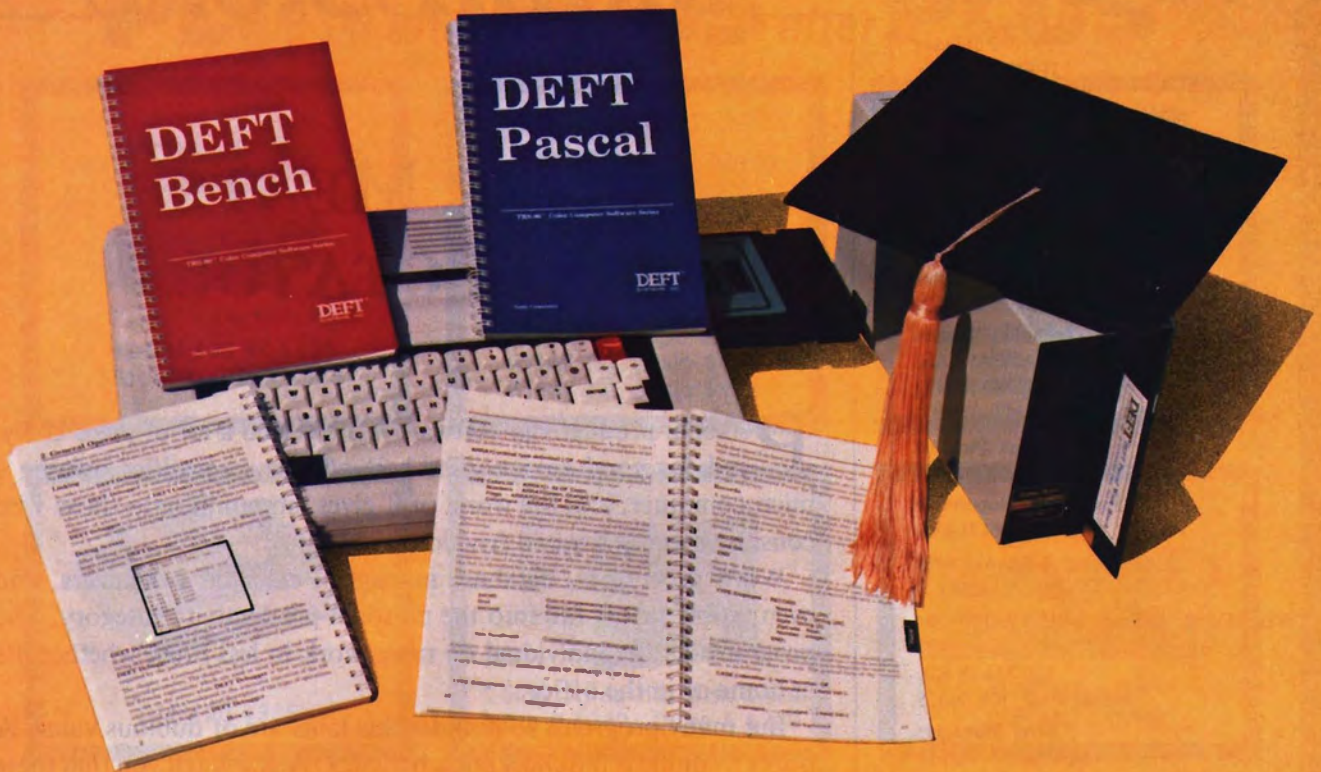
Play this classic strategy game with a friend.
Wally Adams

 This symbol indicates the program's placement on the Instant CoCo loader, available on cassette. See our Instant CoCo ad for details.
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HOT CoCo (ISSN 0740-3186) is published monthly by CW Communications, 80 Pine St., Peterborough, NH, and additional mailing offices. Subscription rates in U.S. are \$24.97 for one year, \$38 for two years, and \$53 for three years. In Canada and Mexico, \$27.97—one year only, U.S. funds. Application to mail at second class postage rates is pending at Peterborough, NH and additional mailing offices. Nationally distributed by International Circulation Distributors. Foreign subscriptions (surface mail), \$44.97—one year only, U.S. funds drawn on a U.S. bank. Foreign subscriptions (air mail), please inquire. In South Africa contact *HOT CoCo*, P.O. Box 782815, Sandton, South Africa 2146. **All subscription correspondence should be addressed to *HOT CoCo*, Subscription Department, P.O. Box 975, Farmingdale, NY 11737. Please include your address label with any correspondence.** Postmaster: Send address changes to *HOT CoCo*, Subscription Services, P.O. Box 975, Farmingdale, NY 11737. Entire contents copyright 1984 by CW Communications/Peterborough, Inc.

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3471

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DIGRESSIONS

OUR MEAT AND POTATOES

Personal-productivity software has received a lot of press lately, and for good reason. The best of it truly justifies owning a microcomputer, and the worst of it gives ammunition to those who consider owning a micro frivolous.

Word processors, database managers, calendar organizers, and even typing tutors fall into the personal-productivity category. The programs let the individual do more work in less time, whether it's at home or in the office.

But many programs sold under this label are of dubious value. A prime example is the checkbook balancer. Ads will tell you that these programs will straighten out your bank book and help you manage your money better. Human nature dictates, however, that if a person cannot keep a written record of check transactions, it is unlikely that this person will do so on a microcomputer. On the other hand, the meticulous record keeper will find little use for such a program, already having an accurate written account.

Personal-productivity software is what makes the microcomputer world go 'round. Games provide entertainment, and programming provides intellectual stimulation. But no one can argue that spreadsheets, word processors, financial-planning programs, and the like haven't made life easier for those owning microcomputers.

One of *HOT CoCo's* main goals is to bring you programs that help you work better at home or in the office. After all, you buy this magazine to make your Color Computer more useful, don't you? Programming techniques are the appetizer, and games are dessert, and we'll give the best of both. But personal-productivity software is our meat and potatoes.

—Michael E. Nadeau

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Back Issues

Yes, back issues of *HOT CoCo* are available for all months. Here's a short list of some of the best of what we've published in the past:

June 1983—The CoCo Word Processor, a serial-to-parallel interface project, and a tutorial on tape reliability

July 1983—How to upgrade your CoCo to 64K

August 1983—Speech synthesis without hardware

September 1983—Disk utilities, character generator

October 1983—Animation techniques, build a biofeedback device

November 1983—Nuclear submarine simulation

December 1983—Education issue

January 1984—Programs for the investor and businessman

February 1984—Simulate Extended Color Basic on Color Basic CoCos

March 1984—How a disk stores information, create your own word-search puzzles

April 1984—Peripherals Buyer's Guide, how to shop for a disk drive

May 1984—OS-9 review, Financial Transactions Tracker program

June 1984—Simulations issue, how to build an Atari joystick interface

July 1984—Build your own lower-case modification

August 1984—Your disk drive as a graphics tool

September 1984—Buyer's Guide to Educational Software

In each back issue, you'll also find our regular features, reviews of popular software and hardware, and dozens of useful programs that are yours for the typing in.

Each back issue costs \$3.50 plus \$1 shipping and handling. On orders of 10 or more back issues, there is a flat \$7.50 shipping and handling fee. Send your orders to *HOT CoCo*, Attn.: Back-Issue Orders, 80 Pine St., Peterborough, NH 03458.

Instant CoCo

This directory lists all programs available on *HOT CoCo's Instant CoCo* cassette. See our ad on page 64 for more details.

Side A

ARTICLE NAME/AUTHOR	PAGE#	FILE	SYSTEM
Copyright Statement	---	TITLE	All
A Productivity Tool for Everyone/Rose	30	HOMESPRD	32K ECB
Use this spreadsheet program at home or in the office.			
Take Stock in CoCo/Christensen	38	STKGRAPH	32K ECB
Track and graph your stocks quickly and easily.			
A Shaper of Screens to Come/Tapanila and Court	46	SCRNFORM	16K CB
Use your CoCo to design textual displays.			
Print It Pretty/Smith	56	LISTING1	16K CB
Create attractive letterheads and graphics with a dot-matrix printer.			
Adding Advantage/Ellis	60	ADDING	16K ECB
Use your CoCo for statistical analysis.			
Side B			
Computer Dating: A Calendar Generator/Hawkins	65	CALENDAR	16K ECB
Make calendars for years to come.			
Machine-Language Disk I/O/Goodwin	---	TAPEDISK	16K
(See December 1984 <i>HOT CoCo</i> , p. 70.)			
CSAVEM" TAPEDISK", 4096,4675,4096			
Save your machine-language programs to disk.			

BONUS PROGRAM

Search for Almazar/Williamson	---	ALMAZAR	32K
Adventure fans will not be disappointed with this complex game.			
		SFAMAIN	DECB
		ORGSMOVE	
		ORGLDES	
		ORGSDES	
		ORGSVOC	
		ORGOBDES	
		ORGRES	

CB = Color Basic, DECB = Disk Extended Color Basic, ECB = Extended Color Basic, (m) = machine-language program (use CLOADM).

Tips on Entering Our Programs

Having trouble entering our listings from the magazine? Here are a few tips that might help.

First, we print all our Basic listings in the CoCo's 32-column format. This means that each line should appear the same on the screen as it does in the magazine. If a line on your screen does not match the same line in the magazine, reread what you have typed; you might have made an error.

Second, make sure the program is for your computer. Read the System Requirements box. The information in this box represents the minimum system configuration needed to run that particular program. Also, read the article thoroughly before typing in the program. Sometimes the article contains instructions vital to making the typed-in listing work. For instance, some CoCos will not accept the high-speed POKE (POKE 65495,0). The article for a program using this POKE will tell you to change those POKEs to 65494,0 if your computer will not work at the faster speed.

Anyone who owns the new CoCos with the 1.2 ROMs, have noticed poor keyboard response in some published programs. To solve this, you can insert this line: FOR Z = 1 TO 4: POKE 340 + Z, 255: NEXT Z after any line that makes reference to PEEK 338-345. This loop will slow down a Basic program. Another way is to directly insert a POKExxx,255, where xxx is any keyboard location between 338 and 345. Example: IF PEEK(341) = 251 THEN POKE 341, 255: Y = Y - 1.

Assembly listings usually require an editor/assembler to enter them into your CoCo. The two most common editor/assemblers are Radio Shack's EDTASM+ and The Micro Works' SDS80C. An Assembly listing assembled using the SDS80C will probably not run under EDTASM+.

If all the above fails, send us a printout or a detailed description of the problem you experience along with any error messages. We'll try to work it out for you. We cannot help you if you have modified the original program.

The **up-arrow** indicates exponentiation on your Color Computer. However, our printer does not have an up-arrow and prints a caret instead. When entering programs from *HOT CoCo*, please change all carets to up-arrows.

Article submissions from our readers are welcomed and encouraged. Inquiries should be addressed to: *HOT CoCo* Submissions Editor, 80 Pine Street, Peterborough, NH 03458. Include an SASE for a copy of our writer's guidelines. Payment for accepted articles is made at a rate of approximately \$50 per printed page; all rights are purchased. Authors of reviews should contact the *HOT CoCo* Review Editor, 80 Pine Street, Peterborough, NH 03458.

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Telewriter-64™

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THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

...one of the best programs for the Color Computer I have seen...

— Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command. The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple. Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminus, etc.).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

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Feedback

Important Spaces

I've received several letters from readers who are having problems with my program, Hurricane Tracker (*HOT CoCo*, August 1984, p.80). All were getting an FC error in line 6020.

The listing is correct as printed. The error occurs in line 6020 when the space before ELSE in line 6000 is omitted. The Color Computer's Basic sees SSELSES1 as one variable name (equivalent to SS) when the space is left out. This causes S1 to receive a value of zero (if SS ≠ SB) or -1 (if SS = SB). Either value will cause a function-call error in 6020 when the computer tries to set the draw scale to S1.

Other lines that include significant spaces are 110, 11050, 11060, 12030, 12050, 13100, 13110, 14010, 14030, and 14050.

The moral of this story is that any time you have a variable name followed by a keyword (such as TO, ELSE, and THEN), be sure to separate them with a space.

Roger Smith
Crestview, FL

Future Remedy

Thank you for reviewing CoCoPort in your October issue (*HOT CoCo*, p.94) and for your helpful comments regarding the documentation. We're happy you think "the quality of the kit is outstanding," and we hope to remedy the discrepancies in future instructions.

Richard B. Fredette
Vice President
Green Mountain Micro

Send your letters to Feedback,
HOT CoCo, 80 Pine St., Peter-
borough, NH 03458.

"Night Racer"

POKE Correction

The double-speed POKE was printed incorrectly in the text for the article "Night Racer" (*HOT CoCo*, November 1984, p.52). It should read POKE 65495,0 instead of POKE 65494,0. The problem is listed correctly.

—eds.

The Rest of K-Lock

We inadvertently left out part of the Assembly version of K-Lock, November, p.42. The missing portion appears on this page.

Also, do not lock the disk that contains your only working copy of K-Lock. If you do so and then turn off your CoCo, you will have no way to unlock that disk until you get another copy of K-Lock.

—eds.

Newer Paintpot

The version of Paintpot reviewed in the October issue (*HOT CoCo*, p.104) was an early version of the program used by mistake instead of the current one. The newer Paintpot has been considerably enhanced and virtually all the weak points mentioned by the reviewer corrected.

The current version can draw or erase lines, boxes, and circles with one keystroke, and the palette can be switched on and off. It expands the paint feature, allowing shapes to be filled with any color. The text capability is also a major addition to the program. One of the printed sample graphics (p.106) shows several of these features, although they weren't in the version used by the reviewer.

Paintpot is the result of an effort to create a graphics program that is easy for young CoCo users, yet fun and useful for older artists. A free game is now included with all orders. I hope this gives a better idea of what buyers can expect for their money.

Tim Skene
6073 Durocher Ave.
Montreal, Quebec H2V 3Y7

Clubhouse

Have a Color Computer Club? Let prospective members know about it through a letter to Feedback.

San Luis Obispo, CA

We're organizing a user's group for owners of TRS-80 computers, including the CoCo, in San Luis Obispo. We meet on the third Tuesday of each month in the Radio Shack store at 209 Madonna Road.

Wes Porter
2840 Halycon Road
Arroyo Grande, CA 93420
805-481-2387

```

02400 FDB $6042
02410 FCB $D9
02420 FCC 'KENNETH'
02430 FDB $604C
02440 FCB $60
02450 FCC 'WUELZE'
02460 FCB $D2
02470 DISK FCC 'DISK' . DISK IS LOCKED
02480 FDB $6049
02490 FDB $5360
02500 FCC 'LOCKE'
02510 FCB $C4
02520 DISKU FCC 'DISK' . DISK IS UNLOCKED
02530 FDB $6049
02540 FDB $5360
02550 FCC 'UNLOCKE'
02560 FCB $C4
02570 SORRY FCC 'SORRY' . SORRY, INVALID PASSWORD
02580 FDB $6C60
02590 FCB $60
02600 FCC 'INVALID'
02610 FCB $60
02620 FCC 'PASSWOR'
02630 FCB $C4
02640 ERROR FCC 'DISK' . DISK ERROR
02650 FCB $60
02660 FCC 'ERRO'
02670 FCB $D2

```

```

02680 PASS FCC 'ENTER' . ENTER PASSWORD
02690 FCB $60
02700 FCC 'PASSWOR'
02710 FCB $C4
02720 LMSG FCC 'LOCKED'
02730 FDB $2020 . LOCKED
02740 FDB $2020
02750 FDB $1000
02760 FDB $0020
02770 FDB $0001
02780 MASK FCB $80 . MASK BIT FOR PRNT
02790 SECCTR FCB 0 . SECTOR COUNTER
02800 COUNT FCB 0 . PASSWORD ATTEMPTS
02810 COMP FCB 0 . COMPARE SAVE CHAR
02820 SAVE FDB 0 . RETURN TO BASIC
02830 IN FDB 0 . PASSWORD BUFFER
02840 FDB 0
02850 FDB 0
02860 FDB 0
02870 FDB 0
02880 FDB 0
02890 FDB 0
02900 ECHO FCB 0 . ECHO FLAG
02910 BUFF1 RMB 256 . GRAN TABLE BUFFER
02920 BUFF2 RMB 16 . DIR BUFFER
02930 B16 RMB 16 . DEAD SPACE
02940 B32 RMB 16 . SECOND DIR ENTRY

```

Missing Portion of K-Lock

Frogmore, LA

I would like to know if other people in the Ferriday/Jonesville area are interested in starting a Color Computer Club.

*George Tanner
Frogmore Pltn.
Frogmore, LA 71335*

West Knoxville, TN

I'm trying to form a CoCo User's Group in the West Knoxville and Lenoir City area. Anyone interested can contact me after 3 p.m. by phone or write to me. I'd also like to exchange programming tips and original software with interested people anywhere.

*Kenneth Duckworth
Rt. 8, Box 223
Lenoir City, TN 37771
615-986-8994*

CoCo Nuts In Portland, OR

We invite anyone in the Portland Metropolitan area to attend meetings of the CoCo Nuts computer club. Meetings are on the first Saturday of every month at the Far West Federal building on 45th and Woodstock. A large program library on tape and disk is available to all members.

CoCo Nuts would like to exchange newsletters with other CoCo clubs.

*Rick Roth
Club President
PO Box 6507
Portland, OR 97228
503-252-5681*

Beckley, WV

I'm forming a computer club for TRS-80s in the Beckley area.

*Greg Reed
Route 2, Box 76-C
Beckley, WV 25801*

Simcoe, Ontario

All CoCo owners or potential owners in the Barrie, Angus-Borden, and surrounding areas are welcome at our club meetings. The new Essa Color Computer Club (ECCC) meets at 7:30 p.m. every other Monday night at the Simcoe St. Public School in Angus. The club's activities include instruction in Basic and Assembly languages, preparation of a newsletter, and discussions on all CoCo-related subjects.

*Eldon Doucet
PO Box 1001
Angus, Ontario
LOM 1B0*

Framingham, MA

The Framingham Computer Club meets at the Nat Walsh Music Studio on the second and the fourth Thursday of every month. The club also runs a BBS on a CoCo that anyone can access at 617-872-5170.

*Mitch Cohen
43 Fox Hill Road
Framingham, MA 01701*

New England

The New England Color Computer User's Group has a new address. We meet every three to four weeks and produce a newsletter every month.

*Chris Sweet
President
N.E.C.C.U.G.
RD 2, Box 261
Harvard, MA 01451*

Northglenn, CO

The Colorado Computer Club meets at 7 p.m. on the first Wednesday of each month at the Westminster Public Library, 3031 W. 76th Ave.

*Lee R. Castens
Colorado Computer Club
PO Box 33492
Northglenn, CO 80233
303-427-1925*

MC-10 Newsletter

Share ideas, tips, and programs for the MC-10 through a newsletter sponsored by the MC-10 Newsletter Club. The newsletter contains articles, BBS listings, and a feedback section for pooled information. The club's annual dues, which include subscription, are \$4.

*Jose J. Bray
4730 Cass St.
San Diego, CA 92109*

Couleur du Quebec

We'd like to tell readers in Montreal that there's a club strictly for the CoCo in their area, Le Club d'Ordinateur Couleur du Quebec Inc. Members meet in Pointe-Aux-Trembles every Wednesday night at 7:30 p.m.

Nous voudrions informer les lecteurs de Montreal que 'Le Club d'Ordinateur Couleur du Quebec Inc.' (TRS-80 couleur seulement) existe. Les membres se reunissent tous les mercredis soir a 19.30 a Pointe-Aux-Trembles.

*Jean-Marie Beaujean
PO Box 452
Succursale P.A.T.
Montreal, Quebec
H1B 5P3
514-270-7507*

Saskatoon, SK

The Saskatoon Color Computer Club (SCCC) is a group of CoCo and CoCo-compatible users that meets biweekly to exchange ideas, programs, and programming tips. We have lessons in Color Basic, Extended Color Basic, and machine language. SCCC has a large club library and produces a monthly newsletter. The many software and hardware hackers in our club are happy to help other members with questions.

*R. Allen Smith
Vice President
S.C.C.C.
One Madison Crescent
Saskatoon, Saskatchewan
S7L 3V7*

On Line

Are you operating a BBS? Drop a note to Feedback and let our readers know about it.

Yonkers, NY

Colorama of Yonkers is now on line. The BBS is in operation 24 hours a day, seven days a week. Colorama has download, boutique, want ads, magazine, graphics, email, and other special features.

*Fred Siudym, Sysop
PO Box 253
Yonkers, NY 10704
914-965-7600 (BBS)*

North West New Jersey

Colorama of North West Jersey is up and running 24 hours a day, seven days a week. The BBS features news, upload and download, want ads, a shop-at-home service, email, and much more.

*Robert Johnson, Sysop
Colorama of North West Jersey
252 RT 46, PO Box 337
Vienna, NJ 07880
201-637-6286 (BBS)*

Hubbards, Nova Scotia

All callers are welcome, 24 hours a day and seven days a week, to link up with the new BBS in Nova Scotia. The system has upload, download, email, a magazine section, an on-line game with scoreboard, and many more sections.

*Bruce A.V. Hall, Sysop
PO Box 49, CFS Mill Cove
Hubbards, Nova Scotia
B0J 1T0
902-857-9843 (BBS)*

Williamsburg, VA

The Great Gamma Color 80 BBS of the Colonial Capitol of Virginia is a new BBS that operates 24 hours. It features down- and uploading, data files, sysop chat, user log, a public message base, and an email order system for information on hardware, software, and service.

*George A. Marsh III
16 Embers Lane
Williamsburg, VA 23185
804-887-5302 (BBS)*

Tallahassee, FL

Four BBSs now operate on a 24-hour basis in the Tallahassee area. A large number of CoCo users access these bulletin board systems, though any computer is suitable. The four boards are: The New Tallahassee Board 904-681-6250, Niteowl 904-386-2618, SBBS 904-893-4839, and Time Lord Research RCPM 904-878-1399.

*John Guy
1679 Kilkenny Drive
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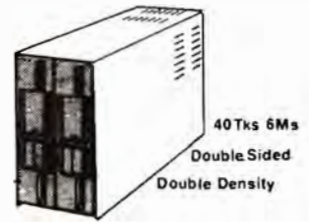
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Columbia, SC

The Midlands 80 Computer Club, which has special sections for the CoCo, has a new number for its TBBS. The new number is 803-776-8261. The BBS operates at 300 or 1,200 baud, 24 hours a day, seven days a week. Your sysop is Ed Sehlhorst.

*Tommy R. Sanders
Midlands 80 Computer Club
PO Box 7594
Columbia, SC 29202*

Tracy, CA

For uploading, downloading, and data files, there's a new Color Computer BBS in the Tracy area that runs on a Silicon Rainbow Products board. The new BBS operates 24 hours a day, seven days a week, and it also supports TRS-80 models III and 4.

*Dennis Neatherland
403 W. 11th St.
Tracy, CA 95376
209-835-6496*

Cleburne, TX

The Dragonfire BBS has just come on line for the Color Computer. The new BBS operates at 300 baud, no parity, seven data bits, and full duplex. Dragonfire communicates with an air of Dungeon-and-Dragons mystery. A section called The Scroll is devoted to fantasy games. The new BBS has all the fea-

tures of other BBSes as well. Dragonfire operates from 10 a.m. to 10 p.m. on weekdays, and 24 hours a day on weekends and holidays.

*James Redmon, Sysop
1004 Berkley Drive
Cleburne, TX 76031
817-641-0133 (BBS)*

Carlisle, Ontario

Dave's CoCo Datacomm is on line 24 hours a day, seven days a week. The BBS features uploading, downloading, message board, and a large on-line shopping section. Sysop David Pearce is glad to chat when he's available.

*David O. Pearce
PO Box #3
Carlisle, Ontario
LOR 1H0
416-689-7950 (BBS)*

Queens, NY

DSS Peripherals has opened a new BBS for the CoCo. The board supports download, upload, and several other interesting features. It replaces The CoCo's Nest BBS, which is no longer operational. The number of the new CoCo's Nest of Bellerose is 718-DIR-0 BBS. The board has a validation process that eliminates some of the problems common to electronic bulletin-board systems.

*Arnie Schiffman, Sysop
Queens, NY*

Kabalarian Philosophy

The Philosophy Bulletin Board has been started by Kabalarian Philosophy, an international organization. It introduces the principles of Kabalarian Philosophy and provides a forum for philosophical dialogue. We are also developing course software to introduce Kabalarian concepts. The organization intends to begin several regional BBSes shortly.

*Dhorea Delain, Editor
Kabalarian Philosophy
908 W. 7th Ave.
Vancouver, BC
V5Z 1C3
733-1000 (BBS)*

OS-9 SIG on CompuServe

The CompuServe OS-9 Forum is a new special-interest group that provides OS-9 users with a message section, real-time conversation, formal instruction, and access to a large section of useful programs for downloading. To access a more extensive library, you can also join the OS-9 User's Group. The fees for the user's group are \$25 annually. Call 800-848-8199 for more information about hooking up to CompuServe.

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18 Brook Village Court
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The Basic Beat

Have you come up with any uses for arrays that I didn't mention last month? There are always new ways to use your computer. The gamblers out there might like a program that picks lottery numbers. In Illinois, you pick six numbers from 1 to 44 and you win various amounts of money if four, five, or six of your numbers match those the state has chosen.

Program Listing 1 generates six numbers from 1 to 44, but you can easily adapt it for any state's system. Line 20 set the FOR loop for the six numbers. Line 40 makes it so the program won't pick the same number twice, and line 50 prints out the winning number. (Do you really think so?) I'll take 10 percent of your winnings.

PRINT@

In order to use high-speed CHR\$ graphics, you must know how to use the PRINT@ command, which will let you print a string or numeric value anywhere on the screen. Program Listings 2 and 3 show some of the advantages of PRINT@. Listing 2 covers the screen with numbers from 1 to 100, and Listing 3 displays

HIGH-SPEED CHR\$ GRAPHICS AND THE PRINT COMMAND

by James W. Wood

these numbers at the same screen position. Each new number erases the previous one.

The Color Computer's video screen has 32 columns and 16 rows, giving a total of 512 PRINT@ positions, numbered from 0 to 511. The command, PRINT@ 100, "COMPUTER" prints the C in position 100, the O in 101, the M in 102, and so on. To find position 100, add 96 from the left side of the chart to the 4 from the top row. The row and column meet at position 100.

When you run Program Listing 4, the "HI" erases the "THERE." It is usually best to end PRINT@ statements with a semicolon; retype line 30, but add a semicolon after the second quote.

Does Program Listing 5 print on the bottom line? Yes, but not because you ended line 20 with a semicolon. The PRINT command extended to the end of the bottom row. Whenever anything is printed

at position 511, the screen scrolls upward, a feature that goes into many scrolling arcade-type games. Program Listing 6 demonstrates a possible game background. Call it "Number Run."

Now that you can print letters or numbers at any position, I'll show you how to print graphics using something called ASCII (American Standard Codes for Information Interchange) codes, the standard numeric codes that computers change into electric signals to send messages to printers or to each other. Program Listing 7 uses ASCII codes to create the alphabet.

The ASCII codes up to number 128 include such characters as upper- and lowercase letters and numbers and are pretty much the same for all brands of computer. The codes from 128-255 let you create graphics.

The characters that these codes generate on the Color Computer screen are unique. For example, the character the PRINT CHR\$(187) creates on the CoCo are different than those for the same command on the Model III or the Apple.

Program Listing 8 shows you all the graphics available. Each PRINT@ position contains four SET positions in a two-by-two pat-

Continues on p. 17

```
10 DIMA(44)
20 FOR B=1 TO 6
30 R=RND(44)
40 IF A(R)=1 THEN 30 ELSE A(R)=1
50 PRINTR;
60 NEXT B
```

Program Listing 1

```
10 CLS
20 FOR A=1 TO 100
30 PRINTA
40 NEXT A
```

Program Listing 2

```
10 CLS
20 FOR A=1 TO 100
30 PRINT@80,A
40 NEXT A
```

Program Listing 3

```
10 CLS
20 PRINT@115,"THERE"
30 PRINT@110,"HI"
```

Program Listing 4

System Requirements
4K RAM
Color Basic

```
10 CLS
20 PRINT@480,"BOTTOM LINE"
30 GOTO30
```

Program Listing 5

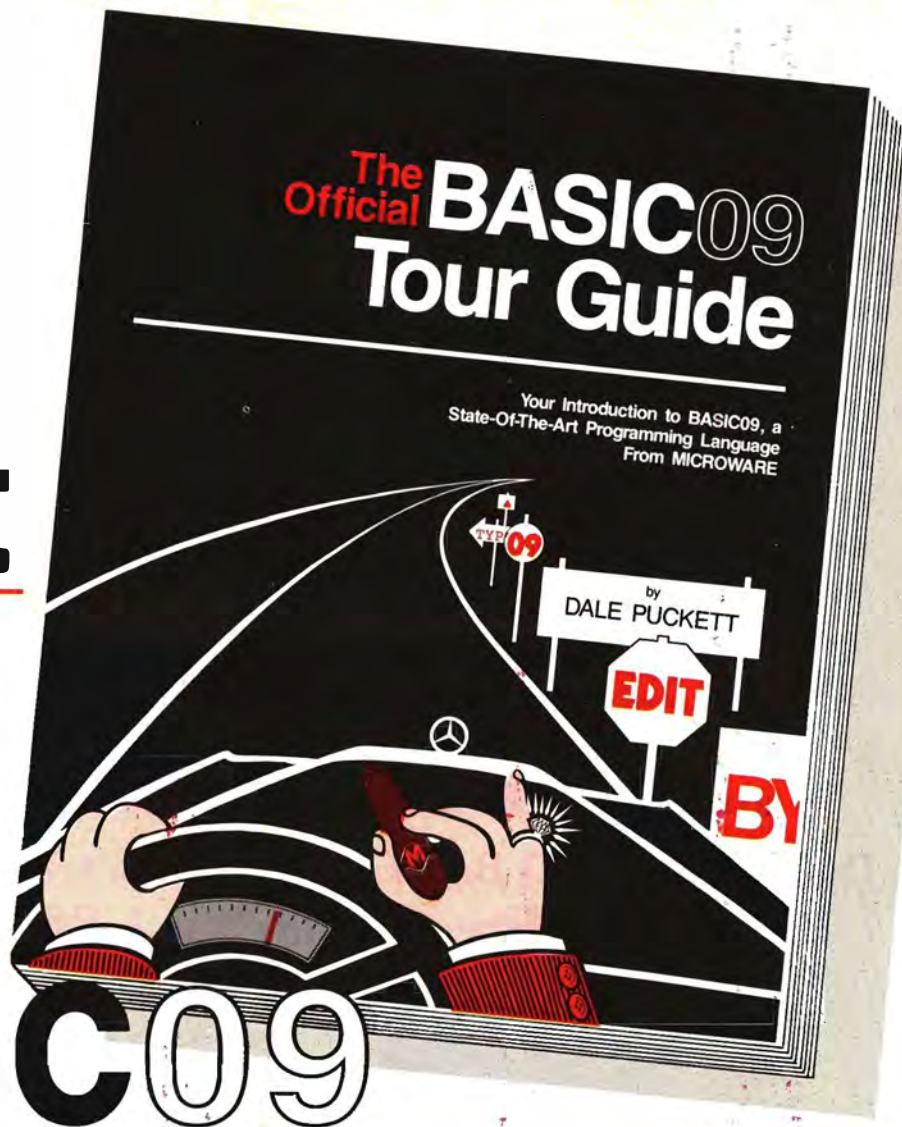
```
10 CLS
20 PRINT@480+RND(30),RND(9)
30 GOTO20
```

Program Listing 6

```
10 CLS
20 FOR A=65 TO 90
30 PRINTCHR$(A);
40 NEXT A
```

Program Listing 7

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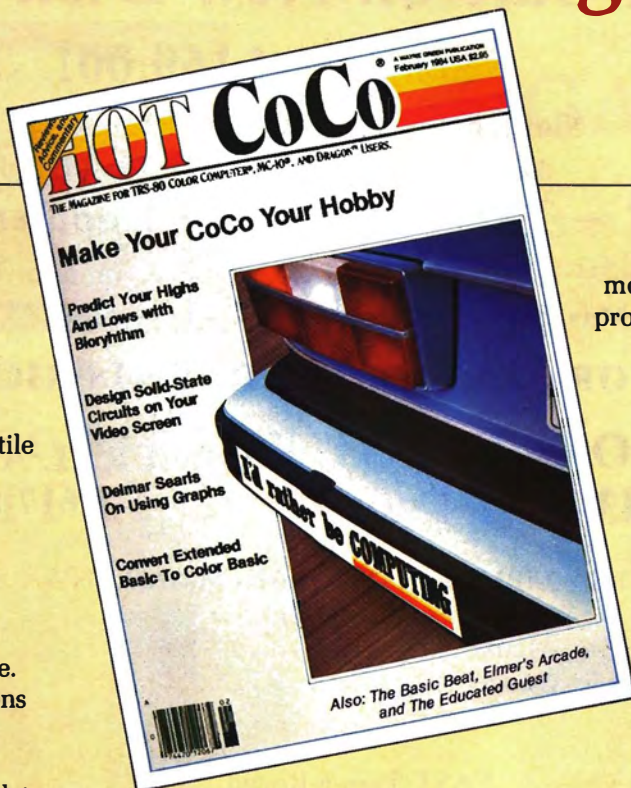
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351F 4

The Basic Beat

Continued from p. 12

tern. Therefore, you have 16 ways of turning four colors off or on, so each color has 16 graphics patterns, but you'll have a hard time seeing the individual patterns in Listing 8.

Program Listing 9 displays the graphics characters one at a time in a PRINT@ position surrounded by a border. Notice how the pattern flashes through a definite sequence in each color. Did you catch anything when you ran Listings 8 and 9? The same pattern repeats in each color.

To create a graphic picture, you must determine which CHR\$ codes you need to print. Use Fig. 1 to create a program that draws the spaceship in Fig. 2. If you need help, take a look at Program Listing 10. T\$ is a string that represents the top row. The CHR\$(128) represents a blank or blank space. CHR\$(177) represents red (177 plus the 1 from the lower left corner of Fig. 1). The 191 is a solid red (all four corners).

If you remember your SET graphics lessons, you'll know that the CoCo can combine black and another color in one PRINT@ position, but that's all—you can't combine any other two colors in the same position.

Notice how much faster CHR\$ graphics are than SET graphics. Try creating your own design.

Add Program Listing 10A to Listing 10 to move the spaceship across the screen from left to right. The FOR A loop prints the ship at a different location each time. The FOR T loop in line 55 smooths the ani-

The values of the four sections of each PRINT@ position.

Starting numbers:

128 green
144 yellow
160 blue
176 red
192 buff
208 cyan
224 magenta
240 orange

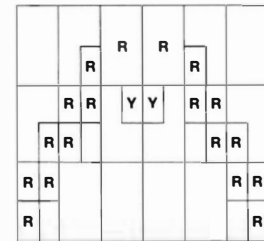


Add the starting number of the desired color to the values of the sections you want to be that color. For example, to make the upper left and lower right red, use $176 + 8 + 1 = 185$. Therefore, PRINT CHR\$(185);

Fig. 1. SET Positions and the ASCII Codes for Color

mation somewhat, but a better way is to shift the object half a PRINT@ position each time it moves. I'll show you how to do that in a future column, since it involves two different sets of CHR\$ codes. Notice that PRINT@ A + 32 and A + 64 place the middle and bottom of the spaceship directly below the top. Adding 32 moves an item down one column.

Using the keyboard to move objects on the screen can be a little complicated. Program Listing 11 performs this task about as simply as possible to let you press the arrow keys to move a square of light on the screen. It is only possible to use the arrow keys with INKEY if you define their CHR\$ codes as in lines 20-30 (U for up, D for down, R for right, and L for left).



R = red
Y = yellow

Fig. 2. A Spaceship Design

Line 60 prevents the square from moving beyond the screen's upper border. If the PRINT@ position (A) is less than zero, add 32 to bring it back down below the border. In the same way, line 70 keeps the square from moving below the bottom border.

Line 80 is somewhat more complicated, and prevents the spaceship from passing too far to the left. If A is reduced from 32 to 31, then $(31 + 1)/32$ equals 1 and so does $INT(31 + 1)/32$. INT chops off the decimal part of a number. Not stopping at 31 and adding 1 back to A would result in the square

```
10 CLS0
20 FOR A=128 TO 255
30 PRINTCHR$(A)+CHR$(128);
40 NEXT A
```

Program Listing 8

```
10 CLS0
20 GR$=CHR$(143):GS=GR$+GR$+GR$
30 FOR W=139 TO 203 STEP 32
40 PRINT@W,GS;:NEXT W
50 FOR A=128 TO 255
60 PRINT@172,CHR$(A);
70 PRINT@180,A;
80 FOR B=1 TO 200:NEXT B
90 NEXT A
```

Program Listing 9

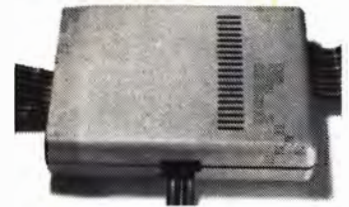
```
10 T$=CHR$(128)+CHR$(177)+CHR$(191)+CHR$(191)+CHR$(178)+CHR$(128)
20 M$=CHR$(177)+CHR$(190)+CHR$(148)+CHR$(152)+CHR$(189)+CHR$(178)
30 B$=CHR$(190)+CHR$(128)+CHR$(128)+CHR$(128)+CHR$(128)+CHR$(189)
40 CLS0:A=40
50 PRINT@A,T$;:PRINT@A+32,M$;:PRINT@A+64,B$;
60 GOTO60
```

Program Listing 10

```
40 FORA=32TO57:CLS0
50 PRINT@A,T$;:PRINT@A+32,M$;:PRINT@A+64,B$;
55 FORT=1TO2:NEXTT
60 NEXTA:GOTO40
```

Program Listing 10A

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The Basic Beat

jumping instantly from the left to the right edge of the screen. You can delete line 190, but you'll have to release the arrow keys and press them again each time you want to move the square one position.

Next month I'll show you how to use DATA lines to store information. They're a great way to store CHR\$ code values, and you can use them for other things, too.

Oh yes, remember the CHR\$ codes for the alphabet? Figure 3 lists them. You could use them to put secret messages into a program—take a look at Program Listing 12, for example. An incorrect password erases the program, but unless you executed a POKE to keep someone from displaying the listing, you don't have much protection from someone easily finding the secret. Once protected, though, you could use this method to hide clues in an adventure game, or answers to a quiz. ■

```
PRINT CHR$(71)+CHR$(79)+
CHR$(79)+CHR$(68)+CHR$(66)
CHR$(89)+CHR$(69)
```

```
1Ø CLSØ:A=272:CS=CHRS(128)
2Ø US=CHRS(94):DS=CHRS(1Ø)
3Ø LS=CHRS(8):RS=CHRS(9)
4Ø PRINT@A,CHRS(255);
5Ø AS=INKEYS
6Ø IFA$=US THEN PRINT@A,CS;:A=A
-32:IFA<ØTHEN A=A+32
7Ø IFA$=DS THEN PRINT@A,CS;:A=A
+32:IFA>51ØTHENA=A-32
8Ø IF AS=LS THEN PRINT@A,CS;:A=A
-1:IF INT((A+1)/32)=(A+1)/32 THE
N A=A+1
9Ø IF AS=RS THENPRINT@A,CS;:A=A+
1:IF INT((A+1)/32)=(A+1)/32 THEN
A=A-1
19Ø FORW=341TO344:POKEW,255:NEXT
W
2ØØ GOTO4Ø
```

Program Listing 11

```
1Ø CLS
2Ø AS = CHR$(82)+CHR$(85)+CHR$(7
1)
3Ø INPUT"WHAT IS THE PASSWORD";B
S
4Ø IF BS<>AS THEN NEW
5Ø REM ---PROGRAM STARTS HERE
```

Program Listing 12

Letter	ASCII
A	65
B	66
C	67
D	68
E	69
F	70
G	71
H	72
I	73
J	74
K	75
L	76
M	77
N	78
O	79
P	80
Q	81
R	82
S	83
T	84
U	85
V	86
W	87
X	88
Y	89
Z	90

Fig. 3. CHR\$ Codes for the Alphabet

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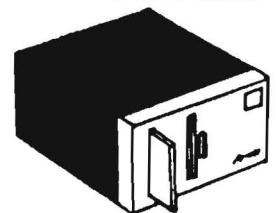
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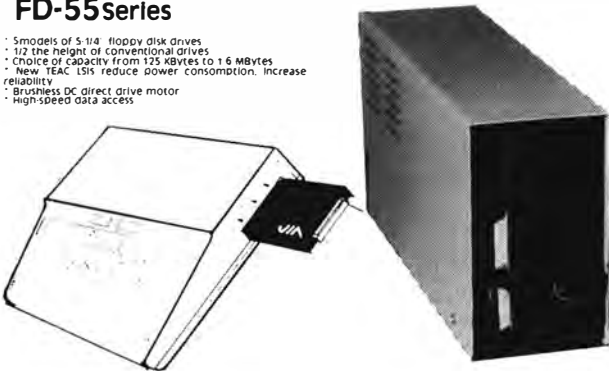
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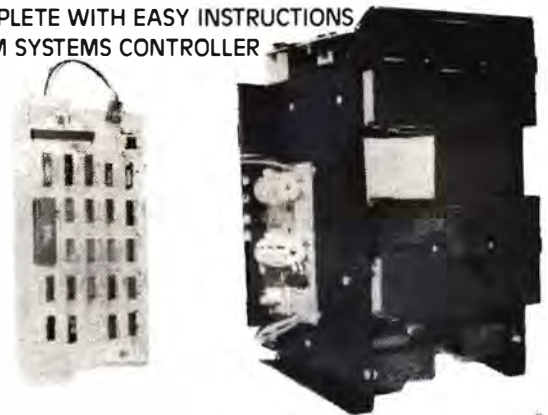


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by Richard Ramella

When Euclid was teaching geometry to King Ptolemy of Egypt in about 300 B.C., His Highness is said to have asked for an easier way of learning. Euclid allegedly told him, "There is no royal road to geometry."

The same goes for Assembly-language programming, except double. Maybe quadruple.

However, Dennis Kitsz and his elves at Green Mountain Micro have fielded an Assembly-language course that could be the turning point in your programming life. *Learning the 6809* is no royal road, but it is a fairly comfortable way to ride along the arduous highway en route to proficiency in As-

sembly-language programming.

Can you do it? Yes, if you're strongly motivated. No, if you're impatient or lack concentration. Yes, if you know a little bit or a lot about Basic. No, if you dislike mental travail. It is not easy, and Kitsz honestly says so up front.

If you opt for the course, be prepared to spend 200-300 hours on it. You will not zip through these lessons, for they include new concepts. Your knowledge of Basic is only a departure point for clues to the mysteries of Assembly-language programming. You will be traveling across alien landscapes. (That reads like something Kitsz said on the tape. If so, I stole it and he's right!)

The course costs \$99. You also need Radio Shack's EDTASM (ROM pack or disk), which costs a bit more than \$50.

Learning the 6809 includes 24 half-hour lessons on 12 cassettes. The tapes contain Kitsz's enthusiastic and nearly verbatim recitation of the lessons in the text, which has 222 loose-leaf pages, plus technical appendices on the Motorola processor.

The tapes also contain 35 Basic and Assembly programs printed in the text, so there is no need to type in any program. These include an Assembly listing for the Game of Life, which is very interesting to see run. Questions and answers in a style worthy of the *Baltimore Catechism* (e.g., *What does bit mean? Bit means binary digit*) grace the margins around each lesson.

You get two different teaching techniques. Reading a lesson while listening to Kitsz go through it is an excellent

method of pacing and reinforcing new information. When Kitsz's enthusiasm exceeds your ability to understand, you can rewind the tape a few paragraphs and try, try again (and again. . .).

The margin, catechism style, ties together concepts from different approaches by posing and answering questions in a simple way.

Now, let me tell you what happened to me: I agreed to go through this course for the same reasons any Basic programmer might. Assembly-language programs are lightning-fast in execution, they surpass unwieldy Basic's abilities, and Assembly is what the big boys use to write arcane programs envied by us plebians who live in a Basic world.

When the course arrived, I noted its 24 lessons and multiplied each by two hours. I would spend two hours per lesson each evening and know Assembly language in only 24 days.

I was an optimistic fool, as became clear by the second lesson, when Kitsz teaches how to count in hexadecimal numbers. It's rather like being told you must memorize the multiplication table from 24 times 24 to 50 times 50, for reasons which would become clearer later. It was the first of many occasions in which there is no other way than stopping the lesson and learning the concept.

So I stopped and learned it.

I got a bit lost in Lesson 3. By Lesson 4 I was hopelessly confused, though I had been studying for more than a week of evenings. At that point I resolved to listen to the lesson tapes and read the text straight through, for two reasons. One, I had a vague hope I

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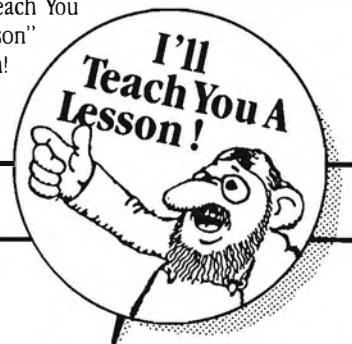
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would begin to learn through some mysterious osmotic process—more foolishness on my part. Two, I wanted an overall flavor of the material so I could decide whether to return the course to *HOT CoCo* in shameful failure or convince myself to go through the lessons in the depth required.

An unexpected third thing happened, despite the fact I got rather groggy in the process. Without understanding Assembly language, I began to absorb the harmony and connectedness of what Kitz was driving at. I began to regard the Color Computer as a kind of warehouse maze whose contents opened and closed to my understanding as I traveled through.

In time I dimly saw the links between these suddenly tangible guideposts within. And as I listened to the final lesson, in which Kitz bestowed the title of Assembly programmer on me without knowing I'd shamelessly cheated, I was resolved with a definite sense of excitement and discovery to go back and do the course the right way.

This, then, is a progress report. I have now spent about 50 hours on the course and have arrived at Lesson 8. I can put together very simple Assembly listings, but I'm far from creating even intermediate efforts. I'm learning some hybridizations—calling machine code from a Basic program, but I'm far from my goal of translating my own Basic programs into Assembly and, better, writing in Assembly as a starting point.

There is an overwhelming number of new concepts. The introductory lesson filled me with hope. Lesson 2 was simple but grinding with its necessity of learning to count in hex. Lesson 3 delved into the microprocessor with explanations of registers, the accumulator, addresses and more. The mnemonics of Lesson 4 threw me completely.

Then followed lessons on the editor/assembler, addressing modes, instructions, and . . . well, I'm not qualified to say what comes next even though I've read it. But bit by bit (and byte by byte) I began to learn about hand

assembly, timing, sound, and different ways of making things happen.

When I become enmired in some confusing concept, often an idea from a previous lesson will intercede and help me understand the new material. At other times, I find myself repeating entire chapters, slowly and painfully.

When I am depressed, I recall my early days of learning Basic. There was a time when I knew, for example, exactly what Basic's string statements did, but I was unable to use them well because I hadn't run up against programming puzzles for which a string trick would be the solution. It's somehow the same at this point in Assembly.

The finding? If you want to learn Assembly and are determined, get this course. The price can't be beat, all the answers are here, and Kitz has put out a first-rate, honest product.

Despite the occasional fear that my IQ has dropped to equal by belt size, I give this product a 9.8 out of a possible 10. Green Mountain Micro, you're my kind of people. ■

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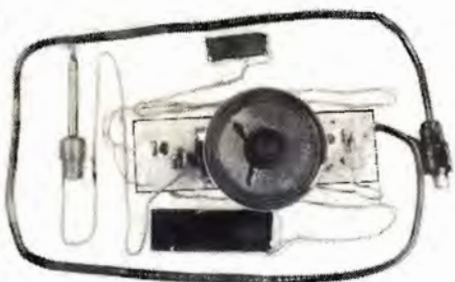
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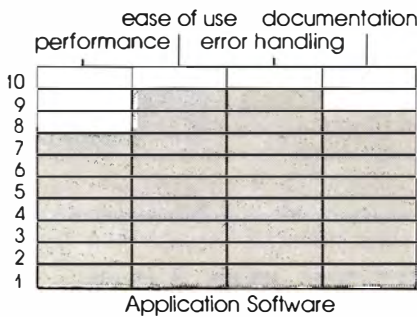
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BY SCOTT L. NORMAN

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Elite Software
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by Scott L. Norman

Here is another worthy entry in the CoCo applications sweepstakes: an easy-to-use relational database manager with a good capacity for data storage. It's not perfect—its

mathematical abilities are limited, and you'll need another program to set up complex reports—but Elite-File can still do a whale of a job for many purposes.

A Little Background

A few definitions might be helpful before I dive into the details of the program. At the highest level, a computer stores a mass of data in a *file*. The data consists of a number of independent entries called *records*, each of which in turn is composed of a certain number of *fields*. The most overworked example in the business is an address-book file, in which each record consists of all the information about a given person and the fields are last name, first name, street address, and so on.

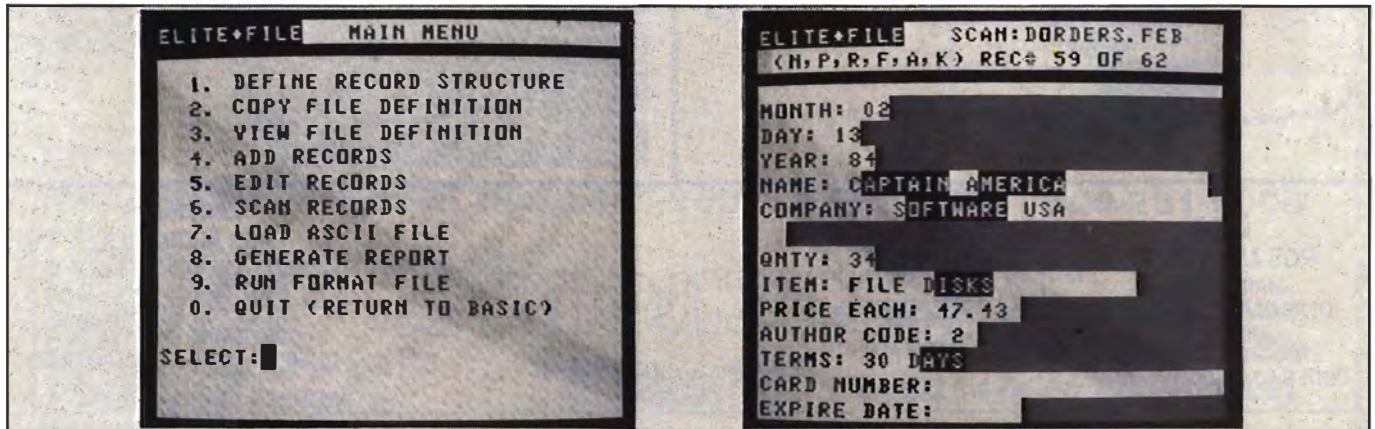
Every record in a file has the same structure: the same fields, in the same order. Many so-called database managers for personal computers are actually *datafile* managers, capable of

working with only one file at a time. Elite-File and few other high-end CoCo information-management programs satisfy the definition of a true *database* manager in that they can manipulate several files at once, whether searching for a piece of data or storing new information.

Taking this one step further, a *relational* database manager can work with files that have different overall structures. For instance, a small business might keep a customer mailing list, along with a whole set of files concerning credit rating, date of last purchase, special needs, and so forth.

As long as there is some way to establish a correspondence between the records in different files (by using the customer name as a field in each, for example), a relational database manager can use information from many sources to construct a special report or to provide new insights into the information.

Elite-File has this sort of capability,



Elite-File's Main Menu

A Sample Record

within certain limits. This, along with the program's general simplicity, are perhaps its most attractive features.

The Big Picture

Elite-File is one component of Elite Software's family of applications programs; the others are the Elite-Calc spreadsheet (*HOT CoCo*, December 1983, p. 19), and Elite-Word, a word processor (June 1984, p. 22). The three are well integrated: Elite-File will read ASCII data prepared by Elite-Calc or -Word, and can be used to supply data for the latter's "variable text" feature. This lets you perform mail-merge operations such as inserting names, addresses, and so on into a form letter.

There is a negative side to all this compatibility: Elite-File depends on Elite-Word to prepare and store report formats—the lists of commands that will produce complex reports from a data file. While there is a report-generation facility within the database manager itself, you can only use it during a single working session; there is no way to save the design of any report, except by using the word processor. This, in my opinion, is one of the few drawbacks to the package.

But let's not belabor the point; there is a lot to like about Elite-File. It can handle a respectable amount of data, stored in fairly elaborate files. As is typical of such programs, there are overlapping limits on the size of data structures; e.g., a record can contain up to 255 fields or 2,000 characters, but no single field can be longer than 255 characters: Any one file can contain a maximum of 4,000 records.

Elementary Operations

The program will run on a 32K, single-drive system. A 64K machine offers no advantage, but you can use as many as four drives for data files. Elite-File itself is entirely memory-resident, so once you've loaded it, you can remove the program disk and replace it with a data disk to maximize storage space.

The master disk is not copy-protected, and you are encouraged to make duplicates for your working sessions. This also means you can customize the system to your printer. You can edit a POKE command in the loader program to set up the baud rate you prefer, according to the usual scheme. Then you can save the modified routine and use it in subsequent operations.

The 70-page manual is divided into sections for general, advanced, and expert users, plus a comprehensive command summary. The general and advanced sections, which you should read thoroughly, will get you through most of your work.

The expert portion is just a little over three pages long and is devoted principally to using Elite-File in variable-text applications and accessing its data files from Basic programs. It is quite possible to construct simple databases using only the information in the general section, but you will need the advanced material if you plan to do calculations.

Setting up a data file with Elite-File is much like operating with other programs of the breed. Selections from a main menu let you define record structure, add records to a file and

edit them, scan through the stored information, generate reports (within limits), and so on. Editing and report generation call up their own menus; the report menu includes the commands for sorting the file and selecting records that meet certain criteria.

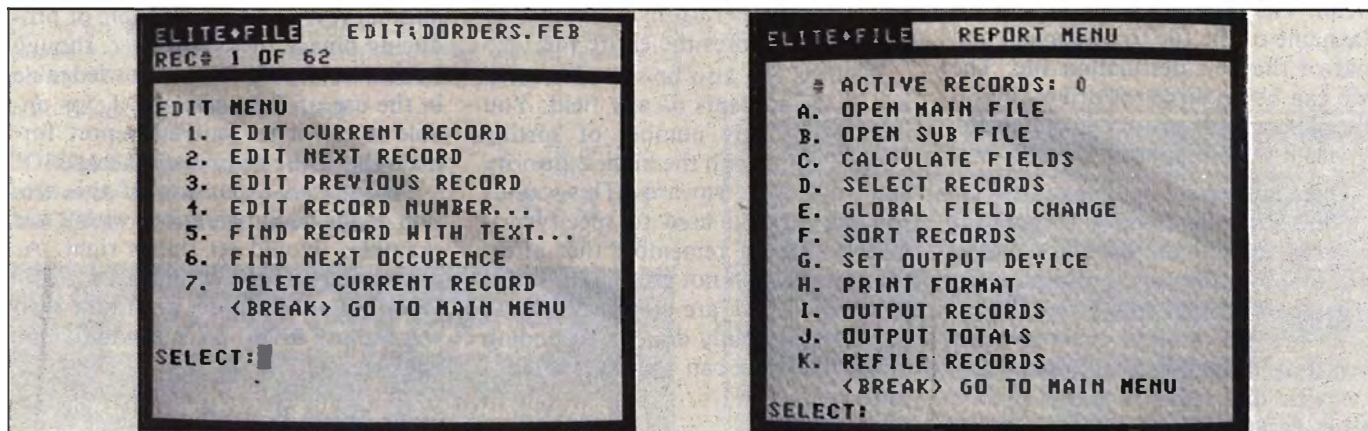
Field definition is somewhat simpler than it is with some other data managers. Elite-File recognizes only two types of data—plain text and numerical values—and you only need the latter if you intend to do calculations with stored values. The program stores zip codes, telephone numbers, dates, and so forth as text. Thus, you can set up a file by entering the field names you wish to use, each followed by a colon and the number of bytes you want to reserve.

It is possible to change the structure of a record after you've entered data into a file, but it's not advisable. It pays to think about your data-management needs beforehand, and not count on doing any brilliant improvisation at the keyboard.

Once you've defined the structure, Elite-File prompts you for the "primary keys". These are as many as eight fields that determine the order in which the program stores records on disk; no separate index file is generated. You can always rearrange the records for any given report, of course.

If you enter your records randomly, without a bit of prearranging first, you'll find that Elite-File takes several seconds of reading and rewriting to disk as the program puts new entries in proper order. The process becomes longer the more records you enter.

Once you've defined the fields, you can start loading a file with informa-



The Edit Menu

The Report Menu

tion. Elite-File generates a simple form on the display, with highlighting used to indicate the space allotted for the various fields; it uses the conventional 32-by-16 text format.

You can edit data during the entry process, of course, and Elite File also features a convenient editing menu for working on an existing file. You can locate records in a file by their sequential storage number or (more conveniently) by any text string they contain.

You must properly distinguish between upper- and lowercase letters to obtain a successful match with the test-search command, but it will examine all data fields and will work on substrings.

It is not necessary to destroy the old version of an edited record in order to save the new one. You can keep both in the file, which leads to a convenient method for entering a whole series of records that are similar but differ in one or two fields. Pressing the clear key after editing saves the latest version to disk; using a shifted clear instead leaves the original version alone and also stores the new one in the proper place.

This is just one way in which Elite-File reduces the amount of retyping you have to do when duplicating information. There is also an easy way to copy the structure of an entire file, shorn of the information it contains. This can come in handy if you have to keep separate sets of data for each month or other fiscal period, to mention just one example. You don't have to spend time specifying the same set of fields for each file.

The deed is done through the Copy File Definition option of the main menu. The program prompts you for the name of the file to be copied, and that of the new destination file. The two can be on different drives, if you like. This simple process is one of the program's more appealing features.

There are several options for browsing through a file. Specifying the Scan Records feature of the main menu, followed by a file name, brings up the first record in that file. A subsidiary menu lets you look at the very next record or locate one by number or by contents. The latter option is a little more elaborate than the text-search command of the editing menu, however.

*“Elite-File is a
very decent program
and you can learn
to do a lot
with it
in a hurry.”*

To begin with, there are now two text-search commands: Find and Key. Find works like the corresponding command on the Edit menu and locates any specified substring in any field. Key, on the other hand, only searches the first field that was specified as a primary key. In many cases, this is enough to locate a unique record.

The advantage is that a Key search is fast. This makes sense when you realize that Find has to examine every field of every record before moving on. I should mention one drawback of the Key search technique: To be successful, the substring you specify must include the beginning of the key field. If you're looking for fields in which “elephant” appears and want to save typing, you would still have to specify “elep,” or at least “el.” Something like “hant” or “ant” wouldn't work.

Calling for report generation brings up another menu that includes a good set of record-selection options. All the usual logical equality and inequality relationships are available, and you can AND or OR them together at will. You can also compare field names with constants or with other field names. Only the records meeting a selection criterion remain active through subsequent operations. A select-@ command restores the entire file.

Records can also be sorted according to the contents of any field. You can specify any number of sorting keys, starting with the highest priority and working downward. (This sounds like the method used to specify primary keys, but remember that after-the-fact sorts do not change the order in which things are stored on disk.) Sorts are normally done in ascending order, but you can specify the converse.

Reports—A Bugaboo?

Elite-File is a very decent program,

and you can learn to do a lot with it in a hurry. However, the matter of report generation might be troublesome.

Logically enough, the preparation of a report begins with any record selecting or sorting operations you might desire. Next comes the designation of an output device—screen, printer, or disk file. Then you can design the report format and produce the document or video display.

And that's where the trouble lies. A particular type of text string specifies the format of an Elite-File report. The text string isn't difficult to set up, but it's something that the program cannot store on disk. In fact, the format is retained in RAM only until you use some other report-menu command; then it's gone, and you must reenter it to produce another report. It can be inconvenient to retype simple report specifications, and outrageous to have to do so for complex reports. Elite-File offers several formatting options, so those format strings can get lengthy. Elite-Word provides a way out. You can use it to prepare and store command files, which Elite-File can then read from disk at report time. Unfortunately, this amounts to buying a \$60 accessory to do the job.

Elite-Word is a competent program, but people who are satisfied with their word processors might not want to buy another one just to set up database documents. I wouldn't blame them, although to be fair, I'll say again that you can use Elite-File with Elite-Word's “variable text” feature.

The expert-user section of the manual does briefly discuss the makeup of a format file, and mentions that it should be possible to compose one by other means—presumably by using another text processor capable of producing binary files. However, though I consider myself fairly knowledgeable in the use of Telewriter-64, I was unable to use it to generate report formats that Elite-File would accept.

Perhaps an expansion of this section of the documentation, with a few examples, would set things right. As matters stand, the reliance on Elite-Word is unfortunate for those who want to use Elite-File as a stand-alone package.

Some Other Features

Although Elite-File is not particularly strong on calculational ability, it

Elite-File

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CALC-LIST is a separate, machine language, utility that works independently of Elite-Calc. It can read either tape or disk worksheet files, and will give you additional information that was previously "hidden" within your worksheet. With CALC-LIST, you can list on the screen (or print) the actual contents of your worksheet cells, including FORMULAS. You get all the valuable worksheet format data including assigned Column Widths, all cell Format specifications (\$, C, I, F#, G, etc.), Constant table assignments, and Printer Format information (Set-up, Page Length, Line Width, etc.). Use your CALC-LIST printout as a hardcopy backup of your worksheet for review or archival purposes. You can even let your friends use the listing so they can type your worksheets.

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can carry out elementary mathematical operations on data fields. The results are stored in so-called calculated fields, which are not actually part of the permanent data file. Instead, they are defined and evaluated at run time. You can use a calculated field in a report, and print out the total of any numerical field.

A useful option known as Refile Records lets you merge a collection of records from one file into another. You can also use Refile to add more fields to an existing set of records, since the original and final files need not necessarily have the same structure.

Again, Elite-File is a true relational database manager. This capability hinges on the concepts of main files and subfiles. There is nothing in their definition or structure that sets the two apart, and in fact a main file in one application can serve as a subfile in another.

The distinction is in the way in which you link together separate files when you use them. Then you must

inform Elite-File as to which main files and which subfiles you want to open. Here is the rule:

A subfile contains, as one of its primary keys, a field that appears (but not necessarily as a key) in a main file. It is the subfile key that determines which records are to be linked.

With multiple-file management, you can have up to 16 main files open at once, provided that all have the same structure. This is a convenient way to combine monthly financial records into quarterly or yearly summaries, for instance. Elite-File will treat all the files as one big database for sorting, selection, and reporting purposes.

Wrap-Up

Elite-File is exceptional in the areas of ease of startup and use, and in file manipulation (sorting, selection, merging, and so on).

Again, the lack of a built-in facility for saving report formats is one of the two major obstacles to Elite-File as a

data-management system for a small business. The other is the lack of password protection for sensitive material. The first problem disappears if you use Elite-Word for reporting chores, but the second is simply a fact of life.

Things are somewhat brighter for the casual user, however. Because the program is so straightforward, I find myself firing it up for applications like the management of my classical-record collection. Here, my reporting requirements are quite simple—occasional "Have" or "Don't have" lists containing a few fields each—and it's not too difficult to set up the formats whenever needed.

I have also begun to use the program professionally in a solid-state physics laboratory. Here, I am more concerned with keeping track of the processing steps that various samples have gone through than I am with printing comprehensive reports about a whole file. If you have similar needs, or if you are in the market for a companion word processor as well, Elite-File deserves your attention. ■



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Homespread is no rabbit when it comes to speed,
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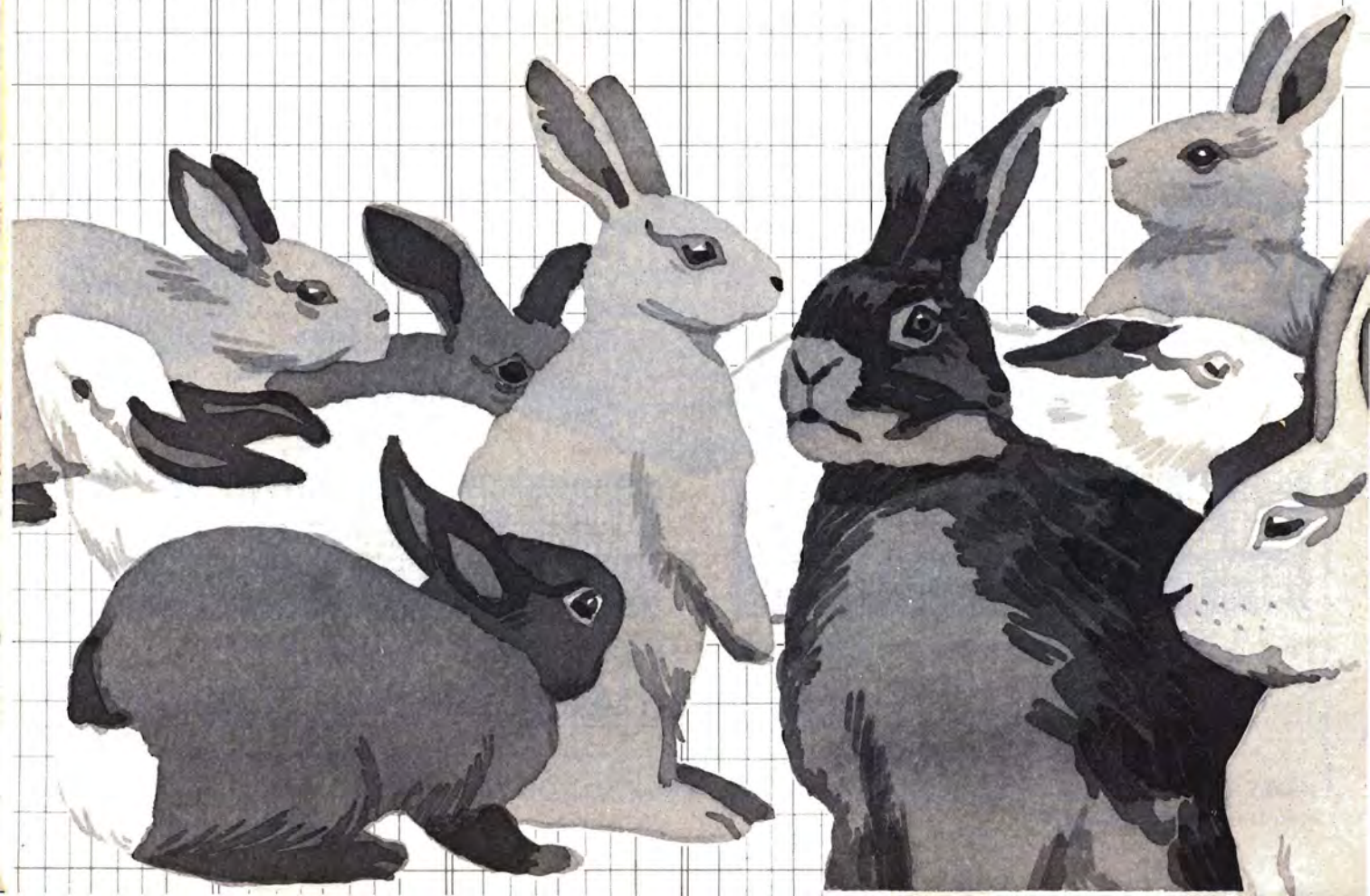
Unless you got your CoCo yesterday, you've probably played at least several games, put your home inventory on tape or disk, and tried your hand at programming in Basic. But have you ever tried really putting your CoCo to work? Homespread is a spreadsheet program designed to use commands that are the same or simi-

lar to the popular VisiCalc spreadsheet program. It can do almost anything the high-priced business spreadsheets do. Suddenly, taking work home to your CoCo from the office is a much better proposition.

Homespread can help you juggle expense accounts and prepare business forecasts, cost analyses, and re-

ports for the office. And it can be very useful around your home. It will help you plan budgets, organize files, and prepare purchase analyses. Use it to record expenses and balance your budget.

Figure 1 is an example of how you could keep track of your monthly checks, charges, and uncommitted



balances. Or set Homespread to work organizing your recipe files. Figure 2 shows a recipe printout. Enter your recipes with the number of people they serve. If five people show up instead of four, type 5 under WANT and Homespread will recalculate the quantities and place them under TQUANT.

You might design a format for listing and calculating quantities and costs for home construction projects, such as in Fig. 3. The advantage of organizing a project with a spreadsheet is that you can insert amounts or items and instantly know the total price. This lets you brainstorm about materials without losing touch with the reality of cost. After you use Homespread to organize the refinishing of your attic, you can erase the specifics and save the format for building a tool shed or other project.

How It Works

Homespread is written in Basic, which makes it slower than programs written in machine language, and it displays a smaller area than that of the high-cost office spreadsheets. But it doesn't skimp on the functions. Homespread has an eight-column by 99-row capacity and a four-column by 12-row display that scrolls in four directions

with the movement of the cursor. Its label fields hold five characters. It displays column headers from anywhere on the spreadsheet, or holds them off-screen to increase the display area. Homespread easily handles formulas and automatically updates column summations when you enter new data.

When you run this program, its screen displays a matrix with headings for the first 12 rows and the first four columns. It numbers the rows and assigns letters to the columns. In addition to these letter or number labels, Homespread allows you to enter up to five alphanumeric characters as a header or title for each column and row. The program automatically enters what you have typed if you try to type more than five characters. To head a column, for example, move the cursor to the first row under the column you want, and position it a little to the left of the column heading before typing your title.

Homespread can take numbers from designated positions and place the calculated results in any position you choose. Position the cursor where you want the results of the calculation to appear and enter a plus sign, the symbol that prepares the computer to accept the formula to follow. Then, type in the formula. Suppose you

want the number in A1 to be added to the number in B1, and the sum to reside in C3. Position the cursor at C3. Then, type A01 + B01. (Row numbers below 10 must be typed as two-digit numbers beginning with zero.)

Homespread lets you combine two operations in a single formula, and enter several formulas at the same location. The program executes entries in the order you enter them. It checks all the formulas you enter after each number entry in order to calculate immediate updates; as a result, if there are many formulas, the computer slows down number entry. Entering the formulas last will speed up execution. In addition, typing and execution go more quickly if you use the summation command described below because summation formulas are the most commonly used.

Commands

Homespread's command letters are B, C, I, P, S, and T. To execute these commands, type a slash followed by the command letter. B is for blank; it erases all letters, numbers, and formulas in the square in which the cursor is located. C clears all data from the computer's memory, enabling you to start another set of data. I inserts a new row, but it does not erase for-

illustration by Katherine Mahoney



System Requirements

**32K RAM
Extended Color Basic
Printer Optional**



mulas. Run the cursor along the row into which you've inserted while you watch the "information" row at the bottom of the screen—it will show if the row contains formulas. Use the B command to eliminate unwanted formulas.

The P command directs the program to print selected rows. The computer prompts you to enter the column-letter/row-number combinations that begin and end the row you want to print. The S command allows you to save, verify a save, or load a file. Because an input/output error in verification causes loss of all data, it's a good idea to make a backup copy before using the verify command.

Spreadsheet programs commonly locate column headers or titles in row 1. But when you are working in row 55, it's frustrating to have to scroll all the way back to row 1 to find out what column you're in. To put the titles contained in row 1 at the top of your columns, no matter where you are in Homespread, enter /T. This is somewhat different from VisiCalc, which constantly displays its titles. Homespread displays only column titles, not row titles. The ability to display row titles from anywhere on the spreadsheet would have considerably limited the display area. And because Homespread has only eight columns, accessing row headers never takes very long.

VisiCalc users are probably familiar with its sum command, which is activated by the @-S key combination, followed by row or column ranges. Homespread's sum command is somewhat less sophisticated, but no less useful. To sum, simply position the cursor and type @. The program asks whether you want a row (R) or column (C) summation. When you have selected either R or C, the program gives you a total.

You can sum rows either singly or collectively. Position the cursor on the column in which you wish the sums to appear, in the row just below the last row to be summed. The row summation command totals rows to the col-

umn before the one containing the cursor. It sums all the rows above the row containing the cursor. For example, if you place your cursor at F4, type @, and then type R after the prompt, Homespread will give you the totals of A1 to E1 in F1, A2 to E2 in F2, and A3 to E3 in F3.

Homespread sums columns individually. Position the cursor one row below the last in the column you want summed. The program displays the sum in the square containing the cursor. If an entry in a previously summed column changes, Homespread automatically updates the sum. Row sums do not update in this manner because it is easy enough to total all rows in one operation. Homespread does not save row-sum commands onto tape or disk, but it does save column-sum commands.

A Tutorial

Once you have an idea how the program works and have typed it into your CoCo (don't forget to save it), you'll want to put Homespread through its paces. Homespread is an excellent aid to decision making about purchases for your home. Suppose you are buying a new home computer system. Naturally, you've got a 64K CoCo 2 in mind, and you've decided you want to add two disk drives, a printer, and two programs. You

would prefer to go to the local Radio Shack store, pick out what you want, and take it home. But would you be better off ordering by mail? Will avoiding your state sales tax help?

Load and run Homespread. Press the enter key after the prompt. The cursor should be on row 1 just to the left of the A label in column A (the A1 position). Type ITEM, and press the enter key. Move the cursor to the B1 position with the arrow key. Type NO, for number, and press the enter key. Type U/PR, for unit price, in the C1 position, and in the D1 position enter PRICE, which functions as a subtotal. The computer enters PRICE automatically because it is an entry with five characters. Move to E1. Don't worry if you can't see the column label for E. The program doesn't display more than four column headings at a time, but it does let you type into a fifth column to the right. Moving the cursor two blocks to the right of the D1 position reveals the E1 heading, which is now one block to the left of the cursor's position. Enter TAX in the E1 block and TOTAL at the F1 position.

You'll notice that from time to time the cursor may go off the screen or past a marked column. Use the arrow keys to retrieve it: The left arrow key is probably universally useful in this situation. In any case, it is impossible to crash the program by going off the screen with the cursor keys.

Now that you have entered the column headings, move the cursor back to A1 to begin labeling row headings. Use the down arrow to move to A2, and type COCO. At A3 type DRIVE, at A4 type PRNTR, and at A5 type PROGR. Under the B column enter the number of pieces of each kind of component you are considering: one

DESCR	CHECK	VISA	AM EX	FIXED MONTH EXP.	TOTAL	BANK
GAS	27				3395	
DINE					1212	CHGS
2/7		29.50				
WATER	14.95			MORT 550	1373	UNCOM
AIR				PAYTV 25		FUNDS
TCKT			590	CAR L 75		
MD	25			OIL 160		
HOME	66.95			-----	810	
STOVE						
REPR.	45					
NEWTV		495.5				
PLNTS		37.50				
HOME	89.77					
DINE						
2/14			59.50			
TOTAL	268.67	562.5	649.5			

Fig. 1. An example of a format that keeps track of your checks, charges, and uncommitted bank balance.

CoCo 2, two disk drives, one printer, and two programs. In the C column under U/PR, enter the price for each piece of equipment. In Fig. 4 these prices appear in blocks C2-C5 as 250, 300, 250, and 40. Use these numbers for now. Under TAX in the E column, from E2-E5 enter 1.08 (the figure to use for 8 percent sales tax).

ITEM	NO	U-PR	PRICE	TAX	TOTAL
COCO	1	250	250	1.08	270
DRIVE	2	300	600	1.08	648
PRINTR	1	250	250	1.08	270
PROGR	2	40	80	1.08	86.4
					1274.4

Fig. 4. Follow instructions to construct this format for purchasing the CoCo.

ITEM	QUANT	TQUAN	UNITS	SERV
SUGAR	3	6	TBLSP	5
FLOUR	1.5	3	CUPS	1
SHORT	5	10	TBLSP	5
EXT	.25	.5	TSPN	MULT
CINN	2	4	TSPN	2
EGGS	2	4		

Fig. 2. Homespread can create a recipe file that figures ingredient quantities based on any number of servings.

After you have entered all the figures above, Homespread is ready for formulas. Move the cursor to the D2 square. Type a plus sign to prepare the computer to accept the formula to follow. Then, type B02*C02 and press the enter key. The product of B2 multiplied by C2, 250, automatically appears in the D2 square. Move the cursor to the F2 block. Following the same procedure, type D02*E02. The

ITEM	QUANT	UNIT	U-C	TOTAL
2x4	50	LFEET	.55	27.5
PLYMD	455	30 FT	.49	222.95
2X3				
WINDOW	5	EA	4.50	22.5
PUTTY	1	DRH	1.25	1.25
PAINT	5	GAL	15	75
SHING	500	EA	.10	50
FLOOR	100	30 FT	.50	50
1x2	75	LFOOT	.34	25.5
			TOTAL	481.4

Fig. 3. A materials cost list for a home construction project.

program displays the number 270, representing price plus tax, in F2. Repeat this procedure for rows 3, 4, and 5, changing the numbers to accommodate each row. If you make a mistake, just type /B to erase all entries in that position.

When you have entered all the formulas correctly, move to F6 and type ----. Then, type @ in F7. The computer calculates your total cost, which should be \$1,274.40, and displays it in F7. Figure 4 represents your screen at this point, without the column letters and row numbers.

Is this more than you want to spend? What if you buy some of these components by mail order? That will save you the sales tax. Type 1 at E2

and @ at F7. Now the total is \$1,254.40. What if you buy mail-order disk drives at \$240 each from one of the well-known firms advertising in *HOT CoCo*? Change C3 to 240 and E3 to 1. Then, type @ at F7. Now the total is \$1,086.40. What if you decide to live with one disk drive for the time being? Insert 1 in B3 and type @ at F7. Now the total is \$846.40. A print-

ITEM	NO	U-PR	PRICE	TAX	TOTAL
COCO	1	250	250	1	250
DRIVE	1	240	240	1	240
PRINTR	1	250	250	1.08	270
PROGR	2	40	80	1.08	86.4
					846.4

Fig. 5. By posing "what if" questions, the price of a large, multicomponent purchase can be reduced.

out at this point would look like Fig. 5. If a final total of \$846.40 is what you had in mind, you can save this information. But if you are not satisfied, use Homespread to continue calculating "what ifs" for as long as you wish. ■



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Program Listing. Homespread.

1 CLEAR5000:GOTO12000
10 DIMAS(100),BS(100),CS(100),DS
(100),ES(100),FS(100),GS(100),HS
(100):'STRINGS WILL BE CONVERTED
TO NUMBERS AS REQ
12 DIMCT(8),CE(8)
20 DIMR(100):DIMFT$(100):DIMFIS(
17):F=0
25 Y=1:CLS:GOTO80
30 FOR X=31 TO 383 STEP 32
40 R(Y)=Y
50 PRINT@X,R(Y)
60 Y=Y+1
70 NEXT Y:Y=Y-12
71 PRINT@448,"HOME SPREAD-BY ADRI
AN ROSE":PRINT@480,"A SPREAD SH
EET PROGRAM-HIT<ENTER>TO CONTINU
E"
72 XS=INKEY$:IFX$="" THEN72
73 RETURN
80 'SETS UP ROWS
81 GOSUB300
90 AS(0)="A":BS(0)="B":CS(0)="C"
:DS(0)="D":ES(0)="E":FS(0)="F":G
$(0)="G":HS(0)="H"
110 L=34:L=LOCATION.34 IS START
LOCATION
111 HP=1'LEFT ARROW SUBTRACTS-RI
GHT ARROW ADDS
112 VP=1'UP ARROW SUBTRACTS-DOWN
ARROW ADDS
115 RL=1
120 GOSUB500:POKE1023+L,128:GOSU
B1800
130 OI$=INKEY$:IF OI$="" THEN 13
0
135 PRINT@448,OI$
140 IF OI$="/"THEN GOTO 600'COMM
AND
150 IF OI$="+"THEN GOTO240'CALCU
LATION
160 IF ASC(OI$)>47AND ASC(OI$)<5
8OR ASC(OI$)=45 OR ASC(OI$)=46T
HEN GOTO800
170 IF ASC(OI$)=9 THEN GOTO 900'
MOVE RIGHT
180 IF ASC(OI$)=8 THEN GOTO 1100
'MOVE LEFT
190 IF ASC(OI$)=94 THEN GOTO1300
'MOVE UP
200 IF ASC(OI$)=10 THEN GOTO1500
'MOVE DOWN
210 IF ASC(OI$)>64 AND ASC(OI$)<
94 OR ASC(OI$)=34 THEN GOTO 800
220 IF OI$="e" THEN GOSUB700'SU
M COLUMNS
499 GOTO130
500 'PRINT ALL VALUES
505 IF TS$="" OR TS$="N" THEN HS(0
)="H"
510 ON HP GOTO 520,530,540,550,5
55
520 CLS:FOR X=Y-1 TO Y+1:R(X)=X
:PRINTTAB(0)R(X):TAB(2)AS(X):TAB
(9)BS(X):TAB(16)DS(X):TAB(23)ES
(X):NEXT X
522 GOTO 560
530 CLS:FOR X=Y-1 TO Y+1:R(X)=X
:PRINTTAB(0)R(X):TAB(2)BS(X):TAB
(9)CS(X):TAB(16)FS(X):TAB(23)ES
(X):NEXT X:GOTO560
540 CLS:FOR X=Y-1 TO Y+1:R(X)=X
:PRINTTAB(0)R(X):TAB(2)CS(X):TAB
(9)DS(X):TAB(16)ES(X):TAB(23)FS
(X):NEXT X:GOTO560
550 CLS:FOR X=Y-1 TO Y+1:R(X)=X
:PRINTTAB(0)R(X):TAB(2)DS(X):TAB
(9)ES(X):TAB(16)FS(X):TAB(23)GS
(X):NEXT X:GOTO 560
555 CLS:FORX=Y-1TOY+1:R(X)=X:PR
INTTAB(0)R(X):TAB(2)ES(X):TAB(9)
FS(X):TAB(16):GS(X):TAB(23)HS(X)
:NEXT X
560 RETURN
600 PRINT@448,"COMMAND:B,C,I,P,S
,T?"
610 SC$=INKEY$:IF SC$="" THEN 61
0

```

Listing continued

Program Listing—Homespread

```

620 IF SC$="B" THEN 660
625 IF SC$="C" THEN 670
630 IF SC$="I" THEN 3000
635 IF SC$="P" THEN 3200
645 IF SC$="S" THEN 3800
650 IF SC$="T" THEN 4000
655 GOTO 130
660 PRINT@448,"BLANK":FOR X=1 TO
500:NEXTX
661 OT$=""
662 FOR X=1 TO F
663 IF VAL(RIGHT$(FT$(X),2))=RL
THEN FT$(X)=""
664 NEXTX
665 FOR X=1 TO 8:IF X=CN THEN CE
(X)=100:NEXTX
666 GOSUB 2000:GOSUB500:GOTO130
670 PRINT@448,"CLEAR-ARE YOU SUR
E(Y/N)?":X$=""
671 X$=INKEY$:IF X$="" THEN 671
672 IF X$="Y" THEN 675 ELSE 130
675 FOR X=1 TO 99:AS$(X)="" :BS$(X)=
"" :CS$(X)="" :DS$(X)="" :ES$(X)="" :FS
(X)="" :GS$(X)="" :HS$(X)="" :FT$(X)=
"" :NEXTX
676 FOR X=1 TO 8:CT(X)=2:NEXTX
677 F=0
680 GOTO120
800 'NUMBER OR LABEL
801 FOR X=1 TO F+1
802 TA=VAL(RIGHT$(FT$(X),2))
803 IF TA=RL THEN FT$(X)=""
804 NEXT X
810 GOSUB2200'ENTRY
830 OT$=O1$+O2$+O3$+O4$+O5$+O6$
835 IF ASC(O2$)=13 THEN OT$=LEFT
$(OT$,1):IF ASC(O2$)=13 THEN840
836 IF ASC(O3$)=13 THEN OT$=LEFT
$(OT$,2):IF ASC(O3$)=13 THEN840
837 IF ASC(O4$)=13 THEN OT$=LEFT
$(OT$,3):IF ASC(O4$)=13 THEN840
838 IF ASC(O5$)=13 THEN OT$=LEFT
$(OT$,4)
840 GOSUB 2000
841 IF F<>0 THEN GOTO 2400
842 GOTO700
850 GOTO120
900 'RIGHT ARROW MOVE
905 IF CN>4 AND HP<>5 OR CN=8THE
N GOTO900'RIGHT SCREEN LIMIT
906 POKE1023+L,143:L=L+7:POKE102
3+L,128:GOTO910
907 HP=HP+1:IF HP=6 THEN RL=RL-1
:IF HP=6 THEN HP=5
908 GOSUB500:POKE1023+L,128:GOTO
910
910 RL=RL+1
920 GOSUB 1800'LOCATE POSITION
925 GOSUB 955
930 GOTO 130
955 PRINT@448," ":FOR X=1 TO F: I
F VAL(RIGHT$(FT$(X),2))=RL THEN9
56 ELSE 957
956 PRINT@448,FT$(X); " ";X
957 NEXT X
958 RETURN
1100 'MOVE WINDOW LEFT
1105 IF CN=HP THEN GOTO1107
1106 POKE1023+L,143:L=L-7:POKE10
23+L,128:GOTO1110
1107 HP=HP-1:IF HP=0 THEN RL=RL+
1:IF HP=0 THEN HP=1
1108 GOSUB 500:POKE1023+L,128:GO
TO1110
1110 RL=RL-1
1120 GOSUB 1800'LOCATE POSITION
1125 GOSUB955
1130 GOTO 130
1300 'MOVE WINDOW UP
1305 IF L<34 THEN 1307
1306 POKE 1023+L,143:L=L-32:POKE

```

```

1023+L,128:GOTO1310
1307 Y=Y-1:VP=VP-1:IF VP=0 THEN
RL=RL+8:IF VP=0 THEN Y=Y+1:IF VP
=0 THENVP=1
1308 GOSUB500
1310 RL=RL-8
1320 GOSUB1800
1325 GOSUB 955
1330 GOTO130
1500 'MOVE WINDOW DOWN
1505 IF L>383 THEN GOTO 1507
1506 POKE1023+L,143:L=L+32:POKE1
023+L,128:GOTO1510
1507 Y=Y+1:VP=VP+1:IF VP=89 THEN
RL=RL-8:IFVP=89 THENY=Y-1:IFVP=
89 THEN VP=88
1508 GOSUB 500:POKE1023+L,128:GO
TO 1510
1510 RL=RL+8
1520 GOSUB 1800
1525 GOSUB955
1530 GOTO130
1800 'LOCATE REAL POSITION
1810 X=1
1820 TL=RL-X
1830 TL=TL/8
1840 T2=INT(TL)
1850 IPT2=T1 THEN1870
1860 X=X+1:GOTO1820
1870 CN=X'CN IS COLUMN NUMBER-1-
8
1880 RN=1:UL=8
1885 IF RL<=8 THEN RN=1:IF RL<=8
THEN 1920
1900 UL=UL+8
1905 IF RL<=UL THEN 1915 ELSE191
0
1910 RN=RN+1
1911 IF RN=100 THEN1920
1912 GOTO 1900
1915 RN=RN+1
1920 RETURN
2000 'FILL STRING LOCATION
2010 IF CN=1 THEN AS$(RN)=OTS
2020 IF CN=2 THENBS$(RN)=OTS
2030 IF CN=3 THEN CS$(RN)=OTS
2040 IF CN=4 THENDS$(RN)=OTS
2050 IF CN=5 THENES$(RN)=OTS
2060 IF CN=6 THENFS$(RN)=OTS
2070 IF CN=7 THEN GS$(RN)=OTS
2080 IF CN=8 THEN HS$(RN)=OTS
2090 RETURN
2200 GOTO2200'ENTRY
2205 O1$=INKEY$:IF O1$="" THEN22
05
2206 PRINT@448,O1$
2209 O2$=INKEY$:IF O2$="" THEN
2209
2210 IF ASC(O2$)=34 THEN 2205
2215 IF ASC(O2$)=13 THEN 2300
2220 PRINT@449,O2$
2225 O3$=INKEY$:IF O3$="" THEN 22
25
2230 IF ASC(O3$)=34 THEN 2209
2235 IF ASC(O3$)=13 THEN2300
2240 PRINT@450,O3$
2245 O4$=INKEY$:IF O4$="" THEN224
5
2250 IFASC(O4$)=13 THEN 2300
2255 PRINT@451,O4$
2260 O5$=INKEY$:IF O5$="" THEN 2
260
2265 PRINT@452,O5$
2300 RETURN
2320 RETURN
2400 IF O1$="" THEN 2405 ELSE 2
600'2410 IS SET UP FORMULA
2405 FOR X=1 TO 15:FI$(X)="" :NEX
TX:F=F+1
2410 Z=1:PL=448
2420 FI$(Z)=INKEY$:IF FI$(Z)=""

```

```

THEN 2420
2430 IF ASC(FI$(Z))=13 THEN2540
2431 PRINT@PL,FI$(Z)
2440 PL=PL+1
2450 Z=Z+1:IF Z=13 THEN 2540 ELS
E2420
2540 FOR X=1 TO Z-1:FT$(F)=FT$(F
)+FI$(X):NEXT X:FT$(F)=FT$(F)+ST
R$(RL):GOTO 2600
2600 'CALCULATION
2605 POKE65495,0
2610 FOR W=1 TO F
2615 IF FT$(W)="X" THEN 2940
2620 'SUBSCR MUST BE 2 DIGITS
2630 N=1:PO=1
2640 GOSUB2650:OP$(1)=P$:GOTO278
0
2650 SU(N)=VAL(MID$(FT$(W),PO+1,
2))
2655 IF MID$(FT$(W),PO,1)="A" TH
EN P$=AS$(SU(N))
2660 IF MID$(FT$(W),PO,1)="B" TH
EN P$=BS$(SU(N))
2670 IF MID$(FT$(W),PO,1)="C" TH
EN P$=CS$(SU(N))
2680 IF MID$(FT$(W),PO,1)="D" TH
EN P$=DS$(SU(N))
2690 IF MID$(FT$(W),PO,1)="E" TH
EN P$=ES$(SU(N))
2700 IF MID$(FT$(W),PO,1)="F" TH
EN P$=FS$(SU(N))
2710 IF MID$(FT$(W),PO,1)="G" TH
EN P$=GS$(SU(N))
2720 IF MID$(FT$(W),PO,1)="H" TH
EN P$=HS$(SU(N))
2730 RETURN
2780 PO=5:N=2:GOSUB 2650:OP$(2)=
P$
2790 IF LEN(FT$(W))>10 THEN2800
ELSE 2810
2800 PO=9:N=3:GOSUB 2650:OP$(3)=
P$
2810 IF MID$(FT$(W),4,1)="+" THE
N RE=VAL(OP$(1))+VAL(OP$(2))
2820 IF MID$(FT$(W),4,1)="-" THE
N RE=VAL(OP$(1))-VAL(OP$(2))
2830 IF MID$(FT$(W),4,1)="*" THE
N RE=VAL(OP$(1))*VAL(OP$(2))
2840 IF MID$(FT$(W),4,1)="/" THE
N RE=VAL(OP$(1))/VAL(OP$(2))
2850 IF LEN(FT$(W))>10 THEN2860
ELSE 2900
2860 IF MID$(FT$(W),8,1)="+" THE
N RE=RE+VAL(OP$(3))
2870 IF MID$(FT$(W),8,1)="-" THE
N RE=RE-VAL(OP$(3))
2880 IF MID$(FT$(W),8,1) "*" THE
N RE=RE*VAL(OP$(3))
2890 IF MID$(FT$(W),8,1) "/" THE
N RE=RE/VAL(OP$(3))
2900 RES=STR$(RE)
2920 RS=VAL(RIGHT$(FT$(W),2))
2930 GOSUB 5000
2940 NEXT W
2945 POKE65494,0
2950 GOTO 120
3000 PRINT@448,"INSERT ROW"
3015 X=1
3020 IF AS$(X)="" AND BS$(X)="" AN
D CS$(X)="" AND DS$(X)="" AND ES$(X
)="" AND FS$(X)="" AND GS$(X)="" AN
D HS$(X)="" THEN 3030 ELSE 3025'
ROW INSERT
3025 X=X+1:GOTO3020
3030 MR=X:GOSUB 1800
3035 FOR X=MR TO RN STEP-1
3040 AS$(X+1)=AS$(X):BS$(X+1)=BS$(X)
:CS$(X+1)=CS$(X):DS$(X+1)=DS$(X):ES
(X+1)=ES$(X):FS$(X+1)=FS$(X):GS$(X+1)
=GS$(X):HS$(X+1)=HS$(X)

```

Listing continued

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3045 NEXT X
3046 AS(RN)="":BS(RN)="":CS(RN)=
":DS(RN)="":ES(RN)="":FS(RN)="
:GS(RN)="":HS(RN)="
3047 GOSUB 500:GOTO130
3200 'PRINT OPTION
3205 PRINT@448,"START ROW"
3210 GOSUB 6000
3215 SR=RI
3220 PRINT@448,"END ROW"
3225 GOSUB6000
3230 ER=RI
3231 PRINT@448,"PRINTING"
3235 FOR X=SR TO ER
3236 PRINT#-2,TAB(5)AS(X);TAB(14)
)BS(X);TAB(23)CS(X);TAB(32)DS(X)
;TAB(41)ES(X);TAB(50)FS(X);TAB(5
9)GS(X);TAB(68)HS(X)
3240 NEXT X
3241 PRINT@448,""
3245 GOTO 130
3800 PRINT@448,"SAVE(S),LOAD(L)
OR VERIFY(V)?"
3805 SAS=INKEY$: IF SAS="" THEN
3810 IF SAS="S" THEN 3815
3811 IF SAS="V" THEN 3860 ELSE 3
875
3815 CLS:INPUT"FILE NAME TO SAVE
";NFS
3820 OPEN"O",#-1,NFS
3825 PRINT#-1,L,RN,CN,RL,Y,F,HP,
VP
3830 AS(100)="":BS(100)="":CS(1
00)="":DS(100)="":ES(100)="":
FS(100)="":GS(100)="":HS(100)
="
3831 FORX=1 TO F:PRINT#-1,FTS(X)
:NEXTX
3832 FOR X=1 TO 8:PRINT#-1,CT(X)
,CE(X):NEXT X
3835 FORX=1 TO 100:PRINT#-1,AS(X)
):NEXTX
3836 FORX=1TO100:PRINT#-1,BS(X):
NEXTX
3837 FORX=1 TO100:PRINT#-1,CS(X)
):NEXTX
3838 FOR X=1 TO100:PRINT#-1,DS(X)
):NEXTX
3839 FOR X=1 TO100:PRINT#-1,ES(X)
):NEXTX
3840 FOR X=1TO100:PRINT#-1,FS(X)
):NEXTX
3841 FORX=1TO100:PRINT#-1,GS(X):
NEXTX
3842 FORX=1TO100:PRINT#-1,HS(X):
NEXTX
3855 CLOSE #-1:GOTO120
3860 CLS:INPUT"FILE TO VERIFY";N
FS
3865 SKIPF NFS
3867 PRINT"FILE VERIFIED"
3868 FOR X=1 TO500:NEXTX
3870 GOTO 120
3875 CLS:INPUT "FILE TO LOAD";NFS
3880 OPEN"I",#-1,NFS
3885 INPUT#-1,L,RN,CN,RL,Y,F,HP,
VP
3900 AS(100)="":BS(100)="":CS(10
0)="":DS(100)="":ES(100)="":FS(1
00)="":GS(100)="":HS(100)="
3910 FOR X=1 TO F:INPUT #-1,FTS(X)
):NEXT X
3915 FOR X=1 TO8:INPUT#-1,CT(X),
CE(X):NEXT X
3920 FORX=1TO100:INPUT#-1,AS(X):
NEXTX
3922 FOR X=1TO100:INPUT#-1,BS(X)
):NEXT X
3924 FOR X=1TO100:INPUT#-1,CS(X)
):NEXTX
3926 FORX=1TO100:INPUT#-1,DS(X):
NEXTX
3928 FORX=1TO100:INPUT#-1,ES(X):
NEXTX
3930 FOR X=1TO100:INPUT#-1,FS(X)
):NEXTX
3932 FORX=1TO100:INPUT#-1,GS(X):
NEXTX
3934 FORX=1TO100:INPUT#-1,HS(X):
NEXTX
3970 CLOSE#-1
3975 GOTO120
4000 'TITLE
4005 ON HP GOTO4010,4020,4030,40
40,4050
4010 PRINT@3,AS(1):PRINT@10,BS(1)
):PRINT@17,CS(1):PRINT@24,DS(1):
GOTO4060
4020 PRINT@3,BS(1):PRINT@10,CS(1)
):PRINT@17,DS(1):PRINT@24,ES(1):
GOTO4060
4030 PRINT@3,CS(1):PRINT@10,DS(1)
):PRINT@17,ES(1):PRINT@24,FS(1):
GOTO4060
4040 PRINT@3,DS(1):PRINT@10,ES(1)
):PRINT@17,(FS(1):PRINT@24,GS(1)
):GOTO4060
4050 PRINT@3,ES(1):PRINT@10,FS(1)
):PRINT@17,GS(1):PRINT@24,HS(1)
):GOTO4060
4065 XS=INKEY$:IF XS="" THEN 406
5
4070 GOTO120
5000 'LOCATE RESULTS OF FORMULA
CALC
5010 U=1
5020 TL=RS-U
5030 T1=TL/8
5040 T2=INT(T1)
5050 IF T2=T1 THEN 5070
5060 U=U+1:GOTO 5020
5070 FC=U
5080 FR=1:UL=8
5085 IF RS<8 THEN FR=1:IF RS<=8
THEN 5200
5100 UL=UL+8
5105 IF RS<=UL THEN 5115 ELSE 51
10
5110 FR=FR+1
5111 IF FR=100 THEN 5120
5112 GOTO 5100
5115 FR=FR+1
5200 IF FC=1 THEN AS(FR)=RES
5210 IF FC=2 THEN BS(FR)=RES
5220 IF FC=3 THEN CS(FR)=RES
5230 IF FC=4 THEN DS(FR)=RES
5240 IF FC=5 THEN ES(FR)=RES
5250 IF FC=6 THEN FS(FR)=RES
5260 IF FC=7 THEN GS(FR)=RES
5270 IF FC=8 THEN HS(FR)=RES
5280 RETURN
6000 'ROW INPUT
6010 R1$=INKEY$:IF R1$="" THEN 6
030
6020 PRINT@448,R1$
6030 R2$=INKEY$:IF R2$="" THEN 6
030
6040 PRINT@449,R2$
6049 R1$=R1$+R2$:RI=VAL(R1$):GOT
O6060
6050 RI=VAL(R1$)+VAL(R2$)
6060 RETURN
7000 'SUM COLUMNS
7010 PRINT@448,"ROW(R) OR COL(C)
"
7011 XS=INKEY$:IFXS="" THEN7011
7012 IFXS="C" THEN 7020 ELSE 730
0
7020 FOR X=1 TO 8:IF X=CN THEN C
T(X)=1
7030 IF CT(X)=1 THEN CE(X)=RN
7035 NEXT X
7040 IF CT(1)=1 THEN 7045 ELSE 7
065
7045 CS=#:FOR X=1 TO (CE(1))-1
7050 CS=VAL(AS(X))+CS
7055 NEXT X
7060 AS(CE(1))=STR$(CS)
7065 IF CT(2)=1 THEN 7070 ELSE 7
090
7070 CS=#:FOR X=1 TO (CE(2))-1
7075 CS=VAL(BS(X))+CS
7080 NEXT X
7085 BS(CE(2))=STR$(CS)
7090 IF CT(3)=1 THEN 7095 ELSE 7
115
7095 CS=#:FOR X=1 TO (CE(3))-1
7100 CS=VAL(CS(X))+CS
7105 NEXTX
7107 CS(CE(3))=STR$(CS)
7110 CS=#:FOR X=1 TO (CE(6))-1
7115 IF CT(4)=1 THEN 7120 ELSE 7
140
7120 CS=#:FOR X=1 TO (CE(4))-1
7125 CS=VAL(DS(X))+CS
7130 NEXTX
7135 DS(CE(4))=STR$(CS)
7140 IF CT(5)=1 THEN 7145 ELSE 7
165
7145 CS=#:FORX=1 TO (CE(5))-1
7150 CS=VAL(ES(X))+CS
7155 NEXTX
7160 ES(CE(5))=STR$(CS)
7165 IF CT(6)=1 THEN 7170 ELSE 71
90
7170 CS=#:FOR X=1 TO (CE(6))-1
7175 CS=VAL(FS(X))+CS
7180 NEXT X
7185 FS(CE(6))=STR$(CS)
7190 IF CT(7)=1 THEN 7195 ELSE 7
215
7195 CS=#:FOR X=1 TO (CE(7))-1
7200 CS=VAL(GS(X))+CS
7205 NEXT X
7210 GS(CE(7))=STR$(CS)
7211 IF CT(8)=1 THEN 7215 ELSE 7
235
7215 CS=#:FOR X=1 TO (CE(8))-1
7220 CS=VAL(HS(X))+CS
7225 NEXT X
7230 HS(CE(8))=STR$(CS)
7235 GOTO120
7300 'ROW SUM
7310 GOSUB1800
7320 SA=RN:SD=CN
7330 ON SD GOTO 7331,7332,7340,7
350,7360,7370,7380,7390
7331 GOTO120
7332 GOTO120
7340 FOR X=1TO SA-1:Z=VAL(AS(X)
)+VAL(BS(X)):CS(X)=STR$(Z):NEXTX:
GOTO120
7350 FORX=1TO SA-1:Z=VAL(AS(X))+
VAL(BS(X))+VAL(CS(X)):DS(X)=STR$(
Z):NEXTX:GOTO120
7360 FORX=1TO SA-1:Z=VAL(AS(X))+
VAL(BS(X))+VAL(CS(X))+VAL(DS(X)
):ES(X)=STR$(Z):NEXTX:GOTO120
7370 FORX=1TOSA-1:Z=VAL(AS(X))+V
AL(BS(X))+VAL(CS(X))+VAL(ES(X)):
FS(X)=STR$(Z):NEXTX:GOTO120
7380 FORX=1TOSA-1:Z=VAL(AS(X))+V
AL(BS(X))+VAL(CS(X))+VAL(DS(X))+
VAL(ES(X))+VAL(FS(X)):GS(X)=STR$(
Z):NEXTX:GOTO120
7390 FOR X=1 TO SA-1:Z=VAL(AS(X)
)+VAL(BS(X))+VAL(CS(X))+VAL(DS(X)
)+VAL(ES(X))+VAL(FS(X))+VAL(GS(
X)):HS(X)=STR$(Z):NEXTX:GOTO120
12000 PCLEAR1:GOTO 10

```

END

SUPPORT:

(sə-pōrt) v.t. **1.** To bear the weight of, especially from underneath; uphold in position; keep from failing, etc. **2.** To bear or sustain (weight; etc.) **3.** To keep from failing; strengthen: *PBJ, Inc. supports their product line with technical personnel that are always there to help you.* **4.** To serve, to uphold or corroborate (a statement, theory, etc.) substantiate; verify: *PBJ, Inc. receives testimonials on a daily basis that support their product line.* **5.** To provide (a person, institution) with maintenance; provide for: *PBJ, Inc. supports the CoCo user by consistently creating new advancements in their field.*

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BY CARL J. CHRISTENSEN

TAKE STOCK IN CoCo

Keep on top of Wall Street with this pair of stock tracking and graphing programs.

If you follow the stock market, you have probably wished that the Dow Jones market-tracking programs were available for your Color Computer. Dow Jones has made them available for IBM and Apple and appears to be in no hurry to adapt the programs for other machines. However, while you are waiting, you can use these programs to store and chart stock market quotes.

Program Listing 1, Stock Grapher, allows you to enter the date, high, low, close and volume for a stock and then store this information on tape or disk. The program handles one year of daily quotes. It graphs daily quotes for any three-month period or the weekly trading range and Friday close for an entire year.

The quotes for each stock are saved in separate files and are loaded into the program one at a time for updating or graphing.

The program graphs the trading range as a vertical bar with a tick mark indicating the close. Volume is shown by a vertical bar on the lower half of the graph. The program picks an appropriate scale so your stock never goes off the chart.

Any screen-print program can provide a hard copy of a stock chart. If possible, load the screen-print program at hex 7C00.

Program Listing 2, Quote Entry, provides disk owners with a method for easily updating their quote files either manually or automatically, using Dow Jones News/Retrieval and a terminal program. One disk holds a year's worth of daily quotes for 10 stocks.

Delete the high-speed POKEs in lines 120, 5080, and 5110 in Listing 1 if your computer (especially D and ET board versions) cannot handle it.

- Use the Create a New File option.
- Find the number of the week in the current year and enter it at the appropriate time.
- Use the standard stock symbol for the file name.
- Use selection 1 to enter Monday's data for this stock.
- Use selection 5 to save the information on disk or tape. If you are using tape, I suggest using a separate tape for each stock. By the end of the year it will only take about two minutes to load or save a file.

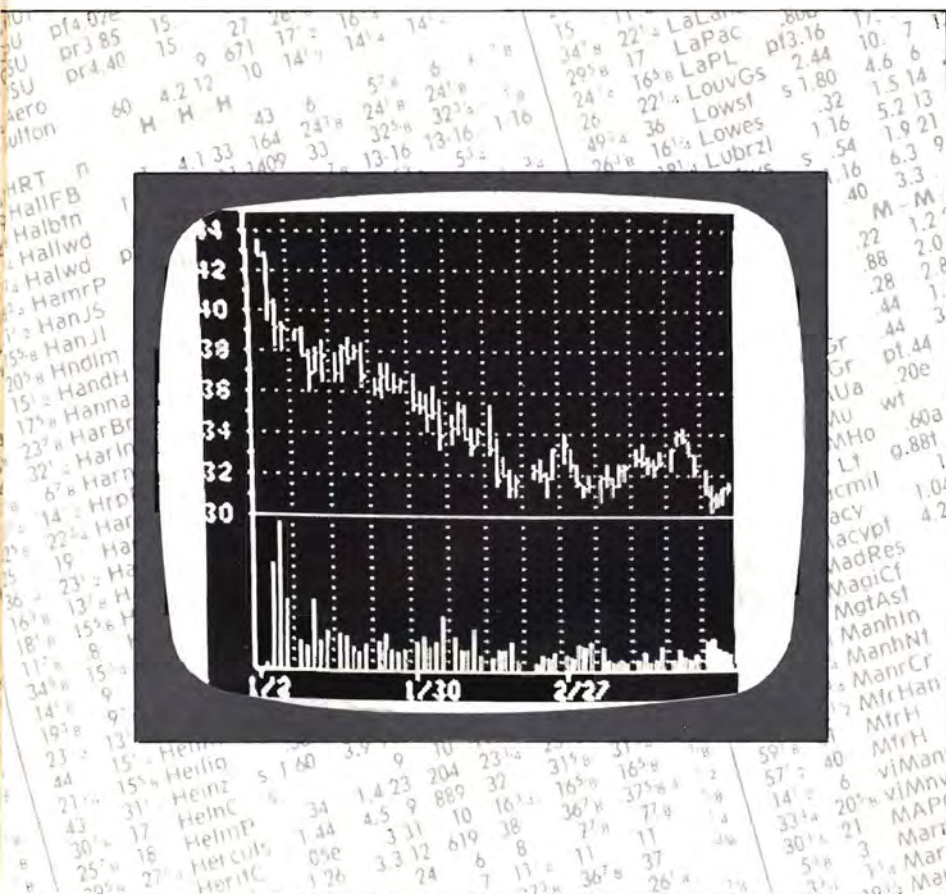
● If you wish to enter data for another stock, use selection 6 and repeat the whole process.

To view or update a file, follow these steps:

- Use the Load an Old File option.
- Always use the standard ticker-tape symbol for the file name.
- Use selection 1 to enter a new quote. Make an entry for every weekday, even holidays and days that you miss. This way the graph will clearly show each week separately. The program does not contain a calendar routine. Keep your dates straight! Using selection 3, you can enter quotes for as many days as you wish. For example, you could wait for the weekend to enter the quotes for the previous week.
- Use selection 2 to view the quotes.
- Use selection 3 to graph the information. When viewing the graph, push any key to return to the menu. You will be able to view it again without having to redraw it.
- If you add new information, use selection 5 to save it.

More on the Graphs

There are two options for graphing



the stock quotes. The first shows daily quotes for any three-month period and the second shows weekly trading range for the whole year. The scale of the graph automatically adjusts for the range of prices being graphed.

Figure 1 shows the daily price movements for the stock of Tandy Corp. for the first three months of 1984. Vertical lines indicate the beginning of each week. Figure 2 begins with the second month and Fig. 3 with the third month. Notice that the vertical scale is changed for each.

Figure 4 shows the same information, but uses the whole-year option. Now the vertical lines mark the end of each 13-week quarter. The trading range is weekly and the tick mark is the Friday close.

Program Notes

Since the program creates and maintains a database, it contains such standard database functions as load, update, view, modify, and save. In addition to these functions, the program also graphs the data in several formats. Refer to Listing 1. Notice that each function is carried out in modules that begin at line numbers that are multiples of 1000. Table 1 lists variables used in Stock Grapher.

Line 120 uses the high-speed POKE. If your machine can't use it, eliminate it here and also in lines 5110 and 6150. The menu's quit option returns the computer to normal speed.

If a new file is to be created using the New/Old? option, the program asks for the number of the week in the current year so that it can fill in previous dates with a one. This is because the graphing module will stop graphing when it finds a blank date. This way your charts will all be positioned correctly on the yearly graph if you start following some stocks at a different date. Also the earlier dates can be filled in at a later date using the Modify selection. Remember, always start on a Monday because the graph of daily quotes is divided into five-day segments.

Table 1. Stock Grapher Variable List

String Variables

MMS\$	month	N\$(0-9)	Numerals for drawing
DDS\$	day	SL\$	slash
HIS\$	high	CW\$	current week
LOS\$	low	FL\$	file name
CLS\$	close	LC\$	screen location
V\$	volume	IS	input
N\$	price for labeling graph	AA\$	input
C\$	each charter for graph labels		

Numeric Variables

HI	high	WHI	weekly high
LO	low	WLO	weekly low
CL	close	WCL	weekly close
V	volume	WV	weekly volume
MAX	maximum price during the period		
MIN	minimum price during the period		
HV	highest volume		
RANGE	maximum less minimum		
MM	month	DD	day
CW	current week	TQ	total quotes
N	counters	BM	beginning month
SH	search target	BQ	beginning quote
I	input	AA	input

Used in the graphing routines

CH	value of a character	P	point
PR	price	VS	volume scale
VI-V8	points for drawing blank graph	X and Y	coordinates in graph
DAY	day	WEEK	week
		SL	screen location

System Requirements

32K RAM
Extended Color Basic
Disk Drive Optional
Printer Optional

Table 2. Sample Sessions

Session 1. No new stocks added

If you are retrieving quotes from Dow Jones:

- Insert Colorcom/E. RUN "GO". Press ENTER. Press down arrow plus 5.
- Insert your disk. Touch R. Touch I. File name: "LOGON".
- Press spacebar. Dial Dow Jones. Switch on modem. Press BREAK repeatedly. When PLEASE LOG IN: appears, press down arrow plus 1.
- Press down arrow plus 1 each time printing stops.
- Turn modem off. If Colorcom/E menu doesn't appear, press down arrow key plus 5.
- Touch W. Touch 2. File name: QUOTES.
- Remove disk and turn computer off.

Insert disk and RUN "ENTRY". No, you are not a new user. Choose manual or automatic entry. Choose 7 to finish.

WAIT! RUN "STOCKS" to inspect and graph quotes.

Session 2. New stocks added

Start on Monday. Use STOCK GRAPHER to enter first quote. Enter other quotes normally. Don't add new stock to QUOTE ENTRY yet. RUN "STOCKS" to inspect and graph quotes.

Tuesday:

- If using automatic entry, RUN "MAKELGON". Enter all symbols. Use Colorcom/E to retrieve quotes.
- RUN "ENTRY".
- No, you are not a new user.
- Use selection 4 to add the new symbols.
- Enter quotes in normal manner.
- Update. Wait.
- RUN "STOCKS" to inspect and graph information.

The Generate Random File module generates a year's worth of random quotes. To use it, temporarily delete line 305. Use it to see what a full year of data looks like on the graph. Modify one quote out of the range of the others to see the scale change. Be sure to insert line 305 (GOTO 500) before using the program.

In addition to showing the list of selections, the menus show the stock symbol and date of last entered quote. When finished, be sure to use the Quit option to return the computer to normal speed.

If you enter the Enter New Quotes module by mistake, you can return to the menu by entering M instead of a month number. In this mode, the program will not accept a low if it is greater than the high. Also, the close has to fall between the high and low.

The first option of the Graph Quotes is to view an old graph or draw a new one. This lets you return to a graph without waiting for it to be redrawn. Notice that once a graph is drawn, it stays there in memory and can be viewed with a simple SCREEN1,1. Also, if your screen-print routine cannot be relocated above this program at hex 7C00, just quit this program and load and execute your screen-print routine. The

graph is still there for the routine to read.

The Modify Previous Entries module lets you correct previous entries. Recall the quote by its number. Pressing enter when the cursor is next to a value leaves it unchanged. You can save or load files using either tape or disk. Be sure to use the stock symbol as the file name. Disk users should make a daily disk backup and weekly tape backup.

Quote Entry

Quote Entry (Listing 2) updates files that you create using Stock Grapher. You first enter the symbols for the stocks you are following. Then enter today's quote either manually or automatically for each stock. You can later modify this information and add new stocks to the list. Finally, the program adds these most recent quotes to the data file for each stock.

Before reading a file, the program checks the directory to see if the disk contains that file. If the file is not on the disk, the program tells you so you can insert another disk when the program is finished updating the first disk. Although each disk will hold only 10 stocks, a portfolio of up to 40 stocks could be maintained by using

four different disks on a single-drive system. This number could be increased by changing the DIMs in line 10.

Using Quote Entry

Here's how to start up Quote Entry:

- Make a backup of the disk that contains Stock Grapher and the data-files of the stocks you are tracking. Remember, if a new issue is to be followed, the file of quotes must be started on a Monday using Stock Grapher.

- Type in Quote Entry, proofread it, and save it as "ENTRY".

For first-time use via Colorcom/E and Dow Jones News/Retrieval, follow these steps (if you do not own a Colorcom/E or are not a Dow Jones subscriber, skip this section):

- Key in Program Listing 3 and save it on the disk as "MAKELGON".

- Run "MAKELGON".

- Enter the symbols for the stocks that you are following.

- Enter XX when you are finished.

- Remove your disk. Insert the Colorcom/E and type RUN "GO".

- Remove the Colorcom/E disk. Press enter. Press the down-arrow and five keys.

- Insert your disk. Touch R.

- Press the one key (Xmit Options = 1. None.)

- Enter as file name "LOGON". Press spacebar.

- Dial your Dow Jones access number. Switch on the modem. Press break repeatedly until "Please log on:" appears.

- Press the down-arrow and one keys each time the printing stops.

- When "Please log on:" appears again, turn the modem off.

- If Colorcom/E menu does not return, press the down-arrow and five keys.

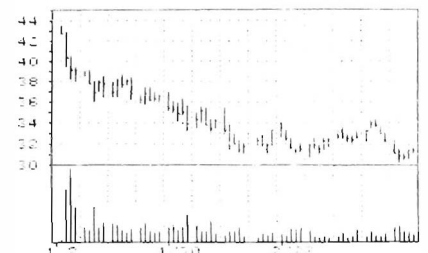


Fig. 1. Daily Price Movements for Tandy Stock for First Three Months

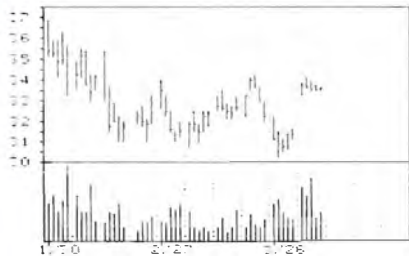


Fig. 2. Price Movements for Tandy Stock Beginning with the Second Month

fied that the quotes are accurate.

- Wait until the prompt "Press any key to continue" eventually returns.
- If any files were not found, press any key, insert the data disk containing those files, and use selection 7 again. The files on the first disk will be "not found" this time.

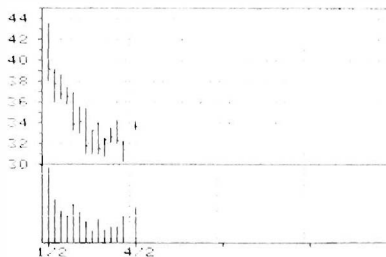


Fig. 4. Price Movements for Tandy Stock Using the Whole-Year Option

● Press the W, then the two key (no capture characters). Enter as the file name "QUOTES".

● Remove your disk and turn the computer off.

If you do not use the Colorcom/E or Dow Jones News/Retrieval, follow these first-use steps:

- Run "ENTRY".
- Press Y in response to "Are you a new user?"
- Enter the stock symbols for the issues that have begun to follow using Stock Grapher.
- When you are finished, enter XX.
- Enter the date.
- Use menu selections 4, 5, and 6 to inspect, correct, or add more stock symbols.

Here are the steps for automatic quote entry:

- Choose the Enter New Quotes, Automatic Entry, and Wait! menu options.

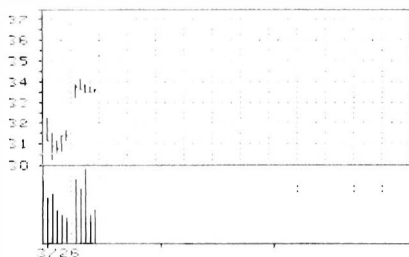


Fig. 3. Price Movements for Tandy Stock Beginning with the Third Month

Use these steps for manual quote entry:

- Choose the Enter New Quotes and Manual Entry options.
- You will be prompted to enter the new quotes for each stock.

To scan and modify quotes, use menu selections 2 and 3 to view and, if necessary, modify the information entered.

To update files:

- Use selection 7 when you are satis-

Other disks should have:

- STOCKS
- STKSYM (will be written by QUOTE ENTRY)
- XYZ
- ABC
- etc. data files

See Table 2 for sample sessions.

If this seems a bit complicated, it is because this system is designed to accommodate three types of user: the tape-system user, the disk-system user who does not use the Dow Jones News/Retrieval system, and the disk-system user who has Colorcom/E or some other terminal program and who uses the Dow Jones system. For example, the routine could be simplified for the latter user by modifying Quote Entry so that it would create Logon as well as STKSYM.

Program Notes

Table 3 contains a list of variables.

The list of stocks to be followed is put in alphabetical order. This is accomplished by a standard bubble sort where each item in the list is compared to the next one. If they are not in alphabetical order, they switch places, and the switch is recorded (SW = 1). ■

Address correspondence to Carl J. Christensen, 523 Inca Way, Salinas, CA 93906.

Your master disk should now contain:

- STOCKS (Stock Grapher)
- ENTRY (Quote Entry)
- STKSYM (list of symbols in portfolio)
- XYZ
- ABC etc. up to 10 data files
- If you are using automatic entry, MAKELGON (to create automatic file for Colorcom/E)
- LOGON (automatic file for Colorcom/E)
- QUOTES (most recent data from Dow Jones)

Table 3. Quote Entry Variable List

String Variables

SYM\$(x)	stock symbol	AA\$ and I\$	inputs
A\$(x)	month from tape	B\$(x)	day from tape
PMS	previous month	PD\$	previous day
MM\$	today's month	DD\$	today's day
HI\$	today's high	LOS	today's low
CL\$	today's close	V\$	today's volume
A\$(x)	lines read from Dow Jones Data file		
IT\$	integer	DES	denominator
SH\$	search target	NU\$	numerator
S\$	temporary storage in alphabetizer sort		
J\$ and K\$	strings read by DSKI		

Numeric Variables

BD(x)	today's bid	AK(x)	today's ask
HI(x)	today's high	LO(x)	today's low
CL(x)	today's close	V(x)	today's volume
A(x)	tape high	B(x)	tape lose
C(x)	tape close	D(x)	tape volume
I & AA	inputs	X and N	counters
TI	total issues	SL	screen location
MM	month	DD	day
SW	switch	A	value of A\$
IT	integer	DE	denominator
SI, S2, S3 and S4	temporary storage in ABC sort		
J and K	value of J\$ & K\$ from DSKI		

Program Listing 1. Stock Grapher

```

10 GOTO 105
15 ' subroutine used in graph
20 MAX=0:MIN=10000:HV=0:WV=0
25 FORN=1TO260:PRINT00,N
30 IF MM$(1)=" " THEN500
35 IF HI(N)=0 THEN50
40 IF HI(N)>MAX THEN MAX=HI(N)
45 IF LO(N)>0 AND LO(N)<MIN THEN
MIN=LO(N)
50 WV=WV+V(N):IF N/5=INT(N/5) TH
ENX=X:IF WV>HV THEN HV=WV
55 IF N/5=INT(N/5) THENWV=0
60 IF MM$(N)=" " THEN70
65 NEXT:RETURN
70 IF WV>HV THEN HV=WV:RETURN
75 RETURN
100 ' title
105 CLS:PRINT@65,"* S T O C K
G R A P H E R *"
110 PRINT@260,"EXTENDED COLOR BA
SIC 32K":PRINT@297,"(TAPE OR DIS
K)"
115 PRINT@396,"(C) 1984":PRINT@4
22,"CARL J. CHRISTENSEN":GOSUB70
00:CLS
120 POKE65495,0:CLEAR4000,6H7BFF
:DIMMS$(260),DD$(260),HI(260),LO
(260),CL(260),V(260)
125 NS(0)="BM+1,0H1U4E1R2F1D4G1L
2BM+6,0"
130 NS(1)="BM+1,0R1NR1U6G1BM+6,+
5"
135 NS(2)="NR4U1E1R1E2U1H1L2G1BM
+7,+5"
140 NS(3)="BM+0,-1F1R2E1H2E2H1L3
BM+7,6"
145 NS(4)="BM+3,0U2NR1L3U1E3D3BM
+4,3"
150 NS(5)="BM+0,-1F1R2E1U2H1L3U2
R4BM+3,+6"
155 NS(6)="BM+4,-5H1L2G1D4F1R2E1
U1H1L3BM+7,+3"
160 NS(7)="U1E4U1L4BM+7,+6"
165 NS(8)="BM+1,-0H1U1E1H1U1E1R2
F1D1G1NL2F1D1G1L2BM+6,0"
170 NS(9)="BM+0,-1F1R2E1U4H1L2G1
D1F1R2BM+4,+3"
175 SL$="U1E4U1BM+3,+6"
200 ' new/old file??
210 CLS:PRINT"1. CREATE A NEW FI
LE":PRINT"2. LOAD AN OLD FILE":P
RINT@480,"TYPE 1 OR 2.":
220 GOSUB7020:IF AA<1 OR AA>2 TH
EN 220
230 IF AA=2 THEN 6000
240 CLS:PRINT"START THE NEW FILE
ON A MONDAY."
250 PRINT@64,"ENTER THE NUMBER O
F THIS WEEK IN THE CURRENT YEAR (
1-52). ":LINEINPUTCW$:CW=VAL(CW
$):IFCW<1 OR CW>52 THEN250
260 TQ=(CW-1)*5:FORN=1TO TQ:MM$(
N)="1":NEXT
270 PRINT@160,"NAME THE FILE USI
NG THE STOCK SYMBOL (TAN).":LI
NEINPUT"FILENAME "':FL$:IF FL$=""
THEN270
300 ' generate random file
305 GOTO5000
310 MM=1:DD=1:FORN=1 TO 260
315 MM$=STR$(MM):MM$(N)=RIGHT$(M
M$,LEN(MM$)-1)
320 DD$=STR$(DD):DD$(N)=RIGHT$(D
D$,LEN(DD$)-1)
325 HI(N)=RND(5)+30+.125
330 LO(N)=HI(N)-RND(5)
335 CL(N)=LO(N)+(HI(N)-LO(N))/2
340 V(N)=RND(100)*100
345 IF DD=21 THEN DD=0:MM=MM+1
350 DD=DD+1
355 NEXT:TQ=N-1
500 ' menu
510 CLS:PRINT"***** SELECTI
ONS *****":
520 PRINT"FILE: "':FL$:PRINT@46,
"LAST QUOTE: "':MM$(TQ)"/"/:DD$(T
Q)
530 PRINT:PRINT"1. ENTER NEW QUO
TES"
540 PRINT:PRINT"2. SCAN QUOTES"
550 PRINT:PRINT"3. GRAPH QUOTES
"
560 PRINT:PRINT"4. MODIFY PREVIO
US ENTRIES"
570 PRINT:PRINT"5. SAVE QUOTES"
580 PRINT:PRINT"6. LOAD ANOTHER
FILE"
590 PRINT:PRINT"7. QUIT":
600 PRINT@499,"type 1 - 7":GOSU
B7020
610 IF AA<1 OR AA>7 THEN 600
620 CLS:ON AA GOTO 1000,2000,300
0,4000,5000,700,800
700 CLS:PRINT"<L>OAD A NEW FILE
<M>ENU":GOSUB7020:IF AA$="L" T
HEN120 ELSE500
800 CLS:POKE65494,0:CLEAR 200:EN
D
1000 ' enter new quotes
1010 IF TQ<0 THEN TQ=0
1020 IF TQ=260 THEN PRINT"THIS F
ILE ("':FL$:"') IS":PRINT"FULL. ST
ART A NEW FILE.":GOSUB7000:GOTO5
00
1030 PRINT"ENTER NEW QUOTES FOR
":FL$:""
1040 PRINT"MOST RECENT QUOTE IS:
":PRINT"#:":TQ:"- "':MM$(TQ)"/"/:D
D$(TQ)':"':V(TQ)
1050 PRINTHI(TQ):LO(TQ):CL(TQ):P
RINT
1060 PRINT"MONTH (1-12)":PRINT@1
80,"M=MENU":PRINT"DAY (1-31)":PR
INT"HIGH":PRINT"LOW":PRINT"CLOSE
":PRINT"VOLUME":PRINT@416,"MAKE
AN ENTRY FOR EVERY WEEKDAY.FOR H
OLIDAYS ENTER THE DATE AND ZEROS
FOR THE QUOTE.":SL=173
1070 TQ=TQ+1
1080 PRINTESL,,:LINEINPUTMM$(TQ)
:MM=VAL(MM$(TQ)):IF MM$(TQ)="M" T
HENTQ=TQ-1:GOTO5000
1090 IF MM<1 OR MM>12 THEN1000 E
LSE SL=SL+32
1100 PRINTESL,,:LINEINPUTDD$(TQ)
:DD=VAL(DD$(TQ)):IF DD<1 OR DD>3
1 THEN 1100 ELSE SL=SL+32
1110 PRINTESL,,:LINEINPUTHI$(HI(
TQ)=VAL(HI$(TQ)):SL=SL+32
1120 PRINTESL,,:LINEINPUTLO$:LO(
TQ)=VAL(LO$):IF LO(TQ)>HI(TQ) TH
EN1120 ELSE SL=SL+32
1130 PRINTESL,,:LINEINPUTCLS:CL(
TQ)=VAL(CLS):IF CL(TQ)>HI(TQ) OR
CL(TQ)<LO(TQ) THEN 1130 ELSE SL
=SL+32
1140 PRINTESL,,:LINEINPUTV$:V(TQ)
)=VAL(V$)
1150 PRINT@360,"CORRECT? (Y/N)"
:
1160 GOSUB7020:IF AA$="Y" THEN 5
00
1170 IF AA$="N" THEN TQ=TQ-1:CLS:
GOTO1000
1180 GOTO1160
2000 ' scan quotes
2010 CLS:INPUT"BEGIN WITH MONTH"
:BM:IF BM<1 OR BM>12 THEN2010
2020 N=(BM-1)*21
2030 N=N+1
2040 IF N<1 THEN N=1
2050 IF N>TQ THEN N=TQ
2060 PRINTN:FL$:" "':MM$(N)"/"/
:DD$(N)':" "':V(N)
2070 PRINTHI(N):LO(N):CL(N):PRIN
T
2080 IF N=TQ OR N/5=INT(N/5) THEN
PRINT@480,"<F>ORWARD <B>ACK
<M>ENU":GOSUB2100
2090 GOTO2030
2100 GOSUB7020:IF AA$="F" THENCLS:
RETURN
2110 IF AA$="B" THEN N=N-9:CLS:GO
TO2040
2120 IF AA$="M" THEN N=0:GOTO500
2130 GOTO2100
3000 ' graph quotes
3010 CLS:PRINT"1. VIEW PREVIOUS
GRAPH":PRINT"2. DRAW A NEW GRAPH
":GOSUB7020:IF AA<1 OR AA>2 THEN
3010
3020 IF AA=1 THEN SCREEN1,1:GOSU
B7020:GOTO5000
3030 CLS:PRINT"1. GRAPH THREE MO
NTHS":PRINTTAB(5)"(DAILY QUOTES)
":PRINT:PRINT"2. GRAPH ENTIRE YE
AR":PRINTTAB(5)"(WEEKLY TRADING
RANGE)":GOSUB7020:IF AA<1 OR AA>
2 THEN3030ELSECLS
3040 IF AA=2 THEN3300
3050 CLS:INPUT"ENTER FIRST MONTH
":FM:IF FM<1 OR FM>12 THEN3050
3060 IF FM>11 THEN FM=11
3070 FM=FM-1:BQ=INT(FM*20)+1
3100 ' one quarter
3105 MAX=0:MIN=10000:HV=0
3110 FORN=BQ TO BQ+64
3115 IF N=261 THEN3145
3120 IF MM$(BQ)=" " THEN500
3125 IF HI(N)>MAX THEN MAX = HI(
N)
3130 IF LO(N)>0 AND LO(N)<MIN TH
EN MIN=LO(N)
3135 IF V(N)>HV THEN HV=V(N)
3140 NEXT
3145 GOSUB7100:V1=255:V2=18:V3=2
4:V4=168:V5=72:V6=BQ:V7=3:V8=20:
GOSUB3500
3150 X=24:DAY=0
3155 FORN=BQ TO BQ+64
3160 IF N=261 THEN3205
3165 DAY=DAY+1
3170 IF HI(N)=0 THEN3190
3175 LINE(X,120)-(HI(N)-MIN)*S)-(
X,120-(LO(N)-MIN)*S),PSET
3180 LINE(X,120)-(CL(N)-MIN)*S)-(
X+1,120-(CL(N)-MIN)*S),PSET
3185 LINE(X,180)-(X,(180-(V(N)/V
S))),PSET
3190 IF DAY/5=INT(DAY/5) THEN X=
X+6:GOTO3200
3195 X=X+3
3200 NEXT
3205 GOSUB7030:GOTO5000
3300 ' whole year
3305 GOSUB20:GOSUB7100:V1=245:V2
=56:V3=25:V4=225:V5=56:V6=1:V7=4
:V8=65:GOSUB3500
3310 X=25:WEEK=0:N=-4
3315 N=N+5
3320 WEEK=WEEK+1
3325 WHI=0:WLO=10000:WV=0
3330 FORD=0T04
3335 IF HI(D+N)=0 THEN3355
3340 IF HI(D+N)>WHI THEN WHI=HI(
D+N)
3345 IF LO(D+N)>0 AND LO(D+N)<WLO
O THEN WLO=LO(D+N)
3350 WV=WV+V(D+N):WCL=CL(D+N)
3355 NEXT
3360 IF WHI=0 THEN3380
3365 LINE(X,120)-(WHI-MIN)*S)-(X,
120-(WLO-MIN)*S),PSET
3370 LINE(X,120)-(WCL-MIN)*S)-(X+
1,120-(WCL-MIN)*S),PSET
3375 LINE(X,180)-(X,(180-(WV/VS)
)),PSET
3380 IF WEEK/13=INT(WEEK/13) THE
N X=X+8:GOTO3390
3385 X=X+4
3390 IF N>251 THEN3400
3395 GOTO3315
3400 GOSUB7030:GOTO5000
3500 ' draw blank graph
3505 PMODE4,1:PCLS:SCREEN1,1
3510 LINE(21,0)-(V1,0),PSET
3515 LINE(21,180)-(V1,180),PSET
3520 LINE(21,120)-(V1,120),PSET
3525 LINE(21,0)-(21,180),PSET
3530 LINE(V1,0)-(V1,180),PSET
3535 FORX=21TO V1 STEP V2:FORP=0
TO180STEP4:PSET(X,P):NEXT:NEXT
3540 FORY=8TO120STEP16:FORP=21TO
V1 STEP6:PSET(P,Y):NEXT:NEXT
3545 FORY=0TO120STEP8:LINE(19,Y)
-(20,Y),PSET:NEXT
3550 DRAW"BM0,123"
3555 PR=INT(MIN):FR=MIN-INT(MIN)
:MIN=MIN-FR

```

Listing continued

DIGISECTOR™ DS-69 VIDEO DIGITIZER FOR THE COCO



Give your COCO the gift of sight!

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C-See is a menu-driven software package included with your DS-69. It provides high speed 5 level digitizing to the screen, high precision 16 level digitizing for superb hard copy printout, and simple software control of brightness and contrast. Or call our driver routines from your own Basic program for easy 64 level random access digitizing. Pictures taken by the DS-69 may be saved on disk by C-See and then edited by our optional MAGIGRAPH package for enhancements and special effects.



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```

3560 FORN=1TO8
3565 NS=STR$(PR):NS=RIGHT$(NS,LE
N(NS)-1):NS=RIGHT$(NS,3)
3570 IF INT(PR)<>PR THEN3580
3575 FORC=1 TO LEN(NS):C$=MID$(N
$,C,1):CH=VAL(C$):DRAWN$(CH):NEX
TC
3580 PR=PR+(1*(16/S))
3585 LC$="BM"+STR$(0)+", "+STR$(1
23-(N*16))
3590 DRAWLC$:NEXTN
3595 FORX= V3 TO V4 STEP V5:LINE
(X,180)-(X,183),PSET:NEXT
3600 DRAW"BM18,190":DT=V6
3605 FORN=1TO V7
3610 IF VAL(DD$(DT))=0 THEN3630
3615 FORC=1 TO LEN(MM$(DT)):C$=M
ID$(MM$(DT),C,1):CH=VAL(C$):DRAW
N$(CH):NEXT
3620 DRAWSL$
3625 FORC=1 TO LEN(DD$(DT)):C$=M
ID$(DD$(DT),C,1):CH=VAL(C$):DRAW
N$(CH):NEXT
3630 DT=DT+V8:LC$="BM"+STR$(18+(
N*V5))+", "+STR$(190)
3635 DRAWLC$:NEXTN:RETURN
4000 ' modify previous entries
4010 CLS:PRINT"YOU NEED TO KNOW
THE NUMBER OF THE QUOTE THAT YO
U WISH TO MOD- IPY":PRINT
4020 PRINT"SCAN THE OLD QUOTES T
O FIND THE NUMBER."
4030 PRINT@448,"<>CAN <M>ODIF
Y":GOSUB7020
4040 IF AAS="S"THEN2000
4050 IF AAS">"M"THEN4030
4060 CLS:INPUT"NUMBER OF QUOTE":
SH:IF SH>TQ THEN4060
4070 IFSH=0THEN500
4080 CLS:PRINT"MONTH "MM$(SH):PR
INT"DAY "DD$(SH):PRINT"HIGH"HI(S
H):PRINT"LOW"LO(SH):PRINT"CLOSE"
CL$(SH):PRINT"VOLUME"V(SH)
4090 PRINT@448,"PRESS <ENTER> IF
CORRECT.":
4100 SL=15:PRINT@SL,,:LINEINPUTI
$:I=VAL(I$):IF I>12 THEN4100 EL
S E X=X:I$="" THEN4110 ELSE MM$(
SH)=I$
4110 SL=SL+32
4120 PRINT@SL,,:LINEINPUTI$:I=VA
L(I$):IF I>31 THEN4120 ELSE X=X:
IF I$="" THEN4130 ELSE DD$(SH)=I
$
4130 SL=SL+32
4140 PRINT@SL,,:LINEINPUTI$:I=VA
L(I$):IF I$="" THEN4150 ELSE HI(
SH)=I
4150 SL=SL+32
4160 PRINT@SL,,:LINEINPUTI$:I=VA
L(I$):IF I$="" THEN4170 ELSE X=X
:IF I>HI(SH) THEN4160 ELSE LO(S
H)=I
4170 SL=SL+32
4180 PRINT@SL,,:LINEINPUTI$:I=VA
L(I$):IF I$="" THEN4190 ELSE X=X:
IF I<LO(SH) OR I>HI(SH) THEN4180
ELSE CL$(SH)=I
4190 SL=SL+32:PRINT@SL,,:LINEINP
UTI$:I=VAL(I$):IF I$="" THEN420
0 ELSE V(SH)=I
4200 GOTO500
5000 ' save quotes
5010 CLS:PRINT"<T>APE <D>ISK
<M>ENU?":GOSUB7020:IFAA$="M" O
R AA$="T" OR AA$="D" THEN5020 EL
SE5010
5020 IF AA$="M"THEN500
5030 POKE65494,0:CLS:LINEINPUT"F
ILENAME ":FL$
5040 IF AA$="D" THEN CLS:PRINT"*
* INSERT DATA DISK":PRINT"* PRE
SS <ENTER>":GOTO5090
5050 CLS:PRINT"* POSITION TAPE"
:PRINT"* PRESS PLAY AND RECORD"
:PRINT"* PRESS <ENTER>"
5060 INPUTX:OPEN"O",#1,FL$
5070 FORN=1TOTQ:PRINT#1,MM$(N),
DD$(N),HI(N),LO(N),CL(N),V(N):NE
XT

```

```

5080 CLOSE#1:POKE65495,0:GOTO50
0
5090 INPUTX:OPEN"O",#1,FL$
5100 FORN=1TOTQ:WRITE#1,MM$(N),D
D$(N),HI(N),LO(N),CL(N),V(N):NEX
T
5110 CLOSE#1:POKE65495,0:GOTO 50
0
6000 ' load quotes
6010 CLS:PRINT"<T>APE OR <D>IS
K?":GOSUB7020:IFAA$="T" OR AA$=
"D" THEN 6020 ELSE6010
6020 IF AA$="M"THEN500
6030 POKE65494,0:CLS:LINEINPUT"F
ILENAME ":FL$
6040 IF AA$="D" THEN CLS:PRINT"*
* INSERT DATA DISK":PRINT"* PRE
SS <ENTER>":GOTO6110
6050 CLS:PRINT"* POSITION TAPE"
:PRINT"* PRESS PLAY":PRINT"* P
RESS <ENTER>"
6060 INPUTX:TQ = 0:OPEN"I",#-1,F
L$
6070 IF EOF(-1)=-1 THEN6100
6080 TQ=TQ+1
6090 INPUT#-1,MM$(TQ),DD$(TQ),HI
(TQ),LO(TQ),CL(TQ),V(TQ):GOTO607
0
6100 CLOSE#-1:POKE65495,0:GOTO50
0
6110 INPUTX:CLS:TQ=0:OPEN"I",#1,
FL$
6120 IF EOF(1)=-1 THEN6150
6130 TQ=TQ+1:PRINT@TQ,TQ
6140 INPUT#1,MM$(TQ),DD$(TQ),HI(
TQ),LO(TQ),CL(TQ),V(TQ):GOTO 612
0
6150 CLOSE#1:POKE65495,0:GOTO 50
0
7000 ' inkey$ sub
7010 PRINT@480,"PRESS ANY KEY TO
CONTINUE.":
7020 FORAA=1TO10:AS=INKEY$:NEXT
7030 AA$=INKEY$:IFAA$=" "THEN 703
0
7040 AA=VAL(AAS):RETURN
7100 ' graphing scale sub
7110 RANGE=MAX-MIN:IF RANGE>480
THENPRINT"RANGE TOO GREAT":GOSUB
7000:GOTO500
7120 S=.25
7130 IF RANGE<240 THEN S=.5
7140 IF RANGE<120 THEN S=1
7150 IF RANGE<60 THEN S=2
7160 IF RANGE<30 THEN S=4
7170 IF RANGE<15 THEN S=8
7180 IF RANGE<7 THEN S=16
7190 IF RANGE<3 THEN S=32
7200 VS=HV/57:RETURN

```

Program Listing 2. Quote Entry

```

50 ' clears & dims
60 CLEAR3000:DIMS$(40),BD(40),
AK(40),HI(40),LO(40),CL(40),V(40
),AS(260),BS(260),A(260),B(260),
C(260),D(260)
100 ' title
110 CLS:PRINT@64,"** Q U O T E
E N T R Y **"
120 PRINT@130,"(FOR STOCK GRAPHE
R PROGRAM)"
130 PRINT@257,"DISK EXTENDED COL
OR BASIC 32K"
140 PRINT@396,"(C) 1984":PRINT@4
22,"CARL J. CHRISTENSEN"
150 GOSUB1000
200 ' new user?
210 CLS:PRINT"ARE YOU A NEW USER
? (Y/N)":GOSUB1000:IFAA$="N"THE
N300
220 IFAA$">"Y"THEN210
230 GOSUB4000:GOTO400
300 ' read STKSYM file
310 OPEN"I",#1,"STKSYM"
320 INPUT#1,PM$,PD$
330 IF EOF(1)=-1 THEN360

```

```

340 TI=TI+1
350 INPUT#1, SYM$(TI):GOTO330
360 CLOSE#1
400 ' enter date
410 CLS:PRINT"MOST RECENT QUOTES
ON FILE WERE ENTERED ON: ";PM$;
"/";PD$
420 PRINT@96,"ENTER TODAY'S DATE
.":PRINT@160,"MONTH (1-12)":PRIN
T"DAY (1-31)":SL=174
430 PRINT@SL,,:LINEINPUTMM$:MM=V
AL(MM$):IF MM<1 OR MM>12 THEN430
ELSE SL=SL+32
440 PRINT@SL,,:LINEINPUTDD$:DD=V
AL(DD$):IF DD<1 OR DD>31 THEN 44
0
500 ' menu
505 CLS:PRINT"MENU"
510 PRINT:PRINT"1. ENTER NEW QUO
TES"
515 PRINT:PRINT"2. SCAN QUOTES"
520 PRINT:PRINT"3. MODIFY QUOTES
"
525 PRINT:PRINT"4. ENTER NEW ISS
UES TO FOLLOW"
530 PRINT:PRINT"5. SCAN ISSUES L
IST"
535 PRINT:PRINT"6. MODIFY ISSUES
LIST"
540 PRINT:PRINT"7. FINISHED - UP
DATE FILES"
545 GOSUB1000:IFAA<1 OR AA>7 TH
EN545
550 ON AA GOSUB 1000,2000,3000,4
000,5000,6000,7000
555 GOTO500
1000 ' new quotes
1010 CLS:PRINT"1. MANUAL ENTRY."
:PRINT:PRINT"2. AUTOMATIC ENTRY
FROM DISK FILE.":PRINT:PRI
NT"3. MENU.":GOSUB1000
1020 ON AA GOTOL1000,1200,500
1030 GOTOL1000
1100 ' manual data entry
1105 FORN=1TOTI
1110 CLS:PRINT"DATE: ";MM$:"/";D
D$:PRINT@64,"QUOTE FOR: "SYM$(N)
;".":
1115 PRINT@128,"HIGH":PRINT"LOW"
:PRINT"CLOSE":PRINT"VOLUME":SL=1
35
1120 PRINT@SL,,:LINEINPUTHI$(
N)=VAL(HI$):SL=SL+32
1125 PRINT@SL,,:LINEINPUTLO$(
N)=VAL(LO$):IF LO(N)>HI(N) THEN1
125 ELSE SL=SL+32
1130 PRINT@SL,,:LINEINPUT CL$:CL
(N)=VAL(CL$):IF CL(N)>HI(N) OR C
L(N)<LO(N) THEN1130 ELSE SL=SL+3
2
1135 PRINT@SL,,:LINEINPUTVS$(N)
=VAL(V$)
1140 PRINT@448,"CORRECT? (Y/N)":
:GOSUB1000
1145 IF AA$="N" THEN1100
1150 IF AA$">"Y"THEN1140
1155 NEXT:RETURN
1200 ' auto data entry
1210 OPEN"O",#1,"QUOTES/"
1220 IF EOF(1)=-1 THEN1900
1230 INPUT#1,AS
1300 ' find "stock xyz" line
1310 T=INSTR(AS,"STOCK")
1320 IF T=0 THEN1220
1330 T=INSTR(AS," ")
1340 IF MID$(AS,T,3)<>" "THEN1
220
1400 ' strip spaces in front of
symbol
1410 T=INSTR(AS," "):AS=RIGHT$(A
S,LEN(AS)-T)
1420 IF LEFT$(AS,1)=" "THENA$=RI
GHT$(AS,LEN(AS)-1):GOTO1420
1500 ' find # of stock in list
1510 FORN=1TOTI
1520 IF AS=SYM$(N)THEN1605
1530 NEXT

```

```

1600 ' read quote lines
1605 INPUT#1,AS:GOSUB1705:BD(N)=
A
1610 INPUT#1,AS:GOSUB1705:AK(N)=
A
1615 INPUT#1,AS:GOSUB1705:HI(N)=
A
1620 INPUT#1,AS:GOSUB1705:LO(N)=
A
1625 INPUT#1,AS:GOSUB1705:CL(N)=
A
1630 INPUT#1,AS:GOSUB 1705:V(N)=
A
1635 IF HI(N)= Ø THEN HI(N)=AK(N
)
1640 IF LO(N)= Ø THEN LO(N)=BD(N
)
1645 IF CL(N)= Ø THEN CL(N)=AK(N
)
1650 GOTOL220
1700 'sub-convert str's to #'s
1705 T=INSTR(AS,""):AS=RIGHT$(A
S,LEN(AS)-T)
1710 IF LEFT$(AS,1)=" "THENA$=RI
GHT$(AS,LEN(AS)-1):GOTOL710
1715 ' is it volume?
1720 T=INSTR(AS,""):IF T<>Ø THE
N A$=RIGHT$(AS,LEN(AS)-T):A=VAL(
AS):RETURN
1725 ' no fraction?
1730 T=INSTR(AS,"/"):IF T=Ø THEN
A=VAL(AS):RETURN
1735 'convert frac. to decimals
1740 T1=INSTR(AS,""):IT$=LEFT$(
AS,T1-1)
1745 DE$=RIGHT$(AS,LEN(AS)-T)
1750 NU$=MID$(AS,T1+1,T-T1+1)
1755 IT=VAL(IT$):DE=VAL(DE$):NU=
VAL(NU$)
1760 A=IT+(NU/DE):RETURN
1900 CLOSE#1:CLS:PRINT"FINISHED.
":GOSUB1000:RETURN
2000 ' scan quotes
2010 CLS:FORN=1TOTI
2020 PRINT SYM$(N);HI(N);LO(N);C
L(N):PRINTV(N):PRINT
2030 IF N/5=INT(N/5)THENGOSUB100
0:CLS
2040 NEXT:GOSUB1000:RETURN
3000 ' modify quotes
3010 CLS:PRINT"TYPE SYMBOL OF IS
SUE TO BE CHANGED AND PRESS
<ENTER> ":LINEINPUTSH$
3020 FORN=1TOTI:IF SH$=SYM$(N)TH
EN3040
3030 NEXT:RETURN
3040 CLS:PRINTSYM$(N):PRINTMMS;"
/"DD$
3050 PRINT@96,"HIGH";HI(N):PRINT
"LOW";LO(N):PRINT"CLOSE";CL(N):P
RINT"VOLUME";V(N):SL=114
3060 PRINT@SL,;:LINEINPUTI$:I=VA
L(I$):IF I$="" THEN3070 ELSE HI(
N)=I
3070 SL=SL+32
3080 PRINT@SL,;:LINEINPUTI$:I=VA
L(I$):IF I$="" THEN3090 ELSE X=X
:IF I>HI(N) THEN 3080 ELSE LO(N)
=I
3090 SL=SL+32
3100 PRINT@SL,;:LINEINPUTI$:I=VA
L(I$):IF I$="" THEN3110 ELSE X=X
:IF I<LO(N) OR I>HI(N) THEN3100
ELSE CL(N)=I
3110 SL=SL+32:PRINT@SL,;:LINEINP
UTI$:I=VAL(I$):IF I$="" THEN 312
0 ELSE V(N)=I
3120 RETURN
4000 ' new issues
4010 CLS:PRINT"TYPE THE SYMBOLS
OF THE ISSUES TO BE FOLLOWED.
":PRINT"PRESS <ENTER> AFTER EACH
ONE.":PRINT@448,"WHEN FINISHED,
TYPE 'XX' AND PRESS <ENTER>."
;
4020 TI=TI+1
4030 PRINT@260,;:LINEINPUT SYM$(
TI):IF SYM$(TI)=""THEN4030
4040 IF SYM$(TI)=""THEN SYM$(T

```

```

I)="" :TI=TI-1:GOTO4100
4050 PRINT@260,STRING$(10,32):GO
TO4200
4100 ' abc sort
4110 SW=Ø
4120 FORN=1TO TI-1
4130 IF SYM$(N)<SYM$(N+1)THEN41
80
4140 S$=SYM$(N):S1=HI(N):S2=LO(N
):S3=CL(N):S4=V(N)
4150 SYM$(N)=SYM$(N+1):HI(N)=HI(
N+1):LO(N)=LO(N+1):CL(N)=CL(N+1
):V(N)=V(N+1)
4160 SYM$(N+1)=S$:HI(N+1)=S1:LO(
N+1)=S2:CL(N+1)=S3:V(N+1)=S4
4170 SW=1
4180 NEXTN
4190 IFSW=1THEN4110ELSE RETURN
5000 ' scan issues
5010 CLS:FORN=1TOTI
5020 PRINTN;SYM$(N)
5030 IF N/10=INT(N/10)THENGOSUB1
000:CLS
5040 NEXT:GOSUB1000:RETURN
6000 ' modify issues list
6010 CLS:PRINT"TYPE SYMBOL OF IS
SUE TO BE CHANGED AND PRESS
<ENTER> ":LINEINPUTSH$
6020 FORN=1TOTI:IF SH$=SYM$(N)TH
EN6040
6030 NEXT:RETURN
6040 CLS:PRINT"STOCK";N;"IS ";SY
M$(N);"."
6050 PRINT@96,"CORRECT? (Y/N)":G
OSUB1000:IF A$=""THENRETURN
6060 IFAA$<>"N"THEN6050
6070 PRINT@96,"DELETE FROM LIST?
(Y/N)":GOSUB1000
6080 IFAA$=""THEN6170
6090 IFAA$<>"Y"THEN6070
6100 SYM$(N)=""
6110 FORN=1TOTI
6120 IF SYM$(N)=""THEN T=N
6130 NEXT
6140 FORN=T TO TI
6150 SYM$(N)=SYM$(N+1):HI(N)=HI(
N+1):LO(N)=LO(N+1):CL(N)=CL(N+1
):V(N)=V(N+1)
6160 NEXT:TI=TI-1:RETURN
6170 PRINT@96,"TYPE NEW SYMBOL A
ND PRESS":PRINT" <ENTER> ":LINE
INPUTSYM$(N)
6180 IFSYM$(N)=""THEN6170ELSE RE
TURN
7000 ' finished - update files
7100 ' save STKSYM
7110 CLS:OPEN"O",#1,"STKSYM"
7120 WRITE#1,MMS,DD$
7130 FORN=1TOTI:WRITE#1,SYM$(N):
NEXT
7140 CLOSE#1
7200 'read,update&save files
7300 ' file on disk?
7310 FORN=1TOTI
7320 SH$=SYM$(N)
7330 IF LEN(SH$)<8 THEN SH$=SH$+
" ":GOTO7330
7340 SH$=SH$+"DAT"
7350 FORX=3TOTI:DSKI$Ø,17,X,J$,K
$
7360 J=INSTR(J$,SH$):K=INSTR(K$,
SH$)
7370 IF J<>Ø OR K<>Ø THEN GOSUB7
400:GOTO7900
7380 NEXTX
7390 PRINT SYM$(N);" NOT FOUND.
":GOTO7900
7400 ' read in old file
7410 TQ=Ø:OPEN"O",#1,SYM$(N)
7420 IF EOF(1)=-1THEN7440
7430 TQ=TQ+1:INPUT#1,AS(TQ),BS(T
Q),A(TQ),B(TQ),C(TQ),D(TQ):GOTO7
420
7440 CLOSE#1:TQ=TQ+1
7450 IF TQ=261 THEN PRINT SYM$(N
);" FILE IS FULL.":GOTO7900
7500 ' update
7510 AS(TQ)=MMS:BS(TQ)=DD$:A(TQ)
=HI(N):B(TQ)=LO(N):C(TQ)=CL(N):D

```

```

(TQ)=V(N)
7600 ' save
7610 OPEN"O",#1,SYM$(N)
7620 FORX=1TOTQ:WRITE#1,AS(X),BS
(X),A(X),B(X),C(X),D(X):NEXT:CLO
SE#1:RETURN
7900 NEXTN:GOSUB1000:RETURN
10000 ' inkeys$
10010 PRINT@480,"PRESS ANY KEY T
O CONTINUE.":
10020 FOR AA=1TO10:AA$=INKEY$:NE
XT
10030 AA$=INKEY$:AA=VAL(AA$):IFA
A$=""THEN10030ELSE RETURN

```

Program Listing 3. MAKELGON

```

10 ' CREATE AN QUOTE RETRIEVAL F
ILE
20 CLEAR3000:DIMAS(100)
30 AS(1)="DOW2; DJNS"
100 CLS:LINEINPUT"ENTER YOUR PAS
SWORD ";AS(2)
110 AS(3)="//CQ"
120 X=3
130 X=X+1:CLS:PRINT@448,"ENTER '
XX' WHEN FINISHED.":
140 PRINT@64,;:LINEINPUT"ENTER S
TOCK SYMBOL ";AS(X)
150 IF AS(X)=""THENAS(X)="DISC
":GOTO2000
160 GOTOL300
200 CLS:OPEN"O",#1,"LOGON/ "
210 FORN=1TOX
220 PRINT#1,AS(N):PRINTAS(N)
230 NEXTN
240 CLOSE#1:END

```

END

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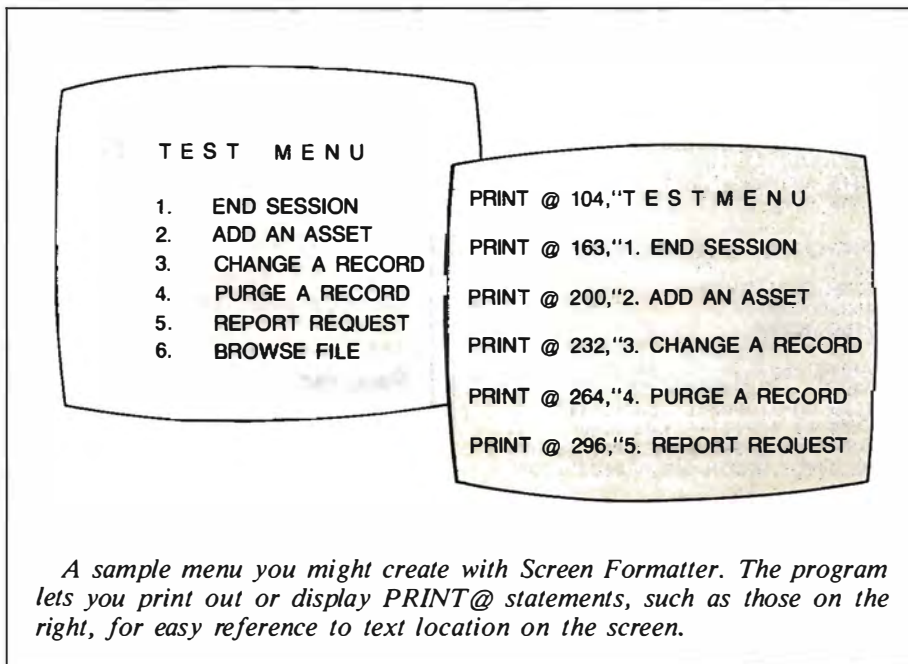
When you start up Screen Formatter, a flashing cursor appears in the left corner of the screen. Most typists are able to type at their usual high speed because the program responds quickly to keystrokes. Lowercase characters are displayed on screen as uppercase green letters in a black box,

but they are printed out as true lowercase letters. The program features a nondestructive cursor, which allows you to move around the screen without erasing previously entered text. Use the space bar for erasing. You can enter text anywhere on the screen except the lower right corner.

Once you have created a screen that you like, press the enter key to print it out along with the PRINT@ locations of each typed line. For a screen display of the PRINT@ locations, press the @ key. The program displays six lines at a time; pressing the

enter key advances the screen to the next six lines. When you have viewed all the PRINT@ locations, the program prompts you to press either the @ key to clear the screen and start a new format, or the ! key to bring back the original screen. Pressing either the break or reset key stops the program. ■

Address correspondence to Glen R. Tapanila and Dick Court, 316 Laurelhurst Drive, Tumwater, WA 98501.



The diagram illustrates the output of the Screen Formatter program. On the left, a screen titled "TEST MENU" displays a numbered list of six options: 1. END SESSION, 2. ADD AN ASSET, 3. CHANGE A RECORD, 4. PURGE A RECORD, 5. REPORT REQUEST, and 6. BROWSE FILE. On the right, a separate box lists the PRINT@ statements corresponding to each line of the menu, such as "PRINT @ 104, 'T E S T M E N U'" for the first line and "PRINT @ 296, '5. REPORT REQUEST'" for the fifth line.

A sample menu you might create with Screen Formatter. The program lets you print out or display PRINT@ statements, such as those on the right, for easy reference to text location on the screen.

```
170 A = 16384 + L*32 + CP - 1
1100 POKE(16384 + X* 32 + Y - 1)
, BB
1130 POKE (16384 + X* 32 + Y - 1)
, BB
1150 POKE(16384 + X* 32 + Y - 1)
, ASC (B$(X,Y))
1170 A = 16384:L = 0:CP = 1
```

Table 1. Line Listing Changes for MC-10.

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Color Basic or Micro Color Basic
Printer Optional

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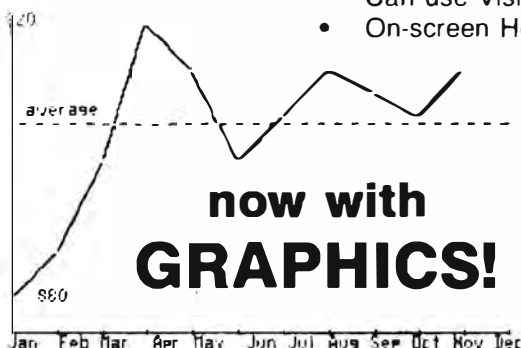
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```

100 CLEAR2000
110 QS=CHR$(34)
120 DIMB$(16,32):CLS5
130 FORX=0TO16:FORY=1TO32:BS(X,Y)
=CHR$(32):NEXTY:NEXTX
140 CLS
150 L=0:CP=1
160 IF L=15 AND CP=32 THEN CP =
31
170 A=1024+L*32+CP-1
180 AS=INKEY$:POKEA,206:POKEA,20
7
190 IFAS="" THEN 180
200 IFASC(AS)=8 OR ASC(AS)=9 OR
ASC(AS)=10 OR ASC(AS)=94 THEN 24
0
210 IFASC(AS)=12 OR ASC(AS)=13 O
R ASC(AS)=64 THEN 350
220 BS(L,CP)=AS:PRINT032*L+CP-1,
BS(L,CP):CP=CP+1:IFCP>32 THEN C
P=1:L=L+1:IFL>15 THEN L=15
230 GOTO160
240 PRINT032*L+CP-1,BS(L,CP);
250 IF ASC(AS)=8 THEN 260
252 IF ASC(AS)=9 THEN 280
254 IF ASC(AS)=10 THEN 300
256 IF ASC(AS)=94 THEN 320
260 CP=CP-1:IF CP<1 THEN CP=32:L
=L-1:IF L<0 THEN L=15
270 GOTO160
280 CP=CP+1:IF CP>32 THEN CP=1:L
=L+1:IF L>15 THEN L=15
290 GOTO 160
300 L=L+1:IFL>15 THEN L=0
310 GOTO 160
320 L=L-1:IFL<0 THEN L=15
330 GOTO 160
340 REM * OUTPUT
350 IFASC(AS)=12 THEN 180
360 IFASC(AS)=64 THEN 760
370 REM *****
380 REM * OUTPUT TO PRINTER
390 REM *****
400 FORX=1TO2:PRINT#-2,"":NEXTX
410 XS=""
420 PRINT#-2,XS"-----"

```

```

-----
430 FORX=0TO15
440 PRINT#-2,XS"1";
450 FORY=1TO32
460 PRINT#-2,BS(X,Y);
470 NEXTY
480 PRINT#-2,"1"
490 NEXTX
500 PRINT#-2,XS"-----"
510 FORX=1TO2:PRINT#-2,"":NEXTX
520 LC=22
530 FORX=0TO15
540 XX=0
550 FORY=1TO32
560 IFBS(X,Y)=" " THEN GOTO 610
570 XX=1
580 PA=X*32+Y-1
590 Y1=Y
600 Y=32
610 NEXTY
620 IF XX=0 THEN 680
630 PRINT#-2,"PRINT @'PA',"QS;
640 FOR Z=Y1 TO 32
650 PRINT#-2,BS(X,Z);
660 NEXT Z:PRINT#-2,""
670 LC=LC+1
680 NEXT X
690 FORX= LC+1 TO 66
700 PRINT#-2,""
710 NEXTX
720 GOTO170
730 REM *****
740 REM * OUTPUT TO SCREEN
750 REM *****
760 CLS
770 LC=0
780 FOR X=0 TO 15
790 XX=0
800 IF LC>10 THEN 810
805 GOTO 840
810 INPUT "PRESS <ENTER> TO CONT
INUE":AS$
820 CLS
830 LC=0
840 FOR Y=1 TO 32

```

```

850 IFBS(X,Y)=" " THEN GOTO 890
860 XX=1
870 PA=X*32+Y-1
880 Y1=Y:Y=32
890 NEXTY
900 IF XX=0 THEN 970
910 PRINT"PRINT @'PA',"QS;
920 LC=LC+2
930 FOR Z=Y1 TO 32
940 PRINTBS(X,Z);
950 NEXTZ
960 PRINT"
970 NEXTX
980 PRINT "-----"
990 PRINT "PRESS <!> TO RETURN T
O SCREEN"
1000 PRINT" OR
1010 PRINT "PRESS <@> FOR NEW SC
REEN"
1020 IS=INKEY$:IF IS="@>" THEN GO
TO 1040
1025 IF IS="!" THEN GOTO 1050
1030 GOTO 1020
1040 CLS:GOTO 130
1050 CLS
1060 FORX=0TO15:FORY=1TO32
1070 IF ASC(B$(X,Y))=32 THEN GOT
O 1160
1080 IF ASC(B$(X,Y))>32 AND ASC(
B$(X,Y))<65 THEN GOTO 1090
1084 GOTO 1120
1090 BB=ASC(B$(X,Y))+64
1100 POKE (1024+X*32+Y-1),BB
1110 GOTO 1160
1115 GOTO 1150
1120 IF ASC(B$(X,Y))>96 THEN BB
= ASC(B$(X,Y))-96
1125 GOTO 1150
1130 POKE (1024+X*32+Y-1),BB
1140 GOTO 1160
1150 POKE(1024+X*32+Y-1),ASC(B$(
X,Y))
1160 NEXTY:NEXTX
1170 A=1024:L=0:CP=1
1180 GOTO180

```

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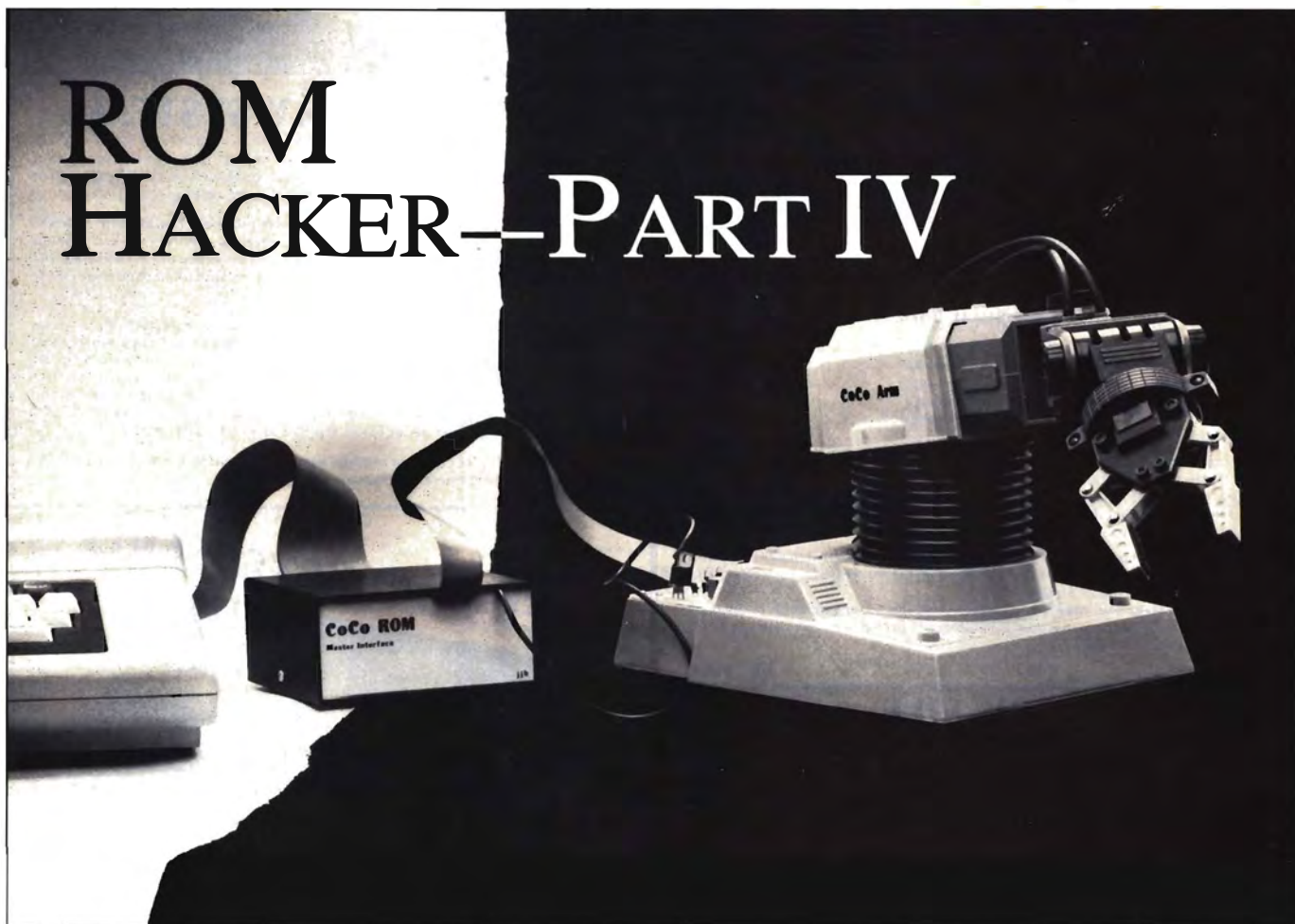
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BY JAMES J. BARBARELLO

ROM HACKER—PART IV



Construct your own computer-controlled robot arm and program it to perform complicated procedures

We've come to the last project in the ROM Hacker series, the one many of you have been waiting for—the robot arm. The prospect of building a robot arm has always fascinated me, and long ago I decided I wanted one for my CoCo. An ideal robot arm would have a reach of two feet and be able to pick up 10 to 20 pounds. It would be a closed-loop system, for greater accuracy, that fed data back to the computer describing exactly where each segment of the arm was at any given moment. It would also have a teaching mode that allowed it to remember a series of subtle movements that you initiated manually.

Unfortunately, the cost of a robot arm such as the one above would be about the same as a new car. A more economical system might not have a teaching mode or feedback, and would

be limited to lifting one pound. But a robot arm of these specifications would cost \$400, and that's assuming you build everything from scratch (not a simple task). When you consider that you could buy two 64K Extended Color Basic CoCos, a good printer, or drive 0 for about the same price, it is evident that not many of us want to spend that much on a hobby project.

After careful consideration, I decided that modifying an existing robot arm would be the best approach. Armatron, Radio Shack's robot arm, is ideal for this application. Using it as a basis for our CoCo-controlled project eliminates the considerable complexity of building the mechanical structure of a robot arm. You can modify its drive mechanism to use six inexpensive dc motors and control it with an uncomplicated interface circuit using parts that are readi-

ly available from Radio Shack. Best of all, the total cost for the project is about \$80, including the cost of the Armatron.

Ed. note: Due to the length of this project, we must give it to you in two parts. This month you will make the modifications to Armatron itself; next month you will build the additional electronics needed.

Armatron is a fairly complex piece of equipment. It uses one motor that employs a large set of gears, rotating cams, connecting rods, and mechanical linkages to allow six axes of movement

System Requirements

**16K RAM
Extended Color Basic**

(in two directions). Radio Shack's robot arm is a marvel of mechanical engineering and a bargain at around \$32. Its controlling mechanisms, however, are also mechanical. By moving the joystick (a mechanical linkage), you select one of a series of rotating cams that connect a gear to the power shaft. This is probably the worst design possible for modification to electronic control. But all is not bleak.

Disarmatron

If you open Armatron and strip away the mechanical linkages, cams, and drive motor, you'll see that you can drive each of the six remaining movement gears with small, individual replacement dc motors. For our last project, the CoCo Mouse (see "ROM Hacker—Part III" in the October 1984 issue of *HOT CoCo*, p. 50), I explained how to control a dc motor. All you have to do is modify Armatron by removing a major portion of the mechanical drive assembly, custom fit the housing to accept six dc motors and the control circuitry outlined here, install and position the motors, build and connect the control circuitry, and put everything back together again. Did I say *all*? Don't despair. If you have a little skill with hand tools and an adventurous spirit, you should have no problem with this project.

Figure 1 shows the complete schematic of the CoCo Arm. There are six identical circuits, the first of which contains R1, R2, Q1, Q2, K1, K2, and M1. Say you provide a high signal to pin 1 of S01. This energizes K1 via R1 and Q1, and connects the positive 5-volt line to the upper side of M1. If you provide a low signal to pin 2 of S02, K2 is de-energized, and the other side of M1 connects to the ground line. Because of the 5-volt differential running across it, M1 begins to operate. If you reverse the voltage levels on pins 1 and 2 of S01, the voltage potential to the motor reverses, causing a change in its direction of rotation. Finally, if you bring pin 1 to ground (or make pin 2 high), you'll have an identical voltage potential on both sides of the motor, causing it to stop rotating. This same reasoning applies to the remaining motors M2 to M6.

A 9-volt cube or plug-in power supply provides the power for the circuit. The 9 volts dc are regulated in IC1 to positive 5 volts dc, a level that is compatible with the motors for which this project calls.

Reference	Description	RS Part #
Armatron	Robot arm	60-2364
C1,C2	1.0 uF, 16WVDC tantalum capacitor	272-1434
IC1	7805 5-volt regulator	276-1770
J1	Coax dc pow. jack (2.1 mm insd. dia.)	274-1549
K1-K12	Micro-mini SPDT relay, 5 VDC coil	275-240
M1-M6	1.5-6VDC hobby motor	273-222
PP1	9 VDC "cube" power supply	273-1651
Q1-Q12	Power MOSFET (IRFD-1Z3)	276-2073
R1-R12	2.2k-ohm, ¼ w fixed resistor	271-1325
R.Phantom	4.7k-ohm, ¼ w fixed resistor	271-1330
S01-S04	16-pin DIP socket	276-1998

Misc: 2-½ feet #22 black-stranded wire; 2-½ feet #22 red-stranded wire; PC board; white glue; Duco cement; 4-½ inch length of felt weatherstripping; solder.

Table 1. CoCo Arm Project List of Materials

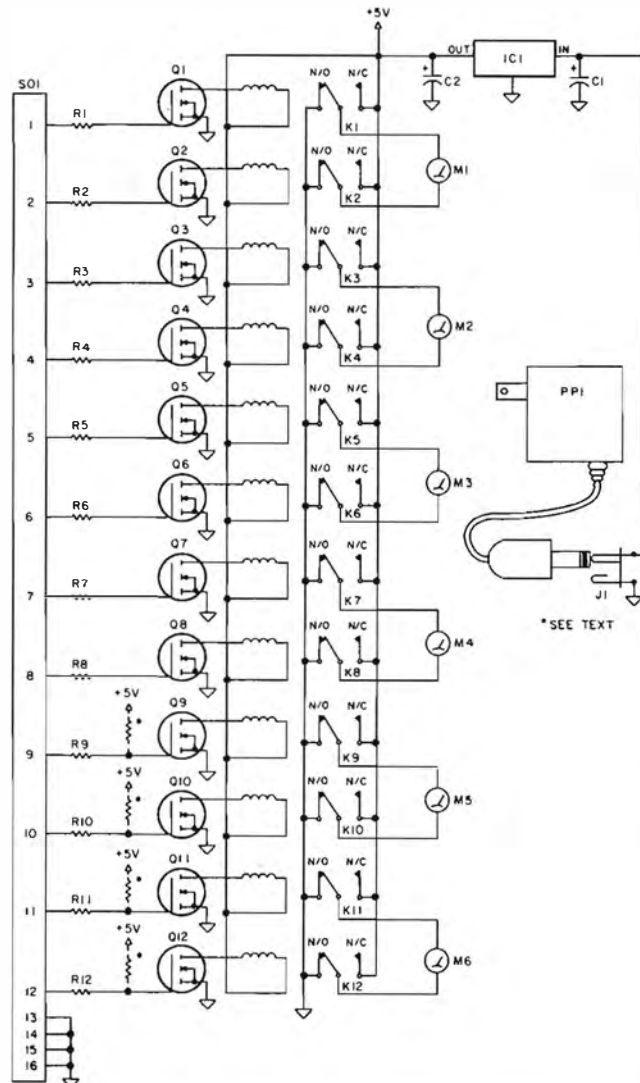


Fig. 1. Schematic Diagram for CoCo Arm Control Board

The schematic shows "phantom" resistors on the inputs of Q9 to Q12. The PIA high level can be anywhere between 3.5 and 4.8 volts. If the MOSFETs are not particularly sensitive, 3.5 volts might be insufficient power to trigger the circuit. In this instance, adding a "pull up" resistor of 4.7k ohms boosts the power level at the gate of a power MOSFET enough to ensure proper triggering, but allows the device to remain off when the output from the PIA is low. Though these resistors should be necessary only on SO1 lines 9 to 12 of the PIA (side B), they can be used on any of the lines if you experience a problem with triggering.

Making the Mod

Before you begin, you'll need to gather the following tools: a Phillips-head screwdriver, a Mototool (or mini drill) with a small grinding wheel, diagonal cutters, a bit of fine sandpaper, and a fine-toothed hacksaw blade or coping saw.

Remove the Armatron from its box. It has a base that contains the joystick controls. A vertical shaft extends from the base into the arm. The arm segments consist of an upper arm section, a joint, a forearm portion, a wrist, and a hand. On the upper arm section there is a cowling with a decal that reads "Radio Shack Armatron." You'll find two screws on the top of the cowling. Loosen them and remove the cowling, disconnecting the two cosmetic rubber tubes from the forearm segment. Store

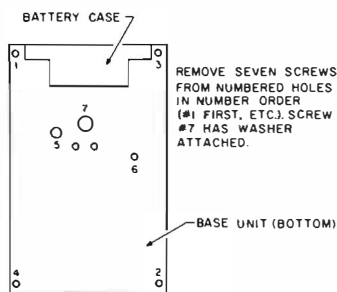


Fig. 2. Armatron Bottom and Location of Screws

the cowling in a safe place until later.

When you move Armatron, always support its arm—don't let it fall or move on its own. Turn Armatron over to look at its base. Loosen the seven screws shown in Fig. 2 while holding the unit together. They are loose when they

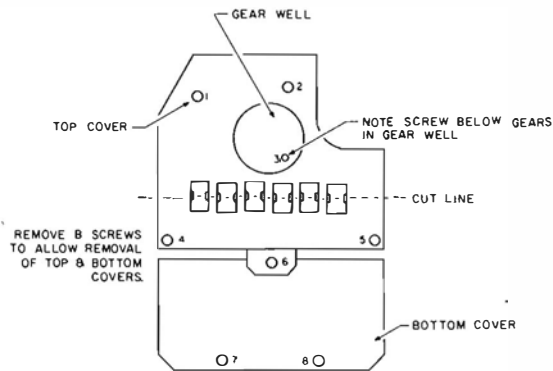


Fig. 3. Top and Bottom Cover Locations

begin to click as you rotate them. When all screws are loose, place Armatron upright. Carefully lift away the arm and light blue portion of the base from the dark blue bottom. Below the vertical shaft is a gear assembly. One large, removable gear is probably still on the assembly. Remove it and label it gear 5. Place the arm section in a safe place for later.

The base contains two white covers (see Fig. 3). The top cover has a depression with gears in it. The bottom cover is smaller. Take out the uppermost gear and label it gear 4. Then, remove the remaining three gears and label them 3, 2, and 1, respectively. Store them in a safe place.

Loosen the eight screws in the top and bottom covers. Discard the bottom cover, but save the top one. Place it in a safe location for later. You will not need several parts that come with the Armatron. The base contains 10 bright orange linkages that were under the bottom cover. Take out these linkages. Above where the linkages were you'll find a brass shaft with six black gears that you should remove. You'll see a short brass shaft with a white and pink

gear to the right of a green cylinder. Remove it along with the white gear beneath it. Then, take out the green cylinder and the nearby dc motor. (Clip the motor wires at the battery compartment.)

The base still contains one brass shaft with six black gears below several green, white, pink, and black gears. The brass shaft is the drive mechanism for the remaining gears that move the arm. The drive shaft hangs into two rectangular cavities (see Fig. 4). Note the protrusion inside the left wall labeled A in Fig. 4 and the wall separating the two cavities labeled B. The six motors must fit into the cavities, but the left wall protrusion and the middle wall block their installation.

Using a small grinding wheel, grind away the protrusion on the left wall. Then, use diagonal clippers to cut most of the middle wall away. Grind the remaining portion down so that it is flush with the back and bottom of the cavity. You should now have a single cavity into which the six gears can protrude.

The plan calls for the motors to rest on a wooden ledge that is affixed to the bottom of the cavity. Cut a piece of

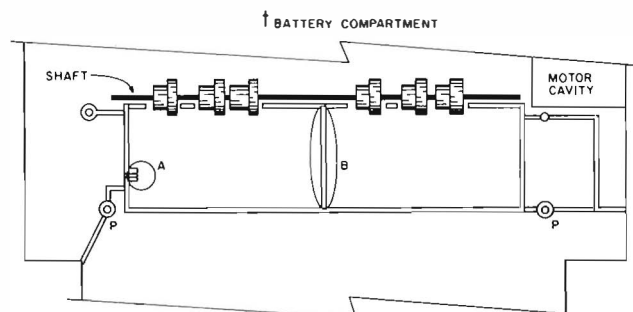


Fig. 4. Rectangular Cavities in Base Unit

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wood 1 inch wide by $4 \frac{5}{16}$ inches long by $\frac{1}{4}$ inch thick (be precise). Place this piece of wood into the cavity to check its fit. Does it teeter or rock? You might have to file a groove in the wood where it meets the vestige of the middle wall. It is important to make this piece of wood fit snugly. Once the ledge fits well, use a bit of sandpaper to clean and scuff up the bottom of the cavity. Then, glue the wood in place with white glue or Duco cement.

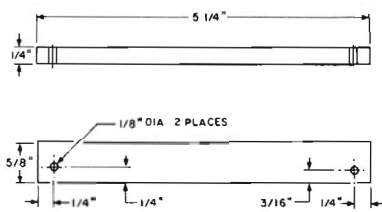


Fig. 5. Motor Construction Details

While the glue is drying, cut another piece of wood to $\frac{5}{8}$ inch wide by $5 \frac{1}{4}$ inches long by $\frac{1}{4}$ inch thick. This piece serves as the motor brace. Drill a $\frac{1}{8}$ -inch diameter hole on each end, using Fig. 5 as a reference. Glue a $4 \frac{1}{2}$ -inch length of felt weatherstripping (maximum $\frac{1}{8}$ -inch thick) to the underside of the brace, centering it between the holes. Then, pass two 4-40 by 1-inch machine screws through the holes from the top of the motor brace. Carefully turn the machine screws into the holes in the posts that are labeled P in Fig. 5.

Meshing and Testing

Take the six motors listed in Table 1 and place them under the brace, making

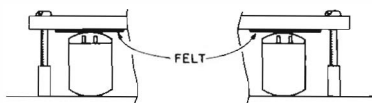


Fig. 6. Motor Mounting (Side View)

sure that the motor terminals are outside the cavity (see Fig. 6) and the motor gear can mesh with the drive gear. Think of the motors as having numbers from 6 to 1 running from left to right. The first and fourth motors must mesh to the right of the first and fourth drive gears. The other motors mesh to the left

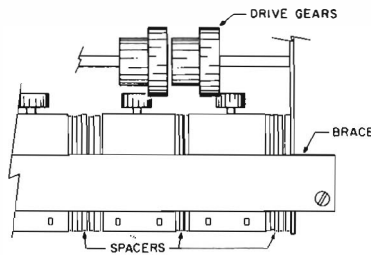


Fig. 7. Motor Mount Spacers and Meshing

of their appropriate drive gears. See Fig. 7 for an idea of how the gears should mesh. When you have correctly positioned the motors, tighten the screws on the brace until it holds the motors lightly in place.

For the next step, find a large piece of stiff cardboard. The back of an $8 \frac{1}{2}$ -by-11-inch pad will do nicely. Cut the sheet into $\frac{3}{4}$ -by-1-inch pieces. Use these as spacers for holding the alignment of the motors with their gears (see Fig. 7). When you have inserted all the spacers that you think are necessary, test the meshing of the gears by manually rotating the drive gear. Make adjustments by adding or taking away cardboard spacers. When you are satisfied that you have properly aligned the motors and gears, tighten the two brace screws until the motors are snug in their positions.

Before you test the motors, you should modify the top cover and replace it to keep the other gears from flying all over the place. Refer back to Fig. 3. The top cover contains six rectangular cutouts below the circular gear well. There are 12 protrusions, one on each of the long walls of the cutouts. Draw a line through these protrusions, and cut along this line with a hacksaw blade. Discard the bottom portion of the cover and reinstall the top portion, which contains the gear well. You need only three screws for this now because the bottom portion contained the other two screw holes.

Retrieve the five gears you labeled and set aside earlier. Install them, 1 to 5, back into the gear cavity. The bottom of gear 1 has a small hole. The gears fit into the cavity bottom end first. When reinstalling gear 5, you might have to jockey it past the small pink gear to the right of the cavity.

To test the proper operation and positioning of the motors, you need a 1 $\frac{1}{2}$ -volt battery and two jumper wires.

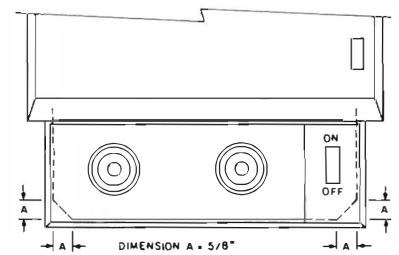


Fig. 8. Top Base Machining Details

Attach the jumper wires to the battery. Then touch the other ends of the jumper wires to the terminals of each of the motors in turn. The motor you are testing, its associated drive gear, and one of the gears in the gear well should all spin. If they do not, reposition the motor until its gear and the associated Armatron gears spin when you apply voltage to the motor. Repeat this for all motors.

Pull the joysticks and face plate out of the base of the arm section of Armatron and discard them. Follow Fig. 8 to cut out the surface beneath the face plate. Use a hacksaw blade to cut along the dotted lines. The plan calls for leaving a triangular piece of plastic in each outer corner that covers the posts to which you'll screw the PC board later. These corner wedges help support the PC board. You drill holes through them so that screws can reach from the PC board above down to the anchoring posts below.

When you have cut out the face plate area, use sandpaper to smooth the edges. Then place the base on a table. Grasp the vertical shaft of the robot arm with your left hand and hold the arm section with your right hand. Slowly lower the arm section onto the base, rotating it as necessary to allow the gears to mesh. When they mesh, the assembly can come down onto the base. Hold the arm section together while you turn the unit over. Reattach the two pieces with the seven screws you removed earlier. (The screw with the attached washer goes into the center hole.) You've now completed the modification. Next month you'll begin constructing the parts that will control your CoCo Arm. ■

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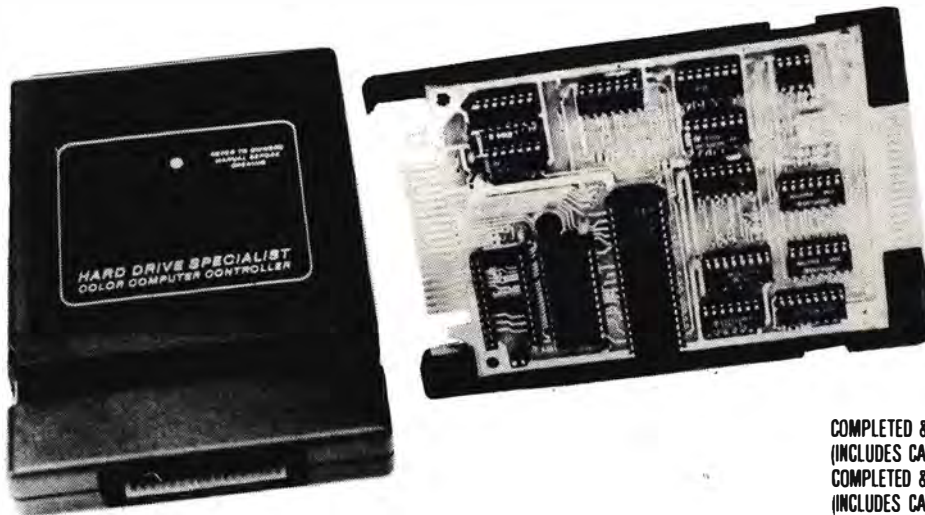


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Start with some understanding of how the graphics mode works and graph paper to work out the details. You don't need an expensive printer. This article was written for Radio Shack's DMP-120. Even though some of the CHR\$ codes may be different, the methods outlined here should apply to all dot-matrix printers.

If you want a dividing line across the paper, you don't have to settle for ***** , \$\$\$\$\$\$\$\$, or -----. Look up the graphics characters that are built in. For instance, try this:

```
10 FOR Z=1 TO 40
20 PRINT#-2,CHR$(62);CHR$(60);
'DON'T FORGET THE SEMICOLON
30 NEXT Z
```

When you run these lines your printer prints this design:

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By changing the CHR\$ numbers in line 20 you will find several attractive combinations. If you insert 253 and 254 into the parentheses you'll get:

Typing 253 and 251 into the parentheses renders this line divider:

But this is just the tip of the iceberg. If you experiment, you can find other designs in the text mode. But don't forget about the graphics mode. With a little planning, the graphics mode can help you create distinctive forms and letters. The following routine can form the basis for several variations of the straight line or rule. Note that use of the graphics mode in this manner often causes a long pause after a PRINT statement before your printer begins printing.

```
10 PRINT#-2,CHR$(18) 'SWITCH TO
GRAPHICS MODE
20 FOR Z=1 TO 480
30 PRINT#-2,CHR$(192); 'DON'T FOR-
GET SEMICOLON
40 NEXT Z
```

For variations on this dividing line, replace the CHR\$ number in line 30 with each of the following numbers: 214, 170, 197, and 214.

Perhaps borders are what you really want to try. Enter this routine for a diamond design with center dots:

```
10 PRINT#-2, CHR$(18) 'SWITCH TO
GRAPHICS MODE
20 FOR Z=1 TO 68
30 PRINT#-2,CHR$(136)CHR$(148)
CHR$(162)CHR$(201)CHR$(162)CHR$(148)
CHR$(136);
```

System Requirements

16K RAM
DMP-120 Printer

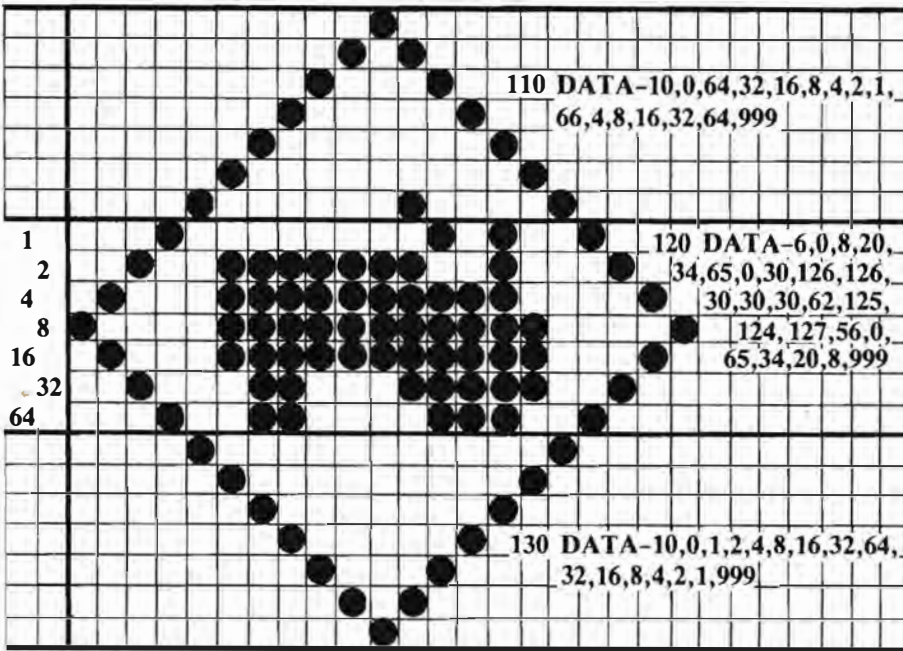


Fig. 2. This farm-equipment-crossing design requires the DMP-120's print head to make three passes.

The rope design is a continuing pattern, each unit of which uses six print positions. There are 480 horizontal pin positions on each page. By dividing 6 into 480 you get 80—the number of rope design units that will fit on one line. In the rope design routine above, line 20 reads Z = 1 TO 80. If a design requires seven pin positions, such as the diamond border routine above, line 20 should be Z = 1 TO 68. If you divide 480 by 7 you get several numbers to the right of the decimal point. Those numbers represent the fraction of the unit size of your design

that remains. Round down to the nearest whole number.

For large designs and drawings you are better off simplifying wherever possible. Circles and curves are not as easy to recreate as straight lines. Figure 2 is the highway symbol for farm equipment crossing. This design re-

quires three passes of the print head at this size. Drawings that require more than one line are easier to program with Data statements.


After you draw a sketch, list the CHR\$ numbers into DATA lines (see lines 110–130 in Program Listing 1). You won't have to add 128 to each column sum this time; the computer can do it for you. When you have a dot or blank space that repeats three or more times, there is a shorthand you can use. I have started all lines in the program listings with several spaces to leave a margin between the design and the edge of the page. If you want five blank spaces, write -5,0. If you want seven dots in a row at the 64 pin position, write -7, 64.

In Program Listing 1, line 10 switches the printer into the graphics mode. Line 20 sets the amount of passes the printer makes for the design. Line 30 reads the data and looks for the number 999, which is the flag or signal to advance to the next row. Line 40 screens for a positive number that it adds to 128 and sends to the printer before looping back for another number. If a number is negative, it reads the next DATA statement number in line 50. Line 60 converts the negative number to a positive multiplier. Line 70 loops back to line 30 to continue the process.

Program Listing 2 doubles the size of the farm-equipment-crossing figure. In line 20 the number of passes has been increased from three to six. The DATA statements have been augmented and amended to account for the increase in lines and resolution.


What about mixing text and graphics? Heed a few precautions and you will have no trouble. The line feeds for the two modes are slightly different so it takes a little planning. Program Listing 3 creates a giant T with which you might begin a story. Because the graphics blocks are only six pins high, you must use a different line feed. In line 100, the 27 and 28 change the line

```

      
    ␣ ' PROGRAM LISTING 1
    1 ' *FARM EQUIP X-ING SYMBOL*
    1␣ PRINT#-2,CHR$(18)
    2␣ FOR R=1TO3
    3␣ READ N:IF N=999THEN8␣ ELSE IF
      N=888 THEN 2␣
    4␣ IF N>=␣THEN PRINT#-2,CHR$(128
      +N):GOTO3␣
    5␣ READ M
    6␣ FOR L=1TO-N:PRINT#-2,CHR$(128
      +M):NEXTL
    7␣ GOTO3␣
    8␣ PRINT#-2:NEXT R
    11␣ DATA -1␣,␣,64,32,16,8,4,2,1,
      66,4,8,16,32,64,999
    12␣ DATA -6,␣,8,2␣,34,65,␣,3␣,12
      6,126,3␣,3␣,3␣,62,125,124,127,56
      ,␣,65,34,2␣,8,999
    13␣ DATA -1␣,␣,1,2,4,8,16,32,64,
      32,16,8,4,2,1,999
  
```

Program Listing 1. Routine to Print Farm-Equipment Figure

```

      
    ␣ ' PROGRAM LISTING 2
    1 ' *FARM EQUIP X-ING SYMBOL*
    1␣ PRINT#-2,CHR$(18)
    2␣ FOR R=1TO6
    3␣ READ N:IF N=999THEN8␣ ELSE IF
      N=888 THEN 2␣
    4␣ IF N>=␣THEN PRINT#-2,CHR$(128
      +N):GOTO3␣
    5␣ READ M
    6␣ FOR L=1TO-N:PRINT#-2,CHR$(128
      +M):NEXTL
    7␣ GOTO3␣
    8␣ PRINT#-2:NEXT R
    11␣ DATA -25,␣,64,32,16,8,4,2,4,
      8,16,32,64,999
    115 DATA -18,␣,64,32,16,8,4,2,1,
      -11,␣,1,2,4,8,16,32,64,999
    117 DATA -11,␣,64,32,16,8,4,2,1,
      -3,␣,-13,12␣,1␣,1␣,1␣,12,12␣
      ,12,4,-2,␣,1,2,4,8,16,32,64,999
    12␣ DATA -1␣,␣,1,2,4,8,16,32,64,
      -4,␣,15,47,127,127,47,-8,15,31,6
      3,-3,127,62,28,-3,␣,64,32,16,8,4
      ,2,1,999
    125 DATA -17,␣,1,2,4,8,16,32,64,
      -13,␣,64,32,16,8,4,2,1,999
    13␣ DATA -24,␣,1,2,4,8,16,32,64,
      32,16,8,4,2,1,999
  
```

Program Listing 2. Routine to Print Double-Sized Farm-Equipment Figure

```

    ␣ 'PROGRAM LISTING 3 BIG T
    1␣ PRINT#-2,CHR$(27)CHR$(28)CHR
      $(235)CHR$(239)CHR$(236)
    11␣ PRINT#-2," ";CHR$(239)
    12␣ PRINT#-2," ";CHR$(239);" was
      the night before Christmas,"
    13␣ PRINT#-2,CHR$(27)CHR$(54)
    14␣ FOR S=1TO7:PRINT#-2:NEXT S
  
```

Program Listing 3. Routine to Create Giant T

feed so that the graphics blocks can be stacked without a bare space. Lines 110 and 120 start with a space to make the two CHR\$(239) statements in lines 110 and 120 stack into a giant T.

Once you understand how to make a drop capital, you can incorporate several stylistic changes to suit your needs. Make the following change to create condensed print:

```
100 PRINT#-2,CHR$(27)CHR$(28)CHR$(27)CHR$(20)CHR$(235)CHR$(239)CHR$(236)
```

For a condensed giant T and standard print enter this:

```
120 PRINT#-2, "" ; CHR$(239)CHR$(27)CHR$(19); " was the night before Christmas,"
```

Try other variations. For example, change the 20 in line 100 to 14 and the 19 in line 120 to 15. This provides an elongated giant T and standard print. After the CHR\$(14) you entered above in line 100, add CHR\$(27)CHR\$(20) for a condensed-elongated giant T with elongated print. To alter the last style to effect standard print insert CHR\$(27)CHR\$(19) in line 120 after CHR\$(15).

Program Listing 4 thoroughly mixes the graphics and text modes. This listing creates a giant, Victorian-style T. The program is similar to listings 2 and 3. Line 30, however, has an additional flag (888) to jump to line 200, which ends the graphics mode and joins the text mode. You can switch from text to graphics mode and back at any time, but keep in mind that you may need to coordinate the line-feed specifications.

```
1 ' *VICTORIAN "T"
10 PRINT#-2,CHR$(18)
20 FOR R=1TO3
30 READ N:IF N=999THEN80 ELSE IF
N=888 THEN 200
40 IF N>0 THEN PRINT#-2,CHR$(128
+N);:GOTO30
50 READ M
60 FOR L=1TO-N:PRINT#-2,CHR$(128
+M);:NEXTL
70 GOTO30
80 PRINT#-2:NEXT R
110 DATA -5,0,2,69,4,114,9,5,66,
68,106,49,33,34,36,40,50,53,49,4
2,36,34,33,33,33,34,38,105,17,38
,64,70,41,33,18,12,2,5,9,6,999
120 DATA -5,0,1,2,2,49,74,4,5,4,
95,48,23,19,9,69,61,1,127,127,1,
61,69,9,19,23,16,127,16,8,104,7,
999
130 DATA -7,0,48,72,70,49,1,1,24
,36,50,98,81,74,68,81,95,95,81,6
8,74,81,96,-3,0,1,1,888
200 PRINT#-2,CHR$(30); "was the n
ight before Christmas,
```

Program Listing 4. Routine to Create Giant Victorian T

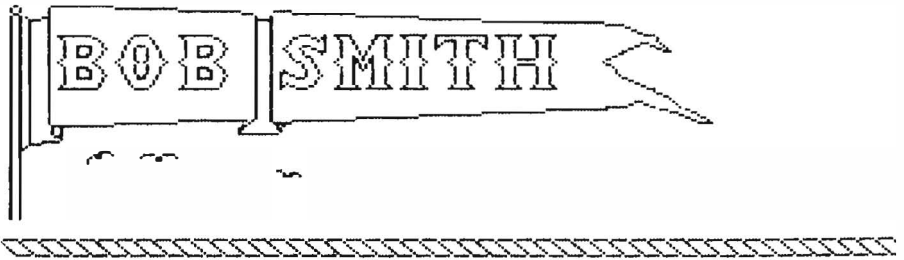


Fig. 3. One example of how you can use the CoCo to design your letterhead.

These programs are not practical for all applications, but they can add pizzazz to your documents, making them stand out in a crowd. ■

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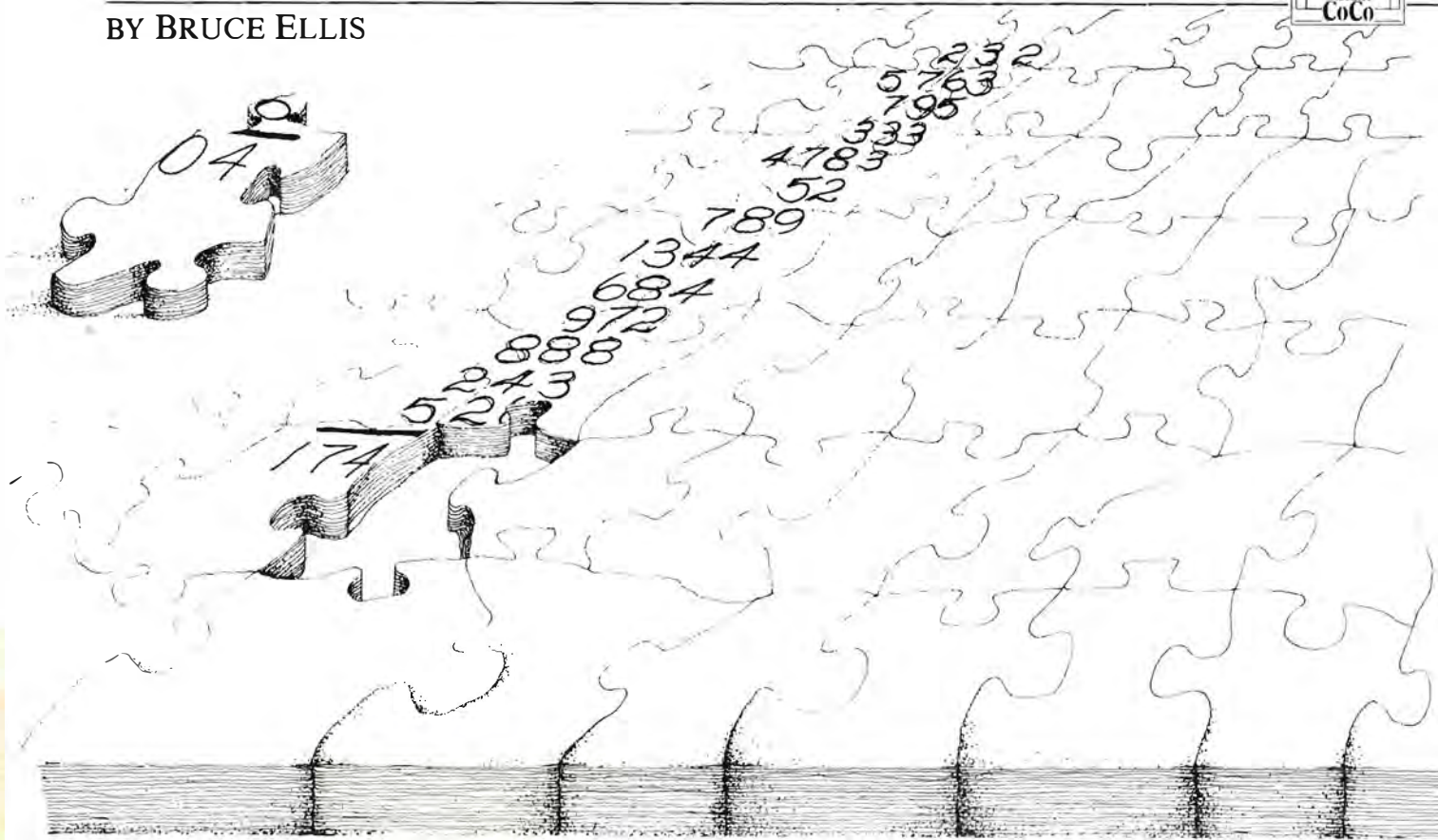
PROGRAM/FEATURES	HRES II NEW	HRES I OLD	BRAND X
Upper/Lower Case Characters	Yes	Yes	Yes
Hard Text and Graphics	Yes	Yes	Yes
Separate Text & Graphics	Yes	Yes	No
Print @ Full Implementation	Yes	Yes	Yes
Print @ Small Line Lengths	Yes	Yes	Yes
Different Line Lengths	28 to 255 (24 to 255) (51 units)	Yes	Yes
Automatic Key Repeat	Yes	Yes	No
Adjustable Key Repeat	Yes	No	No
Auto Repeat Delay	Yes	No	No
Erase to end of line/screen	Yes	Yes	Yes
Home Cursor	Yes	Yes	Yes
Cursor in Blank Screen	Yes	Yes	Yes
CLS command supported	Soft/Bank	Soft/Bank	Soft/Bank
N/C Character Cursor	Rotational	Yes	Yes
Double Size Characters	Yes	Yes	No
Individual Character	Yes	Yes	No
Highlighting	Yes	Yes	No
On Screen Underline	Yes	Yes	No
Clear Key Functionality	Char/Lines/Screen Key	Yes	Yes
I-23 Screen Supported	Yes	Yes	Yes
Open to Blank Screen	Yes	Yes	Yes
Crash	Yes	No	No
Double character size for Enhanced 64 and 95	Yes	No	Yes
Characters per line display	Yes	No	Yes
Protected Screen Lines	1 to 23	Yes	No
Programmable Tab Character Spacing	Yes	Yes	No
Programmable Tab Character Spacing	Yes	Yes	No
Full Screen Reverse Function	Yes	No	No
Switch to Bottom of Screen	10 to 32 Screen for key	Yes	No
Compatibility	Yes	No	No
On Screen Cursor	Yes	No	Yes
Enhanced Basic Required	No	Yes	Yes
Auto Line Language Program	Yes	Yes	Yes
RAM Required in addition to	2K	2K	2K
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HOT CoCo January 1985 59

BY BRUCE ELLIS

*illustration by Dion Owens*

ADDING ADVANTAGE

You can add many programs to your library,
but how many adding programs add these features.

Adding is a program that turns the CoCo into a four-function adding machine. At first glance that may seem to be a limited application for the CoCo, but it's actually very flexible and useful. Adding can be modified easily to include a wide range of specialized functions, and you can use it in conjunction with similar programs.

The essence of Adding is a routine that allows your CoCo to treat a matrix of letters on the right side of its keyboard as a numeric keypad. (See Fig. 1 for a look at how Adding redefines the CoCo's keyboard.) As you enter numbers into this keypad, the program builds a string variable, which is added to a running total

when you press one of the keys designated as operators. In addition to a running total, Adding features a subtotal, two constant keys, a composite function, and a moving average. Other features of the program are an edit routine, which permits the selective review of entries by several criteria as well as correction, deletion and insertion, and an evaluation routine, which computes summary statistics for the entries and presents a frequency distribution.

Adding can handle 150 entries on a 16K system following a PCLEAR 1 statement. After you have entered 150 items, Adding clears its registers, but retains a running total so that work can continue. Items that you have en-

tered before are no longer available for review or evaluation.

Program Operation

After an initial instruction page and a query about whether or not you want to read a file, the program maintains a single display that is updated using PRINT@ statements, rather than clearing the screen. That allows a set of very brief instructions to remain at the bottom of the screen.

System Requirements

16K RAM
Extended Color Basic

Adding asks several questions when you start it up that you answer with the standard keyboard. How many digits do you want displayed? The program displays and evaluates entries as you type them, but total and subtotal displays are rounded according to your instruction here. Would you like a moving average? If so, how many items do you want averaged? Selecting this option disables the composite function to avoid confusion. What two constants would you like to set? The program reverts to its default parameters (no decimal point, no moving average, no constants) if you do not select values for its questions.

Adding displays your entries in the upper left corner as you type them in. You can correct errors with the left arrow. To add or subtract your entries from the accumulating total and subtotal, press the enter and @ keys, respectively. Negative numbers cannot be entered; type them as positive numbers and subtract them. The subtotal is reset to zero every time an entry is begun with a blank space.

Constants can be called by following an entry with one of the following letters: A, S, X, or Z, which denote addition, subtraction, multiplication, and division, respectively. Then press one of the two constant keys. When constants are called in this manner, the program cannot look for a response to the enter or @ key. Use of the constant keys disables the composite function.

The up arrow is also used throughout the program to access the main menu, which allows you to select data entry, clearing the registers, data review, evaluation, or creation of a new or updated file. In addition, the up arrow terminates the data review and evaluation functions, sending you back to their menus.

To use the review and edit function for selectively reviewing data that you have already input, enter specific values or the entry sequence number in response to the appropriate prompts. The entry sequence number, value, and the value of the previous entry are displayed along with the running total as it was calculated when the item was entered. Because entries are stored, they are identified by initial calculations using the constants or the composite function. For example, an item entered as $35*2$ must be located using 70 as a selection criterion.

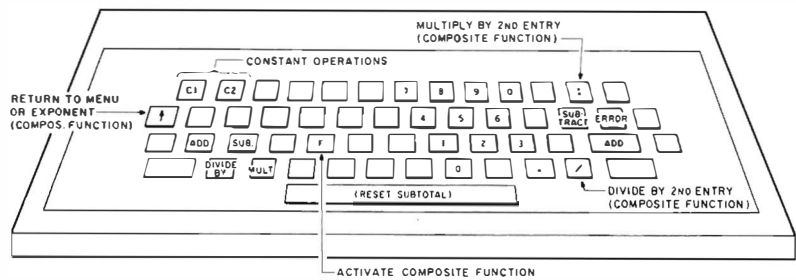


Fig. 1. Adding converts much of the CoCo's keyboard to practical function keys that allow you to perform complex tasks.

You can also review data sequentially, beginning with either a specified number or with a total. Using a total as a selection criterion displays all entries for which the running total as calculated to be greater than or equal to the specified total. After the program displays an item, tapping any key displays the next record for review. When you are reviewing selectively, pressing any key accesses a menu. Tapping the D key deletes an item, and tapping the R key activates the keypad for reentering an item. Pressing the I key activates the keypad as well, and allows a new item to be inserted immediately before the item under review. After deletion, insertion, or reentry, Adding recalculates running totals for all items.

When you request the evaluation routine, the program calculates several statistical measures and sorts the entries by copying them in ascending order into the array previously used for subtotals. Option 1 displays range, minimum and maximum values, mean (arithmetic average), standard deviation, variance, and standard error.

Type in the letter F after an entry to use the composite function. The program waits for a second number to be entered and operated on the first entry before their outcome is added to the running total. You type a colon after the second number to multiply it by the first, and enter a slash to divide the first number by the second. An up arrow identifies the second entry as an exponent that causes the first entry to be carried to that power. Be careful using exponents because it is possible to generate a number large enough to overload the program.

The frequencies routine sorts, counts, and presents all entered items

as a tabulation in ascending order. The program displays five values at a time. It measures their frequencies as percentages derived from the total number of times they occur. Pressing any key continues the display.

Adding's routines for reading or creating files provide manual control of the recorder for inserting and positioning tapes. The program then turns the motor off and asks for the name of the file to be saved or read.

A few words of caution: Don't run the program to identify typos without saving it first. Otherwise, you'll find that all your work is on a tape the computer steadfastly refuses to acknowledge. Some CoCos are sensitive to spacing in program lines. If you encounter a syntax error, make sure there are spaces before and after all Basic commands in the line with the error. Also, Adding contains a POKE statement that speeds up execution on some models of the CoCo. But it might not work on your model. Delete POKE65495,0 in line 15 and POKE65494,0 in line 107 to disable this function if it does not work on your CoCo. ■

Address correspondence to Bruce Ellis, Star Route 1, Box 245, Prince Frederick, MD 20678. Mr. Ellis holds a Master's Degree in Research and Statistical Methodology and is a government statistician.

Program Listing. Adding.

```

1 PCLEAR1:POKE65494,0:CLER1700:
BLS=STRING$(192,143):H$=STRING$(
17,128)+"adding"+CHR$(128)+"mach
ine"+CHR$(128):DIMC(150),T(150),
ST(150),D$(150):' ADDING
B.ELLIS 2/84
2 CLS:PRINT@32,H$:PRINT" THIS PR
OGRAM CREATES A NUMBER PAD USI
NG A MATRIX OF LETTERS ON THE
KEYBOARD. DURING DATA ENTRY,
TWO CONSTANTS ARE AVAIL -ABLE,
ALONG WITH A 'FUNCTION' KEY. S
UBTOTALS ARE DISPLAYED STARTIN
G WITH ITEMS BEGUN WITH"
3 PRINT" A SPACE. MOVING AVERAGE
S ALSO AVAILABLE. EDIT & REVI
EW DATA FROM THE MAIN MENU. RE
TURN TO MAIN OR OTHER MENUES WI
TH '^'. PRESS ANY KEY TO STA
RT."
4 Z$=INKEY$:IFZ$=""THEN4 ELSECLS
:PRINT@32,H$:INPUT" PREVIOUS FIL
E ('Y'IF YES)";Z$:IFZ$<>"Y"THEN1
5 ELSELINE INPUT" [eNTER] FOR RE
CORDER CONTROL ";Z$:MOTORON:AUDI
OON:LINE INPUT" [eNTER] WHEN TAP
E POSITIONED ";Z$:MOTOROFF:AUDIO
OFF
5 LINE INPUT" [eNTER] FILE NAME
--";N$:LINE INPUT" PRESS NAME, T
HEN [eNTER] ";Z$:OPEN" I",#-1,N$
6 IFEOF(-1)THEN8
7 X=X+1:INPUT#-1,C(X),D$(X),T(X)
,ST(X):GOTO6
8 CLOSE#-1:CF=1:PRINT" FINISHED.
"X" ITEMS READ":FORI=1TO900:NEXT
:GOTO15
9 IFC$=""ANDAS="" THENST(X-1)=0:
SOUND40,1:RETURN
10 IFA$="J"THENB$="1":GOTO14:ELS
EIFA$="K"THENB$="2":GOTO14:ELSEI
FA$="L"THENB$="3":GOTO14:ELSEI
FA$="U"THENB$="4":GOTO14:ELSEI
FA$="I"THENB$="5":GOTO14:ELSEI
FA$="O"THENB$="6":GOTO14
11 IFA$="7"THENB$="7":GOTO14:ELS
EIFA$="8"THENB$="8":GOTO14:ELSEI
FA$="9"THENB$="9":GOTO14:ELSEI
FA$="0"THENB$="0":GOTO14:ELSEI
FA$="M"THENB$="0":GOTO14:ELSEI
FA$="." :GOTO14
12 IFA$=CHR$(8)ANDDS>1THENC$=LEF
T$(C$,DS-2):PRINT@DS-1," ":DS=DS
-1:SOUND10,1
13 DS=DS-1:RETURN
14 PLAY"T255L255O4C":C$=C$+B$:PR
INT@DS,B$:PRINT@28,USING"###";X:
D$(X)=C$:RETURN
15 POKE65495,0:PLAY"T8L8O3AD":CL
S:PRINT@32,H$
16 PRINT" USE 'NUMBER PAD' FOR D
ATA... KEYBOARD NBR$ FOR OTHE
R INPUT"
17 INPUT" DIGITS RIGHT OF DECIMA
L POINT FOR TOTALS DISPLAY (0-
7)";D$:D=VAL(D$)+1:PLAY"CF":I
PD>8THEND=8
18 INPUT" CONSTANT #1";Z$:PLAY"C
G":C1=VAL(Z$):INPUT" CONSTANT #2
";Z$:PLAY"GC":C2=VAL(Z$)
19 INPUT" MOVING AVERAGE ('Y'IF
YES)";M$:PLAY"AF"
20 IFM$="Y"THENPRINT@321,"note-M
ULT ENTRY ('X') CAN'T BE USED W
HEN MOVING AVG CHOSEN":INPUT" n
B R ITEMS TO BE AVERAGED";Z$:MA=VA
L(Z$):IFMA=0THEN MA=5
21 PRINT@289,"key <ENTER> TO ADD
<@>SUBTRACT 'F' FACTORS(*/*) B
Y A 2D ENTRY CONSTANTS-(A)ADD,
(S)SUBTRACT (X)MULTIPLY BY OR
(Z)DIVIDE BY CONSTANT #1 OR #2
-ENTER DATA, THEN A-S-X-Z, THEN
'1' OR '2'."
22 IFCF<>1 THENX=1:T(0)=0+TF:ST(
0)=0:ELSEX=X+1
23 GOSUB27:GOTO51
24 ZZ=VAL(C$):C$="" :PRINT@DS+2,"

```

```

f":PLAY"D":FORDS=12TO22
25 AS=INKEY$:IFA$=""THEN25ELSEGO
SUB9:IFA$=""ANDC$<>"THENC(X)=V
AL(C$)*Z:DS(X)=STR$(Z)+X"+D$(
X):RETURNEELSEIFA$="/ANDC$<>"TH
ENC(X)=ZZ/VAL(C$):DS(X)=STR$(Z)
+"/+D$(X):RETURNEELSEIFA$=""AND
C$<>"THENC(X)=ZZ^(VAL(C$)):DS(X
)=STR$(Z)+""+D$(X):RETURN
26 NEXT:RETURN
27 FORDS=1TO31
28 AS=INKEY$:IFA$=""THEN28
29 GOSUB9
30 IFC$=""THEN39:ELSEIFA$=CHR$(1
3)THENC(X)=VAL(C$):C$="" :PLAY"FG
":GOTO41:ELSEIFA$=CHR$(64)THENC(
X)=0-VAL(C$):C$="" :PLAY"DE":GOTO
41:ELSEIFA$="F"ANDM$<>"Y"THENGOS
UB24:C$="" :PLAY"CC":GOTO41
31 IFA$<>"A"THEN33ELSEPLAY"T8L8D
":DS(X)=D$(X)+C"
32 AS=INKEY$:IFA$=""THEN32 ELSEVA
L(C$)+C1:C$="" :PLAY"CG":GOTO41:EL
SEIFA$="2"THENC(X)=VAL(C$)+C2:C
$="" :PLAY"GC":GOTO41:ELSE32
33 IFA$<>"S"THEN35ELSEPLAY"T8L8E
":DS(X)=D$(X)+C"
34 AS=INKEY$:IFA$=""THEN34 ELSEVA
L(C$)-C1:C$="" :PLAY"CG":GOTO41:EL
SEIFA$="2"THENC(X)=VAL(C$)-C2:C
$="" :PLAY"GC":GOTO41:ELSE34
35 IFA$<>"X"THEN37ELSEPLAY"T8L8P
":DS(X)=D$(X)+XC"
36 AS=INKEY$:IFA$=""THEN36 ELSEVA
L(C$)*C1:C$="" :PLAY"CG":GOTO41:EL
SEIFA$="2"THENC(X)=VAL(C$)*C2:C
$="" :PLAY"GC":GOTO41:ELSE36
37 IFA$<>"Z"THEN39ELSEPLAY"T8L8G
":DS(X)=D$(X)+C"
38 AS=INKEY$:IFA$=""ANDC1<>0 TH
ENC(X)=VAL(C$)/C1:C$="" :PLAY"CG"
:GOTO41:ELSEIFA$="2"ANDC2<>0 THE
NC(X)=VAL(C$)/C2:C$="" :PLAY"GC"
:GOTO41:ELSEIFA$<>"THEN28 ELSE 3
9
39 IFA$=""THENC$="" :X=X-1:RETUR
N
40 NEXTDS
41 T(X)=T(X-1)+C(X):ST(X)=ST(X-1
)+C(X):IFA$="1" ORAS="2" THENDS(
X)=D$(X)+A$:ELSEIFA$="0" THENDS(
X)=D$(X)+""
42 PRINT@0,STRINGS(27,"")+""
43 PRINT@28,USING"###";X:PRINT@9
7,"total=
SUBTL (#);ST;"=
:PRINT@161,"eNTRY";D$(X);" VAL=
";C(X):PRINT@192," LAST VALUE:";
C(X-1):PRINT@225,"MVG AVG="
44 PRINT@256," constants#1:";C1;
"#2:";C2
45 IPX->MA ANDM$="Y"THENGOSUB63
46 JS=STR$(INT(T(X))):LJ=LEN(JS)
:JD=D
47 IFLJ<-(10-D)THENE=(10-LJ):IPE<
1THENE=1
48 ONE GOSUB55,56,57,58,59,60,61
,62
49 IFCF<>1 ANDX<150 THENX=X+1:GO
TO27:ELSEIFCF=1THENRETURN
50 PRINT@96,BLS:PRINT@10,5:PRINT@
128," full-- 150 VALUES ENTERED
... YOU CAN REVIEW, EVALUATE O
R SAVE, BUT REGISTERS MUST B
E CLEARED TO CONTINUE ENTRY
-- CURRENT TOTAL WILL BE SAVE
D." :X=150:TP=T(150):PORI=1TO2500
:NEXT
51 PRINT@96,BLS:PLAY"T8L16APAP":
PRINT@129,"choose (1) CONTINUE K
EY-ENTRY (2) CLEAR REGI
STERS (3) REVIEW
(4) EVALUATE
(5) SAVE"
52 Z$=INKEY$:IPZ$=""THEN52 ELSEZ
=VAL(Z$):IPZ=0ORZ>5THEN51
53 ONZ GOTO54,65,68,84,106
54 IPX<150 THENST(X)=0:X=X+1:PLA
Y"CG":GOTO23:ELSE51
55 PRINT@111,USING"###,###,###,###
";T(X):PRINT@143,USING"###,###,###

```

```

,###;ST(X):PRINT@234,USING"###,###,
###,###";MV::PRINT" (";MA;")":R
ETURN
56 PRINT@111,USING"###,###,###,###"
;T(X):PRINT@143,USING"###,###,###,
###";ST(X):PRINT@234,USING"###,###,
###,###";MV::PRINT" (";MA;")":RET
URN
57 PRINT@111,USING"###,###,###,###"
;T(X):PRINT@143,USING"###,###,###,
###";ST(X):PRINT@234,USING"###,###,
###,###";MV::PRINT" (";MA;")":RETU
RN
58 PRINT@111,USING"###,###,###,###"
;T(X):PRINT@143,USING"###,###,###,
###";ST(X):PRINT@234,USING"###,###,
###,###";MV::PRINT" (";MA;")":RETU
RN
59 PRINT@111,USING"###,###,###,###"
;T(X):PRINT@143,USING"###,###,###,
###";ST(X):PRINT@234,USING"###,###,
###,###";MV::PRINT" (";MA;")":RETU
RN
60 PRINT@111,USING"###,###,###,###"
;T(X):PRINT@143,USING"###,###,###,
###";ST(X):PRINT@234,USING"###,###,
###,###";MV::PRINT" (";MA;")":RETU
RN
61 PRINT@111,USING"###,###,###,###"
;T(X):PRINT@143,USING"###,###,###,
###";ST(X):PRINT@234,USING"###,###,
###,###";MV::PRINT" (";MA;")":RETU
RN
62 PRINT@111,USING"###,###,###,###"
;T(X):PRINT@143,USING"###,###,###,
###";ST(X):PRINT@234,USING"###,###,
###,###";MV::PRINT" (";MA;")":RETU
RN
63 V=0:PORQ=1TOMA:V=V+C(X+1-Q):N
EXT
64 MV=V/MA:RETURN
65 PRINT@96,BLS:PLAY"BGBG":PRINT
@129,"key 'Y' [eNTER] to";CHR$(1
28);"cleac";CHR$(128);"all":LINE
INPUT" IF YOU'VE CHANGED YOUR M
IND, JUST PRESS [eNTER] ";Z$
66 IFZ$="Y"THENFORQ=1TOX:C(Q)=0:
T(Q)=0:ST(Y)=0:NEXT:GOTO15
67 X=X+1:PLAY"CG":GOTO23
68 PRINT@96,BLS:PLAY"BGBG":PRINT
@129,"cEVIEW- (1) ITEM BY ITEM,
(2) BY ITEM NUMBER,
(3) BY ITEM VALUE,
(4) BY TOTAL"
69 Z$=INKEY$:IPZ$=""THEN69 ELSEI
PZ$=""THEN51ELSEPLAY"P":Z=VAL(Z
$):IPZ=0ORZ>4THENZ=1
70 RS(1)=" BEGINNING WITH ITEM #
":RS(2)=" ITEM # ":RS(3)=" ITE
M VALUE ":RS(4)=" ITEM TOTAL =>
"
71 PRINT@96,BLS:PRINT@96,RS(2)::
LINE INPUTS$:IPZ$=""THEN68 ELSE
S=VAL(S$):ONZ GOSUB73,75,76,78
72 PRINT@256,STRINGS(22,""):Z$=
INKEY$:IPZ$=""THEN72 ELSEIPZ$=""
THEN68 ELSE71
73 IFS=0THENS=ELSEIPZ$>XTHENS=X
74 FORN=S TOX:GOSUB80:GOSUB81:IP
Z$=""THENRENTSENEXT:RETURN
75 N=S:GOSUB80:GOSUB81:RETURN
76 FORN=1TOX:IPC(N)=S THENGOSUB8
0:GOSUB81:IPZ$=""THENRETURN
77 NEXT:RETURN
78 FORN=1TOX:IPT(N)=>S THENGOSUB
80:GOSUB81:IPZ$=""THENRETURN
79 NEXT:RETURN
80 PRINT@128," ITEM NBR ";N;" vA
L=";C(N):PRINT@160," ITEM TOTAL="
;T(N);" ":PRINT@192," kEY E
D";D$(N);" ":PRINT@224," P
REV vAL=";C(N-1):RETURN
81 PRINT@256," -hIT R-REKEY D-DE
LETE I-INSERT":Z$=INKEY$:IPZ$=""
THEN81 ELSEIPZ$="D" THENPLAY"DA
":FORQ=N TOX:C(Q)=C(Q+1):DS(Q)=D
$(Q+1):NEXT:X=X-1:GOSUB105:RETU
RN
82 IFZ$="R" THENPLAY"AA":XS=X:X=
N:CG=1:GOSUB27:X=XS:GOSUB105:CG=
0:FORI=1TO1000:NEXT:LINE INPUT"

```

Listing continued

Listing continued

```

<ENTER> TO CONT. REVIEW ";Z2$:
SOUND4Ø,1:PRINTØ96,BL$:PRINTØ96,
R$(V);S:N=N-1:RETURN
83 IFZ$="I" THENPLAY"AD":PORQ=X
TON STEP-1:C(Q+1)=C(Q):D$(Q+1)=D
$(Q):NEXT:XS=X:N:CG=1:GOSUB27:
X=XS+1:GOSUB1Ø5:CG=Ø:FORI=1TO1ØØ
Ø:NEXT:LINE INPUT" <ENTER> TO
CONT. REVIEW ";Z2$:SOUND4Ø,1:PRI
NTØ96,BL$:PRINTØ96,R$(V);S:RETUR
N:ELSERETURN
84 PLAY"BG":PRINT" ONE MO
MENT ...":FORS=1TOX:ST(S)=-9E+37
:NEXT
85 FORS=1TOX:P=Ø
86 FORS1=1 TOX:IFC(S1)<=C(S) THE
NP=P+1
87 IFST(P)=C(S) ANDP<>1 THENP=P-
1:GOTO87
88 NEXT:ST(P)=C(S):NEXT
89 SUM=Ø:SSQ=Ø:FORS=1TOX:SUM=SUM
+ST(S):SSQ=SSQ+(ST(S)^2):NEXT:M=
SUM/X:VR=(SSQ-(X*(M^2)))/X:SD=VR
^5:CV=(SSQ-(X*(M^2)))/(X-1):CD=
CV^.5:SE=CD/(X^.5):RG=ST(X)-ST(1
)
9Ø PRINTØ96,BL$:PLAY"BG":PRINT
Ø129,"tASK 1) SUMMARY STATS
2) STANDARD SCORES
3) FREQUENCIES"
91 Z$=INKEY$:IFZ$=""THEN91 ELSEIF
FZ$=""THEN51ELSEPLAY"P":Z=VAL(Z
$):IFZ=ØORZ>3THENZ=1
92 ONZ GOSUB93,95,98:GOTO9Ø
93 PRINTØ96,BL$:PRINTØ97,"n=";X:
PRINTØ1Ø5,"rANGE=";RG:PRINT" mIN
";ST(1),"mAX";ST(X):PRINT" mEAN=
";M:PRINT" sd=";SD:PRINT" vr=";C
V:PRINT" se=";SE,"s=";CD

```

```

94 Z$=INKEY$:IFZ$=""THEN94ELSERE
TURN
95 PRINTØ96,BL$:PRINTØ97,"VALUES
NEED NOT HAVE OCCURRED TO COM
PUTE STANDARD SCORES.":INPUT" VA
LUE":Z$:IFZ$=""^THEN9Ø
96 DZ=VAL(Z$)-M:Z=DZ/CD:ZD=VAL(Z
$)*CD+M:PRINT" mN";M,"s=";CD:PRI
NT" Z=";Z:PRINT" V=";ZD
97 Z$=INKEY$:IFZ$=""THEN97 ELSEIF
FZ$=""^THENRETURNELSE95
98 GOSUB1Ø4:F=1
99 PORF2=F TOX:IFST(F2)=ST(F) TH
ENFR=FR+1:NEXT
1ØØ PRINTST(P);TAB(16);FR:TAB(21
);:PRINT USING"###.##";FR/X*1ØØ;:P
RINT USING"###.##";(P2-1)/X*1ØØ
1Ø1 G=G+1:F=F+FR:PR=Ø:IFP>X THEN
GOSUB1Ø3:RETURN
1Ø2 IFG/6=INT(G/6) THENGOSUB1Ø3:
GOSUB1Ø4:GOTO99:ELSEGOTO99
1Ø3 Z$=INKEY$:IFZ$=""THEN1Ø3 ELS
E RETURN
1Ø4 G=1:PRINTØ64,BL$:PRINTØ96,BL
$:PRINTØ96," ITEM ----- FRQ
&tTL %cUM":RETURN
1Ø5 FORL=N TOX:T(L)=T(L-1)+C(L):
ST(L)=ST(L-1)+C(L):NEXT:RETURN
1Ø6 PRINTØ96,BL$:PLAY"BG":PRIN
TØ64," :LINE INPUT" [ENTER] FOR
RECORDER CONTROL ";Z$:MOTORON:A
UDIOON:LINE INPUT" [ENTER] FILE
NAME --";N$:N$=LEFT$(N$,8):MOTOR
OFF:AUDIOOFF:LINE INPUT" PRESS p
&r, THEN [ENTER] ";Z$
1Ø7 POKE65494,Ø:OPEN"O",#-1,N$:F
ORZ=1TOX:PRINT#-1,C(Z),D$(Z),T(Z
),ST(Z):NEXT:CLOSE#-1:GOTO51

```

END

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illustration by Carl Wesley

COMPUTER DATING: A CALENDAR GENERATOR

Now your CoCo can show you the future with calendars for every day of the week.

BY BRIAN E. HAWKINS

Have you ever noticed that there are items around the house that become scarce just when you need them most? Take calendars, for instance. While making long-distance arrangements for your favorite vacation spot, you realize that you can't find a calendar. Searching for one could take several frustrating minutes—and Club Med is holding the phone.

The following program gives you access to 26 years of calendars, from

January 1984 to December 2009. It displays months on the PMODE 4 graphics screen and allows you to print a 12-month calendar in 40-, 80-, or 132-column format. Fig. 1 is an example of the 80-column format. To make screen-generated calendars easier to read, the normal PMODE 4 graphics colors have been reversed to black on white. The CoCo Calendar Generator is completely menu driven, and it error checks all user input. Holidays aren't included—but then most

of us can remember the Fourth of July anyway. ■

Address correspondence to Brian E. Hawkins, 1301 Wembley Drive, Charlotte, NC 28205.

System Requirements

16K RAM
Extended Color Basic
Printer Optional

Program Listing. CoCo Calendar Generator

```

5 CLEAR 1000
10 DIM YB(25),DM(12),NS$(9),SS$(12),MT$(12)
20 FOR I = 0 TO 25:READ YB(I):NE
XT
30 FOR I = 1 TO 12:READ DM(I):NE
XT
40 FOR I = 0 TO 9:READ NS$(I):NE
XT
50 FOR I = 1 TO 12:READ SS$(I):N
EXT
60 FOR I = 1 TO 12:READ MT$(I):N
EXT
100 PMODE 4,1
200 COLOR 0,5
400 CLS:PRINT" COCO CALENDAR
GENERATOR.":PRINT:PRINT"
1984 TO 2009."
450 FOR I = 1 TO 2000:NEXT
500 CLS:PRINT"CHOOSE ONE OF THE
FOLLOWING.":PRINT:PRINT"(1)....
SCREEN GENERATION":PRINT"(2)....
.PRINTER GENERATION":PRINT"(3)..
.EXIT THE PROGRAM"
600 PRINT@153," ";:PRINT@153,
";:LINEINPUT AN$
700 AN=VAL(AN$):IF AN<1 OR AN>3
THEN SOUND 100,2:GOTO600
800 CLS:ON AN GOSUB 1000,5000,95
0
900 GOTO 500
950 END
1000 GOSUB 10000
1050 PCLS
1100 SCREEN 1,1
1200 LINE (0,30)-(252,191),PSET,
B
1300 FOR I = 0 TO 255 STEP 36:LI
NE(I,30)-(I,191),PSET:NEXT
1500 FOR I = 30 TO 160 STEP 32:L
INE(0,I)-(252,I),PSET:NEXT
1600 LINE(0,0)-(252,30),PSET,BF
1700 GOSUB 15000
1800 D=DD:L=1:DH=DM(MH):IF (YR/4
=INT(YR/4)) AND MH=2 THEN DH=DH+
1
1900 FOR J = 1 TO DH
1950 IF L=6 THEN VL=189:DRAW"BM"
+STR$(DD-1)*36+" ,174R35" ELSE
VL=(L*32)+6
2000 XL=(DD-1)*36:DSS=RIGHT$(STR
$(J),LEN(STR$(J))-1)
2100 DRAW"BM"+STR$(XL)+" ,"+STR$(
VL)+NS$(VAL(LEFT$(DSS,1)))
2200 IF LEN(DSS)=2 THEN DRAW NSS
(VAL(RIGHT$(DSS,1)))
2300 DD=DD+1
2400 IF DD=8 THEN DD=1:L=L+1
2500 NEXT J
2600 IF INKEY$="" GOTO 2600
2700 RETURN
5000 CLS:PRINT"(1).....40 COL. P
RINTER":PRINT"(2).....80 COL. PR
INTER":PRINT"(3).....132 COL. PR
INTER"
5050 DL$="":DD$="":LD$=""
5100 PRINT@128,"CHOOSE ONE OF TH
E ABOVE ";:LINEINPUT CH$:CH=VAL
(CH$):IF CH<1 OR CH>3 THEN SOUND
100,2:GOTO 5100
5150 IF CH=1 THEN L=5:LT=4:TB=10
:QT=5 ELSE L=10:LT=L:TB=30:QT=1
1
5160 IF CH=3 THEN PT=26 ELSE PT=
0
5170 TB=TB+PT
5200 GOSUB 10000
5202 DH=YB(YS):H2=DH
5205 YR$=RIGHT$(STR$(YR),LEN(STR
$(YR))-1)
5210 FOR I = 1 TO L:DL$=DL$+YR$+
"....":NEXT
5215 FOR I = 1 TO 7:LD$=LD$+" "+
STRING$(LT,"-"):NEXT
5220 LD$=LD$+" "
5225 FOR I = 1 TO 7:DD$=DD$+"!" +
STRING$(LT," "):NEXT
5230 DD$=DD$+"!"
5240 IF CH=1 THEN QD$="!SUN !MON

```

```

1TUE IWED !THU !FRI !SAT !" ELS
E QD$="! SUN ! MON !
TUE ! WED ! THU !
FRI ! SAT !"
5250 IF CH=1 THEN DL$=LEFT$(DL$,
36) ELSE DL$=LEFT$(DL$,78)
5300 PRINT"PREPARE PRINTER AND H
IT ENTER."
5400 IF INKEY$="" GOTO5400
5450 FOR MH = 1 TO 12
5500 PRINT#-2,CHR$(13),CHR$(13)
5600 PRINT#-2,TAB(PT);DL$
5650 PRINT#-2,CHR$(13)
5800 PRINT#-2,TAB(((L*8)-LEN(MT
$(MH)))/2);MT$(MH)
5900 PRINT#-2,CHR$(13):PRINT#-2,
TAB(PT);DL$
5910 PRINT#-2,TAB(PT);LD$
5920 PRINT#-2,TAB(PT);QD$
6000 MD=DM(MH)
6050 IF (YR/4=INT(YR/4)) AND MH=2
THEN MD=MD+1
6100 J=1
6200 FOR L1 = 1 TO 6
6300 PRINT#-2,TAB(PT);LD$
6400 PRINT#-2,TAB(PT);DD$
6500 D2$=DD$
6600 GOSUB 20000
6700 PRINT#-2,TAB(PT);D2$
6800 L2=INT(L/2)
6900 FOR I = 1 TO L2:PRINT#-2,TA
B(PT);DD$:NEXT

```

```

7000 NEXT
7100 PRINT#-2,TAB(PT);LD$
7200 PRINT#-2,CHR$(13),CHR$(13)
7210 H2=H2+MD
7220 DH=H2-(INT(H2/7)*7):IF DH=0
THEN DH=7
7300 NEXT MH
7400 RETURN
7500 END
10000 CLS:INPUT"WHICH YEAR WOULD
YOU LIKE";YR
10100 YS=YR-1984:IF YS<0 OR YS>2
5 THEN SOUND 100,2:GOTO 10000
10200 CLS:PRINT"YEAR IS: ";YR
10250 IF AN=2 THEN RETURN
10300 PRINT:PRINT"(1)...JANUARY
(7)...JULY":PRINT"(2)...FEBRUA
RY (8)...AUGUST":PRINT"(3)...MA
RCH (9)...SEPTEMBER"
10400 PRINT"(4)...APRIL (10)
...OCTOBER":PRINT"(5)...MAY
(11)...NOVEMBER":PRINT"(6)...J
UNE (12)...DECEMBER"
10500 PRINT@288,"WHICH MONTH? (B
Y NUMBER) ";:LINEINPUT AN$
10600 MO=VAL(AN$):MH=MO:IF MO<1
OR MO>12 THEN SOUND 100,2:PRINT@
313," ";:GOTO 10500
10700 DT=0

```

Listing continued

JANUARY

1985...	1985...	1985...	1985...	1985...	1985...	1985...	1985...
SUN	MON	TUE	WED	THU	FRI	SAT	
		1	2	3	4	5	
6	7	8	9	10	11	12	
13	14	15	16	17	18	19	
20	21	22	23	24	25	26	
27	28	29	30	31			

Fig. 1. This is what this month looks like in the 80-column format. The CoCo Calendar Generator can print any of 26 yearly calendars in three formats.

```

10750 MO=MO-1:IF MO=0 GOTO10900
10800 FOR I = 1 TO MO:DT=DT+DM(I
):NEXT
10850 IF (YR/4 = INT(YR/4)) AND
MO>1 THEN DT=DT+1
10900 DD=DT-(INT(DT/7)*7):DD=DD+
YR(YR):IF DD>7 THEN DD=DD-7
11000 RETURN
15000 COLOR 5,0
15010 LINE(0,20)-(252,20),PSET
15020 FOR I = 36 TO 220 STEP 36:
LINE(I,20)-(I,30),PSET:NEXT
15095 DRAW"BM9,27F1R2E1U1H1L2H1U
1E1R2F1BM+2,-1D5F1R2E1U5BM+2,+6U
6F4D2U6"
15100 DRAW"BM45,28U6F2D1U1E2D6BM
+3,+0R2E1U4H1L2G1D4BM+6,+1U6F4D2
U6"
15200 DRAW"BM83,28U6L2R4BM+2,+0D
5F1R2E1U5BM+6,+0L4D3R4L4D3R4"
15300 DRAW"BM118,22D6E2F2U6BM+6,
+0L4D3R4L4D3R4BM+2,+0R2E2U2H2L2D
5"
15400 DRAW"BM156,28U6L2R4BM+2,+0D
6U3R4U3D6BM+2,-6D5F1R2E1U5"
15500 DRAW"BM190,28U3R3L3U3R4BM+
2,+6U6R3F1D1G1L2F3BM+2,+0R4L2U6L
2R4"
15600 DRAW"BM226,27F1R2E1U1H1L2H
1U1E1R2F1BM+2,+5U5E1R2F1D2L3R3D3
BM+4,+0U6L2R4"
15700 DRAW "BM55,15S8"
15750 DRAW SSS(MH)
15760 DRAW "BM107,15U1L1D1R1"
15770 DRAW "BM122,15"
15780 YS=RIGHTS(STRS(YR),LEN(STR
S(YR))-1)
15790 FOR I = 1 TO 4:DRAW NSS(VA

```

```

L(MIDS(YS,I,1)):NEXT
15980 DRAW "S4"
15990 COLOR 0,5
16000 RETURN
20000 FOR IJ = DH TO 7
20100 IF J>MD GOTO 20400
20200 MIDS(D2S,((IJ-1)*QT)+3,LEN
(STRS(J)))=STRS(J)
20300 J=J+1
20400 NEXT
20450 DH=1
20500 RETURN
21100 DATA 1,3,4,5,6,1,2,3,4,6,7
,1,2,4,5,6,7,2,3,4,5,7,1,2,3,5,3
1,28,31,30,31,30,31,31,30,31,30,
31
30150 DATA "BM+8,+0R2E1U4H1L2G1D
4F1BM-1,+0"
30200 DATA "BM+7,+0R4L2U6G2BM+0,
+4"
30300 DATA "BM+11,+0L4U1E4H1L2G1
BM+0,+5"
30400 DATA "BM+7,-1F1R2E1U1H1L2R
2E1U1H1L2G1BM+0,+5"
30500 DATA "BM+10,+0U6L1G2D1R4BM
-4,+3"
30600 DATA "BM+7,-1F1R2E1U1H1L3U
3R4BM-4,+6"
30700 DATA "BM+8,-2E1R1F1D1G1L2H
1U4E1R2F1BM-4,+5"
30800 DATA "BM+9,+0U3E2U1L4D1BM+
0,+5"
30900 DATA "BM+8,+0R2E1U1H1L2H1U
1E1R2F1D1G1L2G1D1F1BM-1,+0"
31000 DATA "BM+7,-1F1R2E1U4H1L2G
1D1F1R2BM-3,+3"
31100 DATA "BM+7,-2D1F1R2E1U5BM+
2,+6U5E1R2F1D2L4R4D3BM+2,+0U6F4D

```

```

2U6"
31200 DATA "BM+7,+0U3R3L3U3R4BM+
6,+0L4D3R4L4D3R4BM+2,+0U6R3F1D1G
1L2R2F1D1G1L3"
31300 DATA "BM+7,+0U6F2D1U1E2D6B
M+2,+0U5E1R2F1D2L4R4D3BM+2,+0U6R
3F1D1G1L2F3"
31400 DATA "BM+7,+0U5E1R2F1D2L4R
4D3BM+2,+0U6R3F1D1G1L3BM+6,+3U6R
3F1D1G1L2F3"
31500 DATA "BM+7,+0U6F2D1U1E2D6B
M+2,+0U5E1R2F1D2L4R4D3BM+4,+0U3H
2U1BM+4,+0D1G2"
31600 DATA "BM+7,-2D1F1R2E1U5BM+
2,+0D5F1R2E1U5BM+2,+6U6F4D2U6"
31700 DATA "BM+7,-2D1F1R2E1U5BM+
2,+0D5F1R2E1U5BM+2,+0D6R4"
31800 DATA "BM+7,+0U5E1R2F1D2L4R
4D3BM+2,-6D5F1R2E1U5BM+6,+1H1L2G
1D4F1R2E1U2L2"
31900 DATA "BM+7,-1F1R2E1U1H1L2H
1U1E1R2F1BM+6,-1L4D3R4L4D3R4BM+2
,+0U6R3F1D1G1L3"
32000 DATA "BM+7,-1U4E1R2F1D4G1L
2H1BM+11,+0G1L2H1U4E1R2F1BM+2,-1
R4L2D6"
32100 DATA "BM+7,+0U6F4D2U6BM+3,
+0R2F1D4G1L2H1U4BM+7,-1D1F1D2F1D
1U1E1U2E1U1"
32200 DATA "BM+7,+0U6R2F2D2G2L2B
M+10,+0L4U3R4L4U3R4BM+6,+1H1L2G1
D4F1R2E1"
32300 DATA JANUARY,FEBRUARY,MARC
H,APRIL,MAY,JUNE,JULY,AUGUST,SEP
TEMBER,OCTOBER,NOVEMBER,DECEMBER

```

END

TCE News Release

MONDAY OCTOBER 1, 1984

GAITHERSBURG, MARYLAND

In 1985 TCE Will Introduce CHILD'S PLAY

Mouse Technological Software For The Color Computer!

Ted Malaska, President & Co-founder of TCE Programs Inc., announced today a new division for the development of business software.

The new division will distribute a series of machine language business

programs, under the name *Child's Play* beginning in the first half of 1985. The *Child's Play* series will use mouse technology and what Mr. Malaska termed "*Floating Overlays*", to control the operations within the program.

When asked why the name *Child's Play* was selected for a business series, Mr. Malaska responded: "Floating Overlays will make the program operation seem like *Child's Play*, compared to other business software of today."



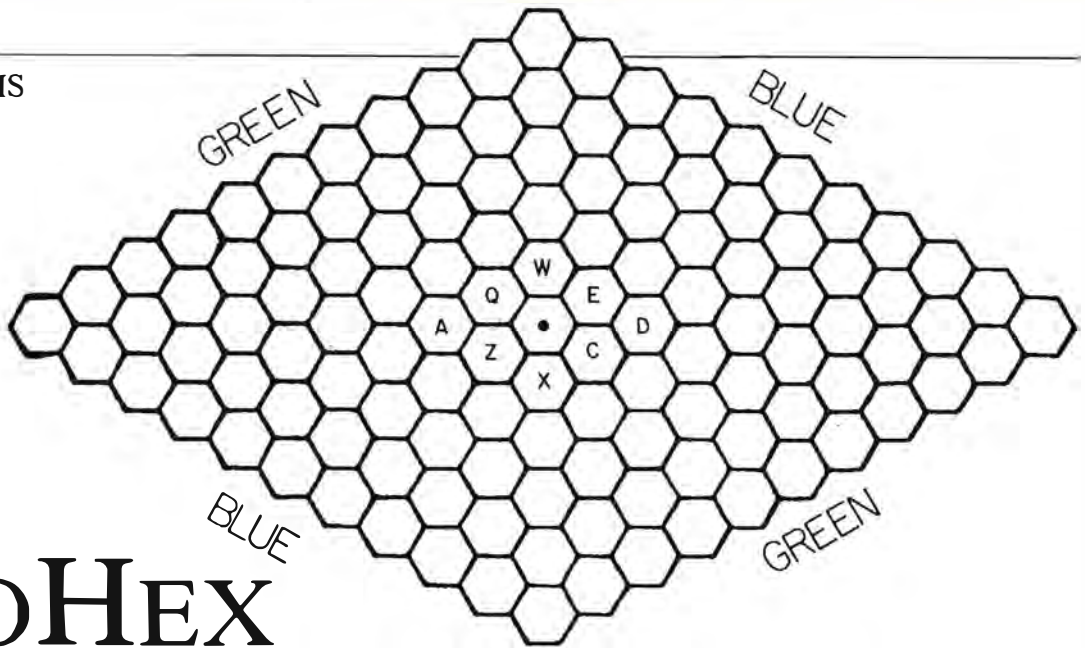
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BY WALLY ADAMS



CoCoHex

Try this high-tech version of an old-tech game.

CoCoHex is based on the traditional game, Hex. It uses a diamond-shaped game board, and although the size can vary, it usually has 11 hexagons on each side. Opposite sides of the board are designated as green, and the other two sides as blue, with the hexagons at the corners of the diamond belonging to either side. The object of CoCoHex is to complete an unbroken chain between your two sides.

Your chain can twist and turn freely, and all hexagons are legal moves. You cannot play a hexagon

that is already occupied, and the game cannot end in a draw since one player can block the other only by completing his own chain.

Enter and run CoCoHex and it draws the board. Green has the first move. Its sides are indicated by green squares drawn on opposite sides. The program draws a flashing cursor board. To move this cursor to a desired position, use the following keys: Q, W, E, A, D, Z, X, C. (As indicated in above illustration.)

When you have reached the desired hexagon, press M to mark the hexa-

gon with your color. When you mark a move, your opponent's sides are indicated, signifying his turn. Press 0 to start a new game. Line 100 is the high-speed POKE. If your computer cannot handle this POKE, delete it. ■

Address correspondence to Wally Adams, P.O. Box 871, Winter Garden, FL 32797.

System Requirements
16K RAM
Extended Color Basic

```

100 POKE 65495,1
110 PMODE3,1:COLOR4,2:PCLS:SCREE
N1,0
120 LINE(3,88)-(0,96),PSET
130 LINE-(3,104),PSET
140 LINE-(11,104),PSET
150 LINE-(15,96),PSET
160 LINE-(11,88),PSET
170 LINE-(3,88),PSET
180 DIM V(6)
190 GET(0,88)-(15,104),V,G
200 B=88
210 FOR A=0 TO 120 STEP 12
220 B=B-8:Y=B
230 FOR X=A TO A+120 STEP 12
240 Y=Y+8
250 PUT(X,Y)-(X+15,Y+16),V,PSET
260 NEXT X,A
270 PAINT(1,1),0,4
280 PAINT(1,191),0,4
290 COLOR1:LINE(40,24)-(52,36),P
SET,BF:LINE(204,167)-(216,178),P
SET,BF
300 C=1:X=128:Y=96
310 AS=INKEY$:IF AS="" GOSUB 540
:GOSUB 530

```

```

320 IF AS="D" GOSUB 540 ELSE340
330 X=X+24:IF X>248 OR PPOINT(X-
1,Y)=4 THEN X=X-24:GOTO 310
340 IF AS="A" GOSUB 540 ELSE360
350 X=X-24:IF X<8 THEN X=X+24:GO
TO 310 ELSE IF PPOINT(X-1,Y)=4 T
HEN X=X+24:GOTO 310
360 IF AS="W" GOSUB 540 ELSE380
370 Y=Y-16:IF Y<16 OR PPOINT(X-1
,Y)=4 THEN Y=Y+16:GOTO 310
380 IF AS="X" GOSUB 540 ELSE400
390 Y=Y+16:IF Y>176 OR PPOINT(X-
1,Y)=4 THEN Y=Y-16:GOTO 310
400 IF AS="Q" GOSUB 540 ELSE420
410 X=X-12:Y=Y-8:IF X<8 OR Y<16
THEN X=X+12:Y=Y+8:GOTO 310 ELSE
IF PPOINT(X-1,Y)=4 THEN X=X+12:Y
=Y+8:GOTO 310
420 IF AS="E" GOSUB 540 ELSE440
430 X=X+12:Y=Y-8:IF X>248 OR Y<1
6 OR PPOINT(X-1,Y)=4 THEN X=X-12
:Y=Y+8:GOTO 310
440 IF AS="Z" GOSUB 540 ELSE460
450 X=X-12:Y=Y+8:IF X<8 OR Y>176
THEN X=X+12:Y=Y-8:GOTO 310 ELSE
IF PPOINT(X-1,Y)=4 THEN X=X+12:

```

```

Y=Y-8:GOTO 310
460 IF AS="C" GOSUB 540 ELSE480
470 X=X+12:Y=Y+8:IF X>248 OR Y>1
76 OR PPOINT(X-1,Y)=4 THEN X=X-1
2:Y=Y-8:GOTO 310
480 IF AS="M" THEN 490 ELSE 520
490 IF PPOINT(X-1,Y)=1 OR PPOINT
(X-1,Y)=3 THEN 310 ELSE GOSUB 54
0:PAINT(X,Y),C,4
500 IF C=1 THEN COLOR4:LINE(40,2
4)-(52,36),PSET,BF:LINE(204,167)
-(216,178),PSET,BF:LINE(40,167)-
(52,178),PSET,BF:COLOR3:LINE(204
,24)-(216,36),PSET,BF:LINE(40,16
7)-(52,178),PSET,BF:C=3:GOTO310
510 COLOR4:LINE(204,24)-(216,36)
,PSET,BF:LINE(40,167)-(52,178),P
SET,BF:COLOR1:LINE(40,24)-(52,36
),PSET,BF:LINE(204,167)-(216,178
),PSET,BF:C=1:GOTO 310
520 IF AS="O" THEN RUN ELSE 310
530 PSET(X,Y,4):PSET(X,Y+1,4):RE
TURN
540 PRESET(X,Y):PRESET(X,Y+1):PA
INT(X,Y),(PPOINT(X-1,Y)),4:RETUR
N

```

Program Listing. CoCoHex

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CoCo for Hire

WORD PROCESSING, PART I

*by Terry Kepner
and Linda Tiernan*

Not long after buying your CoCo, you probably thought about making the machine pay for itself. You might even have bought it with that in mind. But what can you do with your computer to turn a profit? And once you've decided to put your CoCo to work—how do you go about it?

Several books claim to tell you how to make money with your computer. But few delve into the nitty-gritty details about what it takes to run a home-computer business. Many don't even mention the important business considerations: how to get customers, choosing effective advertising, problems that might crop up, how to collect money owed to you, the legalities specific to a business, residential zoning restrictions, and how to stay on good terms with the IRS. And most get-rich-with-your-computer books are vague about the kinds of equipment and materials you need for particular jobs.

A great deal of print in circulation proffers vague ideas without much practical nuts-and-bolts information. This column is designed to fill that information gap, to give you down-to-earth facts about home-computer businesses and how to start one. We'll explore many of the pitfalls and problems you are likely to face along with possible solutions you might adopt.

The column is divided into two parts. This first installment begins with the incidental, but important, facts you need to know before starting any kind of home business. It concludes with an examination of what is probably the most popular of home-computer businesses—word processing.

Setting a Goal

Before embarking on a home-business project, decide what you want to

accomplish. Are you just looking for "pin money," or do you want more money to make payments on a car? Perhaps you want to take it a step further and become your own boss. This isn't a decision you should make lightly. Your long-term goal should be a major factor in your selection of a work-at-home computer business. For example, a typing service for college term papers is an excellent business for students, housewives, and others who have unusual schedules because they can do it in their spare time. But it's not a good business for someone contemplating a full-time career change. The opposite is true of a business such as a computer service bureau.

In addition to studying your financial goals, take inventory of your resources. Make sure that you have all the hardware and software you need to start your business. Keep in mind that you'll need a little money for advertising and special supplies to fit the individual needs of your customers. Don't forget the skills you have that can help, such as typing, bookkeeping experience, or an ability to get along with people.

Draw up two lists. Describe all your short and long-term goals in one list. In the other, detail your resources, including time, money, equipment, and skills. Use these lists as guidelines against which you can weigh your home-business choices. When you

find one that balances with your needs, examine it carefully to make sure that you really want to do it. Starting a home-computer business takes commitment.

Some people who work at home have another problem. For students and others who work on a part-time basis, it crops up rarely. But it can be a big stumbling block for those who rely on a home business to make a living. When you spend all your time working alone, you become stale and start to feel wistful about the company of others. You can't just take a quick break to talk with a coworker, and no one will drop by your desk to deliver a message or ask a question that breaks up the day. If you are a gregarious person, you might find that a full-time career at home is stifling. People-conscious individuals should limit their home businesses to once-in-a-while projects that supplement their standard incomes.

Word Processing for Hire

In this section of the column, we're focusing on a particular business. You'll find information that is specific to your business on how to approach customers, advertise, target a market, develop rates, collect payments, design a service policy, track income, avoid legal difficulties, and keep on top of the specific hardware and software supplies you'll need. It might take more than one installment to detail each business.

This month we look at word processing, a business that any student, homemaker, or businessman with a computer, word-processing program, and printer can begin with a minor investment.

The Doldrums

Whether you take on a full-time

CoCo for Hire

business or an every-other-weekend project for pocket money, you'll discover two difficulties with working at home: self motivation and keeping up your interest. It takes a special outlook on life to be able to get up in the morning and start working, knowing that no one but yourself is in charge. If you start one hour later than usual, *you* are the only one who'll know. The temptation to put it off until later today or tomorrow can be overpowering. For some, it translates into a get-to-it-later syndrome.

Not everyone works well at home. A friend quit a career as a programmer with a company to become a freelance writer and programmer. In less than four months' time he was out looking for a steady job. His problem was not a lack of work, but that he let days go by without touching his computer. Not having a fixed schedule to follow meant that he sometimes slept until late in the morning. And there was always something else he had to do, such as reading trade journals, going on errands, or doing the laundry. The hardest aspect of working at home might be just getting started. But many people say that once you get started, it's not too much trouble to stick with it.

Tips for Typing

Home-computer typists should follow these suggestions for producing clean copy and maintaining a viable business.

● **Be sure your copy looks good.** Your copy's appearance is of paramount importance. It doesn't matter that your program can make a thousand backups in an instant, or that it is compatible with six other machines. What matters is the typed copy your customer wants to have to impress his client or boss. If the print is not clean and neat, you might hear about it—or you might never hear from that customer again.

The appearance of a completed work must be pleasing to the eye and easy to read. In the days of the typewriting schools that flourished before touch-typing came into vogue, students often learned "type art," a practice that included exercises such as creating a typewritten Mona Lisa. Type art taught students to look for light and dark values in each of the typewriter's keys and to be aware of the appearance of type on the page.

● **Concentrate on your work.** No fancy word-processing program can truly compensate for a typist's poor punctuations, misspellings, and typos.

● **Think ahead.** For instance, most typists begin every page with a clearly discernible heading and page number. Someone could drop the finished manuscript and scramble its page order. If you think about ways to avoid problems before they happen and learn from your mistakes, you will provide the kind of service that customers seek out.

● **Know your equipment.** A thorough knowledge of your equipment gives you confidence about the jobs you can accept and helps you to be realistic about those you should turn down. Know which parts of your equipment you need to monitor. Watch for hardware or software features that can help you to be more efficient. Be aware of mechanical parts that are likely to break or cause trouble and switches or buttons you are apt to forget to turn on or off. A working knowledge of your equipment can save you time and money, and if a problem arises, it will be easier for you to describe it to a technician.

● **Practice general maintenance.** Check your print ribbon and print wheel for wear. Keep your equipment and work area clean. One item frequently overlooked by computerists is the keyboard; it should be vacuumed periodically to prevent dust and debris from shorting out the keys. (Cat hair can be a real problem.) If you own a disk drive or drives, a disk-head cleaning kit is a good investment.

● **Make yourself comfortable.** Earning money by word processing is not comparable to tinkering for a little while with a neat program; it is several hours of grinding out someone else's copy. Clear away the clutter. Organize your work space. Center your body opposite the J key when you sit down to type.

Find a chair that is high enough so that your arms bend at a 90-degree angle when your hands are poised over the keyboard. Make sure it has good back support and a firm seat. Don't allow yourself to maintain a slouching posture.

Get a typing easel, a stand on which you place the copy that you are typing. Because it is adjustable, you can set the easel at a comfortable viewing position. Make sure that the room is well

lit and that you angle the copy to eliminate glare. Eye strain is an important consideration. Try not to place your viewing screen so that you have sunlight or a room light directly behind you.

A Word of Warning

When customers hire you to type their copy, they are not giving you *carte blanche* to edit that material as you see fit. Do not edit. It is not your responsibility to correct usage or grammatical errors. Don't make assumptions about what is correct or incorrect. For example, if you are typing a fiction work for a client, don't assume that you are helping out the author by correcting a "misspelled" word. The author might have spelled the word that way purposely; your "correction" could ruin the creative impetus of the entire piece. Similarly, nonfiction works can contain deliberately archaic spellings of familiar words. Change nothing from the original manuscript. If you find what you feel is a glaring error, contact the author before correcting it.

Very often a specific format exists within a client's field or industry to which you must adhere. Scholarly theses, television, radio, film, and advertising scripts, manuscripts for publication, and others have specific and sometimes unusual formats. You cannot change a format to make your work easier or to accommodate the needs of your word-processing program. Ask questions about the format before accepting an assignment. If you can't produce a particular format, don't take the job. Don't leave things to chance because it will cost you money in the long run. A good sales tactic is to develop a file of formats from which your customers can select.

Next month we'll conclude our look into home-computer word processing by exploring pricing, billing, advertising, policy setting, legalities, and the equipment you need to do the job. ■

Address correspondence to Terry Kepner, P.O. Box 481, Peterborough, NH 03458. Terry Kepner is a freelance writer and programmer. He writes monthly columns for 80 Micro and Portable 100 magazines. He's been writing about computers since 1979. Linda Tiernan is a librarian with a master's degree in bio-medical research. She has worked with computers since 1980.

6809 On Line

AT&T ANNIVERSARY

by *Bobby Ballard*

I just finished looking over my telephone bills. Yes, plural. A year ago I received only two bills from two companies, and American Telephone and Telegraph was still called "Ma Bell." Now I receive several bills, and it's time to wish AT&T and all the local telephone companies a happy birthday. Along with the birthday greetings, I'll take a look at what one year of divestiture has brought to us, the customers.

On January 1, 1984, Ma Bell became a chorus of little Bells, and AT&T was released from providing local phone service across the nation. Since that time, rapid change has occurred within the telephone industry. Some of the changes can give us clues about the future of AT&T and our long-distance dollars. Also, there are Radio Shack discounts available and good news for late-night modem phreaks.

Before the divestiture, AT&T was one large, regulated corporation restricted to the business it conducted by federal law and the rulings of the Federal Communications Commission (FCC). Two overall divisions of AT&T now dominate the corporate structure. AT&T-C is the communications half of the corporation and is still regulated by the FCC. AT&TIS, the other half, makes up the Information Systems group, which is free to market products such as computers and switchboards.

The most obvious changes are in the rates charged for long-distance and local phone-usage. AT&T lowered their long distance rates by 6.1 percent since divestiture. The competition from other carriers has been

a direct influence on prices. Of course, AT&T must make their money somewhere, so other rates have increased.

The news that directly affects all us telecommunicators concerns CompuServe and other utility service increases passed on from AT&T for the use of long-distance network lines. The increase is small, only 25 cents an hour surcharge, but it indicates the direction from which AT&T sees many of its future profits flowing. The increase would have gone into effect sooner had not a large public outcry been registered with the House of Representatives. So, on one side you have some local phone companies considering rate increases and AT&T increasing the cost of long-distance data lines for businesses and corporate customers on the other side. But long-distance voice rates are dropping.

BBS Junkies

Good news for BBS junkies who stay up all night on the modem: AT&T introduced their Reach Out America (ROA) program in April, which allows the customer to sign up for reduced hourly rates on long-distance calls placed after 11 p.m. You pay a \$10 monthly fee, which includes an hour of time, to call coast to coast after 11 p.m. weeknights and on weekends at all times except 5-11 p.m. Sunday. Each additional hour costs only \$8.75. These rates

apply to direct-dialed interstate calls between all points in the continental U.S. including Alaska, Hawaii, Puerto Rico, and the Virgin Islands. Your call must originate or end in the continental United States.

For another \$1.50 per month, AT&T will discount your long-distance calls placed between 5 and 11 p.m. an additional 15 percent. If you are interested in finding out more about ROA and when it will be available in your local area, call 1-800-551-3131. There is a \$10 sign-up fee, but this fee is waived if you sign up for the service within the first 90 days of availability in your area. By the way, AT&T has filed a petition to the FCC to lower the ROA rates by 6.1 percent. These new rates will probably be in effect by the time you read this.

Radio Shack Discounts

AT&T offers another plan to help you save money. This new plan, available to business and residential customers, is Opportunity Calling. AT&T announced this new service in May and it will eventually be available nationwide as the local companies are able to handle the billing.

Opportunity Calling credits you with \$1 in purchasing power for each \$1 you spend on long distance with AT&T. You must spend \$15 a month to qualify for the credits, but you get \$15 worth of credit upon reaching that plateau. The credits are good toward discounts on clothing, travel, film, and Radio Shack computers, including software, peripherals, and accessories. The catalog I saw included a Color Computer.

The program available to businesses, Opportunity Calling for Business, offers discounts on many of the same items for use as employee incentives, but also includes discounts on business-related supplies such as stationery, typewriters, copiers, and small computers. You can also save on overnight couriers, tax services, business publications, car leases, and office help. There are many more details to both Opportunity Calling programs, and you can find out more by calling 1-800-992-0992.

Equal Access Is Coming!

Equal access is also brought to you by the big divestiture. It means that the local Bell Operating Companies (BOC) must offer MCI, Allnet, GTE Sprint, and all long-distance companies the same clear connections as AT&T enjoys. It also means that you can designate one long-distance supplier your primary company and dial "1" for access instead of a local number plus code plus number called.

When equal access comes to your local BOC, you'll know it—just like the folks in Charleston, WV, did. Throughout Charleston, MCI, AT&T and the other companies have been waging a publicity campaign to beat the band. And according to an AT&T spokesman, there are still about 40 percent of the Charlestonians that have yet to decide on their primary long-distance company. By the end of 1986, the entire country should have equal access with good connections for all.

The Trends

BellSouth has plans for a new home-computer network in association with Control Video Corporation of McLean, VA. The plan now is just for test marketing in a few key cities. The test marketing, to begin in the fall, may include an agreement with Commodore International.

Of course, BellSouth will have some opposition from AT&T and other hardballers in the communications industry. Other regional holding companies (RHC) have also requested that they be allowed to sell home computers and other products. I think you'll see more of this trend in the future, especially as AT&T continues to develop its line of hardware

"AT&T apparently sees that networking, equipment, and long-distance lines will be the profit makers of the future."

to include data, voice, and videotex in the same box, so to speak.

After looking at the equipment and services AT&T has concentrated on this past year, it's obvious that this corporation sees a future of communications involving more than voice or even data. They apparently see that networking, equipment, and long-distance lines will be the profit makers of the future. Prices for all these services still rest, in part, with the FCC and, in part, with the free marketplace. If the FCC lets the RHCs compete for network and data lines and equipment, then competition will be fierce. If the local companies are excluded, you still have the big boys competing, such as IBM, GTE, and others.

For the past two years AT&T has introduced about three dozen new products a year. This trend will continue, if not increase. In fact, rumor has it that AT&T will soon market a new 32-bit processor. This will just be a small part of AT&T's commitment to new services and new products for the rest of the 1980s.

Finally, the FCC has recently approved the sale of equipment and long distance by the same sales force. I wonder if you'll see an offer like this some day? "Reach out and buy an AT&T PC and get \$50 worth of long-distance calls free."

Happy New Year to all and Happy Birthday AT&T! ■

Address correspondence to Bobby Ballard, 1207 Eighth Ave. 4R, Brooklyn, NY 11215.

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The Educated Guest

More than 50 percent of today's work force is involved in information-related occupations. This column focuses on what educators will need to prepare students for the information age.

The tools for presenting, analyzing, organizing, or relaying information, i.e., word processors, spreadsheets, database managers, and communication software, consistently lead the microcomputer field in sales. Let's look at the potential uses of this software.

The Word Processor

Word-processing software lets you prepare and edit material on a video screen before sending a copy to the printer. Word processors come in a variety of forms. Most offer insert and delete commands, word-wrapping, exchange or replace options, and the ability to move whole blocks of text.

Some word processors allow several different means for defining the top, bottom, left, or right margins; paragraph and temporary indents; character tabs or decimal indents; and have several options for printing headers and footers.

More advanced features include page numbering, creating libraries of text for inclusion into new text with a keystroke, macro capabilities (the ability to assign a series of commands or written text with a keystroke), mail-merge and form-letter capabilities.

Choosing the Right Word Processor

How do you choose the right word processor? Where do you start? Well, my personal favorite for younger students using a Color Computer is Elite-Word by Elite Software, Box 11224, Pittsburgh, PA 15238. This word processor has relatively short and simple instructions, and yet is powerful enough to challenge the more adventuresome student.

Although I feel that the Color Computer is more than adequate to

JOINING THE INFORMATION AGE

by Charles H. Santee

acquaint younger students to word processing, I realize older students should also be familiar with word-processing software that is not yet available for the CoCo, such as WordStar, Word Perfect, or Multi-Mate. I recommend that if you are teaching older students, you periodically inventory local businesses to determine which word processors are actually being used.

In my area, WordStar is the most used along with an IBM PC. Although familiarity with these packages would be a plus to students entering the job market, don't despair if your school doesn't have the funds for such software and the systems they run on. Very complex and capable word processors are available for your Color Computer. And I have seen WordStar up and running on a CoCo that was enhanced to run CP/M. (*Ed. note: CP/M upgrades are available for 64K CoCos from Wayne Technology, P.O. Box 5196, Anaheim, CA 92804, and Color Power Unlimited Inc., 1260 Springfield Ave., P.O. Box 606-E, New Providence, NJ 07974.*)

Spreadsheets

A spreadsheet is a piece of software that shows an organization of little boxes, or "cells," on the screen that are organized into rows and columns. The organization of rows and columns is called a matrix, a template, or a model. The screen shows only a small portion, or "window," of the matrix, but you can use the arrow keys to reveal the rest of the matrix.

Most often you type in words or numbers at the top of the screen and press the enter key to move them into a cell. A cursor indicates which cell will contain the characters you have entered.

A spreadsheet has three major types of entries. The first is a label that consists of letters. The second consists of numeric values. The final type is formulas.

When a formula is entered, you indicate how numeric values in cells are to be combined. The spreadsheet automatically combines the numbers as directed by the formula and enters the result in the box at the cursor location.

Rows are frequently shown by one or more letter indicators and columns are shown by numeric indicators. The row and column indicator is used in writing the formulas you desire. Spreadsheets have many applications such as accounting, budgeting, computing house payments, and matrix math. One educator used a spreadsheet to generate math problem sheets.

Spreadsheet functions can be very complex, but I have worked with third-grade students who were able to master the elementary concepts.

Spreadsheets include many options for organizing and preparing information on the screen as well as for formatting printed reports. You can introduce any elementary-grade student to spreadsheet functions, but it will be most appropriate in a math class. At a high-school level, you can demonstrate a spreadsheet's varied applications, such as organizing population statistics, doing business inventories or ledgers, illustrating advanced math concepts such as a matrix manipulation, or even computing amounts needed for a recipe.

If you are interested in different applications for the Color Computer, read *Spreadsheets on the TRS-80 Color Computer* by Harry Anbarlian, McGraw-Hill Book Company, 1981.

Database Managers

A database manager lets you enter and organize large amounts of information. Each piece of information is placed into a unit called a record. Within each record is a smaller unit of information called a field. A database manager's greatest strength is its ability to selectively sort, organize, or call up records or characteristics of any particular field or set of fields. The characteristic used to organize the database is often called a key.

Note that you must specify in advance the length of each record and field. This determines how much information can be stored in any record or field. Thus, you must carefully plan what each record will contain. I suggest you first write out several examples of typical records and at least two records that stretch the record and field lengths to their maximum and minimum.

Databases use vocabulary similar to the commands required to make random or direct-access files in a disk operating system or in Basic. Learning to use a database gave me a better understanding of how to write programs using random-access files.

I also prefer to use specific-purpose databases rather than going through the tedious exercise of setting up my own. For example, there are a number of sophisticated grade-book programs available for the Color Computer that can offer methods of structuring and manipulating a student database.

The most significant advantage to teaching students how to use a database is that they will learn how to access other databases, a crucial skill in college and in many occupations. Students need to learn how to pinpoint information in the haystack of data generated by computers.

Communication Software

A modem is a device that hooks the computer to a phone to access more sources of information than you can possibly imagine. The program that interprets the information is the communication software. This software includes options to match the signals being transmitted with the medium for receiving the transmission and usually to send and retrieve information from or to the

disk or to the printer. You must become familiar with terms such as baud, download, stop bit, parity, protocol, and EOF markers to use the software.

Learning how to use a modem and communication software is a most needed skill. In a classroom, I would instruct the students by using a heavy dose of retrieving educationally relevant information from a variety of sources. I also feel that major emphasis should be placed on the ethical use and manipulation of information and security.

There is a real need for software that gives instruction and practice in the use of communication software without going on line or running up a phone bill. I would also like to see a simulation of information retrieval for all the major sources (Dow Jones, CompuServe, etc.).

A Few Tips

You may encounter some minor problems when teaching or learning to use a word processor. For example, the keyboard of a computer is slightly different from that of a typewriter. Those who learn on one invariably have problems with the other, especially when you include the word processor's control keys (e.g., break, clear, control). You won't find them on your typewriter.

Here are a few of the concepts that you and your students should become familiar with: the various types of printers—dot matrix, daisy wheel, serial, parallel; control codes, DIP switches, internal memory, disk storage, file buffers, keystroke buffers, and printer buffers.

It is also very handy to understand disk and cassette operating commands and to know how to send information from one application package to another by way of ASCII format.

So, you thought using a word processor was easy. Well, eventually it is. Less complex packages require only an hour or two to learn. More complex word processors take about eight hours before you fully understand the process, and many more before you master it. ■

Address correspondence to Dr. Charles H. Santee, 8 South 045 Grant St., Westmont, IL 60559.

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The DOSsier

GENERAL LEDGER AND HIS TROOPS

by *Scott Norman*

I've been working with some of Computerware's business-applications software recently. It hasn't helped me turn a fortune, but it is interesting.

OS-9 at Last!

Paul Searby and his programmers at Computerware have been supporting the 6809 community with utilities and applications material for a number of years. Their initial emphasis, so far as business software was concerned, was on Random DOS—the operating system of Smoke Signal Broadcasting's line of computers. As I understand it, that other portion of the 6809 world continues to receive the lion's share of Computerware's attention.

The company has been an active supplier of CoCo material ever since our machine began to grow up, though, and in recent years this support has grown to include Flex and OS-9. As a result, a set of seven software packages of interest to small-business operators is now available in both of the advanced operating-system formats.

The products are Accounts Receivable, Accounts Payable, Check Ledger, General Ledger, Inventory Control, Payroll, and a Correspondence System: I gained most of my hands-on experience with the OS-9 version of the General Ledger System.

What You Need. . .

The Computerware software performs well and certainly addresses a

real need. However, I must point out a few things that don't appear in the catalog. These concern other material that you must have before you can work with the business packages.

To begin with, these programs are written in Computerware's Random Basic, so, naturally, you need that interpreter to run them. In fact, you must transfer the Basic9 version of Random Basic (one of two versions that you get on the master disk) over to the business-software working disk.

All video displays in the applications program are set for the 51-column text format of Hogg Lab's O-Pak. It is possible to ignore this and run with the standard Radio Shack screen, but you get some strange-looking text: menus and messages split in midword—that sort of thing.

Unfortunately, neither Random Basic nor O-Pak is mentioned as a business software prerequisite on the standard Computerware catalog sheets; you have to dig into the installation instructions in an applications-program manual to learn that you need them. If you're not a programmer and use your computer only to keep business records, you might have O-Pak lying around with your OS-9 disks, but Random Basic is another story. Those who only use canned applications software aren't

likely to have picked up a second Basic just for the heck of it.

If you're interested in Computerware's OS-9 business series, be prepared to spend up to \$110 for the necessary adjuncts. But this can still be a pretty good deal for professional software.

Cobbling Up Your Disks

The slim manuals (General Ledger's runs to only 23 pages, plus sample reports) were originally written with some of those other 6809 systems in mind. The first thing you must do is ignore the "How to Begin" section and go straight to the back of the book, where a plastic pouch holds the real installation instructions.

The distribution disk contains both programs and sample data files. You must distribute them, along with Random Basic and various OS-9 utilities, among two working disks: "programs" and "data." (Each disk actually has directories for Basic programs and data files: BAS and DTA, respectively.)

This calls for a session at the keyboard, plus a little disk juggling, but it's all worthwhile. You should gain some experience with the sample files—entering transactions, printing reports, and so on—before making up actual production-system disks.

The various program files are dedicated to such tasks as putting up a menu, handling transaction entries, and so on. One data file, LEDSYS, is the system control that keeps track of

the location of the General Ledger and Chart of Accounts files, the terminal and printer pathlists, and other details. A utility program lets you change these entries.

The other DTA file, LEDKEY, is the ledger key: a sequentially accessed file, created after you close each month's accounts, that contains a sorted list of all transactions during the month. It plays a vital role in the production of most General Ledger reports. Once the system is up and running, of course, you are never actually aware of which file is doing what.

A final pair of Basic programs go into the data disk's BAS directory, and two data files, LEDACT and LEDMST, go into DTA.

LEDMST is the Chart of Accounts, the master list of names and numbers assigned to the various accounts that categorize your business. It also houses the most recent monthly and year-to-date balances for each account. LEDACT is *the* General Ledger file: the main working file into which you enter transaction numbers and dates, debits and credits, and a description of each transaction. Both are random-access files; I expect them to lead to much faster operation than is possible with sequential-file structures.

How It Works

In two words, pretty well. General Ledger is a comprehensive double-entry package designed for businesses that can get by with 250 or fewer accounts. The sample data files contain 60 accounts and 146 records in the general ledger file—about 35 percent of the allotted capacity. As you might expect, the Color Computer is not the machine you'd use to keep the books for General Motors.

Within its limits, however, General Ledger can provide the manager with a complete set of accounting reports. A transaction register, income statement, general ledger, trial balance, and balance sheet are all available on a monthly basis. A reasonable number of sorting and selection options are available; for example, you can arrange transaction-register reports according to dates, account numbers, or file-record numbers.

Audit trails and monthly closing

“General Ledger is a comprehensive double-entry package designed for businesses that can get by with 250 or fewer accounts.”

procedures are provided, as are a certain number of protection features. Information entered from the keyboard must balance before the program will write it to a disk file; once that happens, you can't make changes. This evidently protects past information against accidental damage.

The whole thing is menu driven, and if you are familiar with the elements of general-ledger accounting, you shouldn't have any trouble. The documentation is modest, but it does give you a good summary of what to expect from the various menu options.

Products and Vendors mentioned in this month's DOSsier

OS-9 Business Application Software:

Accounts Receivable	\$95
Accounts Payable	\$145
Check Ledger System	\$145
Correspondence System	\$95
General Ledger System	\$175
Inventory Control	\$145
Payroll System	\$195
OS-9 Random Basic	\$75
Hogg Lab's O-Pak	\$34.95
Disk Fix & Other Utilities	\$29.95

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There are a couple of points that could stand clarification, however. Despite some contrary information in the manual, most of the reporting procedures do *not* give you the option of previewing your information on the video display; you get a print-out or nothing. Furthermore, if you mistakenly indicate that the printer is on line when it is not, the program hangs up. Turning the printer on at this point returns you to the OS-9 shell.

Finally, the manual shows signs of its origin as documentation for larger systems, served by 8-inch disks. You can tell by certain references to how the files should be partitioned between drives 0 and 1 (let the CoCo addendum be your guide), and by the description of certain general-management reports on the system menu. Sorry folks, but ratio analyses, cash budgets, yearly comparisons, and a few other things just aren't available to CoCos.

Thoughts on the Side

Making up a set of General Ledger working disks involves a *lot* of copying operations, and it only takes one bout with the standard OS-9 Copy command to make you long for something better. Although I suspect that a number of vendors can come to the rescue, I'm most familiar with another Computerware product for doing this job: the Disk Fix and Other Utilities package (for a review, see *HOT CoCo*, August 1984, p.96). It includes a versatile copying routine, DirCopy, which takes care of everything.

One of DirCopy's options is an interactive mode in which you can specify ahead of time which files are to be copied from one disk to another. You do so by identifying the origin and destination pathlists (only one of each) and then picking the transferees from a list. It beats having to type all the pathlists when you're moving a dozen or more files around.

See there? I've been saying all along that I would get to OS-9 as soon as I found some applications stuff that interested me. ■

Address correspondence to Scott L. Norman, 8 Doris Road, Framingham, MA 01701.

Doctor ASCII

by Richard E. Esposito, Jesse W. Jackson, and Ralph E. Ramhoff

Got a problem with your Color Computer? Ask the Doctor to solve it. Write to Doctor ASCII, HOT CoCo, Pine St., Peterborough, NH 03458. Be sure to include a stamped, self-addressed envelope if you want a reply. Due to the volume of mail this column receives, we cannot guarantee that your question will be published.

Q I have a TTX-1014 bidirectional, daisywheel printer. It has both serial and parallel interfaces. When I hook it up to my CoCo, I get garbage. I have the DIP switches for 600 baud, 7 bits, no parity, 2 stop bits, auto line feed, and DTR high. My CoCo was a 16K, which I modified for 64K. I put in the 1.1 ROM chip. Would any of this cause my problem?

Steve Gersh
San Luis Obispo, CA

A By installing the 1.1 ROM for the 64K mod, you got an 8-bit serial driver to replace the Basic 1.0 7-bit driver. Your switches should be set for 600 baud, 8 bits, no parity, 1 stop bit, auto line feed, and DTR high.

Actually, the Color Computer sends 10 bits per character to the printer. The first bit is always a zero—the start bit. It informs the printer that a character is on its way. The next 8 bits are the binary data for the character, least-significant bit first. Last is the stop bit, always a one, which tells the printer it has stopped sending the character. See what having the switch set for 7 bits does? Suppose the computer sends an A; the ASCII value of an A in hexadecimal form is 41, and in binary it's 01000001, where the least-significant bit (bit 1) is the rightmost bit. Look now at the bits as they are sent in serial:

	start	1	2	3	4	5	6	7	8	stop	
7 bit	0	1	0	0	0	0	0	1		0	1
8 bit	0	1	0	0	0	0	0	1	0		1

See the blank under the 8 for the 7-bit serial? The printer wasn't expecting bit 8. It also wanted bit 8 to be a stop, which is always a one, but it got a zero (and it always is a zero for 8-bit ASCII characters). The printer, when set as you have it, thinks it missed some bits and won't accept the character until it gets 7 bits between a start bit (zero) and 2 stop bits (ones). Inactive serial lines are held in the mark state (one), so if the computer doesn't send another character right away, the printer thinks it is getting the stop bits. It looks like this:

7 bit	start	1	2	3	4	5	6	7	stop	stop
		0	0	0	0	0	1	0	1	1

Because the printer passes the bits serially (like a bucket-brigade), until the start and stop bits correctly frame the data bits (after losing the true start bit and bit 1), their bucket was passed to the end of the line before a correct frame was detected. The character received in error is binary 01010000, or hexadecimal 50. That's an ASCII P

Similarly, if the printer is set for the correct number of bits, but 2 stop bits instead of one, you could get garbage if the CoCo sends the next character's start bit with less than a 1-bit time delay after the previous stop bit.

Anything more? Oh yes, Steve. . . that DTR line. Is it connected to pin 2 of the CoCo serial connector? The Color Computer checks that line to determine if the printer is busy. Know what the printer gets if the CoCo starts sending data and the printer is busy for a few bits? Right! Garbage! If you have a one-line or less buffer in your printer and the busy line is not connected, your printer may get most of a good line, but the start of the next line may be missed or the carriage return/line feed may be lost. If you're getting those symptoms, try POKEing 151 and 152 with 255. This sets the line printer delay to 1.15 seconds to allow for a carriage return. If this clears your problem, the DTR line is not connected properly.

Q I have a CoCo with Extended Basic. Recently, I sent my computer to Peoria to get 64K installed. I have also heard that you can't use the upper 32K without a \$400 disk drive and some other equipment. Is this true? If so, what are some prices and places to consider buying from?

Steve Warrick
Peru, IL

A There are many programs available that use the upper 32K bank of memory. These are some examples, but this list is in no way exhaustive. Telewriter 64, Cognitec, 704 Nob St., DelMar, CA 92014 (\$49.95 cassette, \$59.95 disk); VIP Library, Softlaw, 9072 Lyndale Ave. S., Minneapolis, MN 55420 (\$39.95-\$59.95); Disk Data Handler, Custom Software Engineering, 807 Minutemen Causeway, Cocoa Beach, FL 32931 (\$4.95); DynaCalc (RS DOS version), Computer Systems Center, 13461 Olive Blvd., Chesterfield, MO 63017 (\$149.95); Key - 264K, Key Color Software, P.O. Box 360, Harvard, MA 01451 (\$39.95 cassette, \$49.95 disk); Hi-Resolution Screen Utility and Data Pack II, by CerComp, 5566 Ricochet Ave., Las Vegas, NV 89110 (\$19.95-\$44.95 cassette and disk); and T-Spool, KRT Software, P.O. Box 41395, St. Petersburg, FL 33743 (\$24.95). In addition to these products the Flex and OS-9 operating systems, which require 64K and disk, support vast amounts of varied software packages.

Q I have just received my second issue of your magazine, which I thoroughly enjoyed. I have read a lot about artifacting colors in Extended Basic in your magazine. The sample I saw of it in Nick Bradbury's "Possum Run," March 1984, p.50, was outstanding. I can't find any information on the technique. Please give me a list of publications explaining this subject.

Mike Davis
Englewood, CO

A These colors are produced by drawing vertical stripes in alternate columns against a dark background. In the SCREEN 1,0 mode you get medium green and frosted green. In the SCREEN 1,1 mode you get red and blue. A demo program appeared in the October 1983 Doctor ASCII, p.129.

Q Is there any way to directly type in binary coding from Basic without an editor/assembler?

Robert Fountain
Broadalbin, NY

A. If you are willing to hand assemble the code, you can write a Basic POKE routine to put it in memory. The following program accepts your hexadecimal bytes and POKES them into memory:

```

1Ø INPUT "START ADDRESS";A$:A=VAL
L("&H"+A$)
2Ø PRINT "DATA AT ADDRESS ";HEX$
(A);
3Ø INPUT D$:D=VAL("&H"+D$)
4Ø POKE A,D
5Ø A=A+1
6Ø GOTO 3Ø
    
```

When your values have been entered, press the break key to exit this program. Be careful where you place your machine-language code, because you can get highly unpredictable results if you POKE Basic's pointers, variables, or the program. A machine-language monitor program appeared in this column in the December 1983 issue of *Hot CoCo*, p.129.

Q. Is there a POKE I can use to make the CoCo generate a buff screen instead of its usual green?

*Ronald Berry
Bend, OR*

A. Unfortunately, the 6847 video display generator chip does not support text screens with a buff background. You do, however, have an alternative to the green that the CoCo comes up with. This screen has red characters on a yellow background. To get this text screen, you must first stop Basic from resetting the VDG color set with a POKE 359,16, and then select the alternate color set by using a SCREEN 0,1.

Q. I own a factory 64K CoCo. I have searched in vain for a way of getting my errant 32K without OS-9. I paid for the K, and I want it!

*Duane T. Doutel
Ogden, UT*

A. This program originally appeared in the November 1983 Doctor ASCII, but judging by the mail, it has been overlooked, so I am reprinting it here. It brings the computer up in the 64K mode and copies the Basic ROM into RAM. If you have a nondisk system, you can POKE and PEEK from \$C000 to \$FEFF to your heart's content after running this program. With disk, \$E000 to \$FEFF works fine. The code starting with line 110 patches the Basic ROM so you can press the reset button and still keep your machine in 64K RAM mode. If you don't want it or it is incompatible with your ROM or hardware, delete those lines. It works fine with my 1.1 Basic ROM.

```

1Ø FOR I=32382 TO 324Ø7
2Ø READ X
3Ø POKE I,X
4Ø NEXT I
5Ø EXEC 32382
6Ø PRINT "BASIC NOW IN RAM"
7Ø DATA 26,8Ø,142,128,Ø,166,132,
183
8Ø DATA 255,223,167,128,183,255,
222,14Ø
9Ø DATA 255,Ø,38,241,183,255,223
,28
1ØØ DATA 175,57
11Ø REM reset protection
12Ø POKE &HAØ55,&HØD
13Ø FOR I=&HAØ68 TO &HAØ71
14Ø POKE I,&H12: NEXT I
    
```

Q. I bought a 64K CoCo that was factory upgraded from 16K with the new keyboard, model #28-3003A. Where can I get a technical manual with schematics for this?

What is the best criteria to follow in determining what hardware is most necessary and compatible with my machine? Is my machine compatible with OS-9? I know disk drives are needed.

*David L. Thomas
Gillespie, IL*

A. Radio Shack markets a *Color Computer Technical Reference Manual*, #26-3193, \$14.95. If the one at your local Radio Shack store has the schematic for the wrong version machine, ask them to order the supplemental schematic for your machine to go with the book.

If you are starting out, I recommend acquiring your hardware in this order:

- Upgrade to 64K (I see that you already have).
- Acquire a printer.
- Acquire a disk controller, cable, and drive. I recommend a double-sided one for maximum versatility.
- Acquire a second drive.
- Acquire a monitor, Multi-Pak, and 80-column card.

If you are just starting out, learn to be proficient with the standard DOS before moving on to OS-9. As long as you have good 64K RAMs, properly installed, you should have no hardware problems with OS-9.

Q. As a novice with the CoCo, I entered the following program to play music from a cassette for 60 seconds:

```

1Ø AUDIO ON
2Ø MOTOR ON
3Ø FOR X=Ø TO 6Ø
4Ø FOR Y=1 TO 5ØØ
5Ø NEXT Y
6Ø NEXT X
7Ø AUDIO OFF
8Ø MOTOR OFF
    
```

Can you explain how the CoCo can pass music from a tape to the television speaker at the same time that it is counting in the above program?

*Ben Welijka
Cot St. Luc., Quebec, Canada*

A. As far as the audio is concerned, your program instructs the computer to perform four tasks: turn on the audio, turn on the cassette, turn off the audio, and turn off the cassette. Between the first and last two, it performs the calculating. The music itself is not processed by CoCo's 6809 microprocessor. Some of today's computers have more than one CPU and can indeed perform more than one operation at a time. A simple case is when you have a CoCo with PBJ's Word-Pak. The CoCo sends a code to Word-Pak to update the display, and while the display is being updated, the CoCo can be doing something else.

Q. I have a 16K CoCo, which I would like to upgrade to Extended Basic myself. Can I do this?

*Bryan Lawrence
French Lick, IN*

A. It is a very simple operation. Remove the cover from your CoCo and install the Extended Basic ROM into the empty socket, being careful to line up the notch on the end of the chip with the one in the socket. Make sure all the pins are aligned properly with the holes before exerting pressure. Order part number 26-3018 (\$39.95) from your local Radio Shack store or from one of the various advertisers in this magazine. ■

Reader's Forum

OS-9: A 32K Surprise

OS-9 will run on a 32K machine. I had finished running the Telewriter-64 program and, as an experiment, I loaded my OS-9 boot program into my 32K CoCo, pressed B for boot, put in the system disk, and pressed the enter key. Tokenized garbage appeared on the screen and the computer seemed to lock up.

I was about to reset it when the disk started spinning, the screen cleared, and the OS-9 logo appeared. I tried some OS-9 commands, linked in PRINTERR, redirected outputs, ran multiprocessing commands, created and deleted files and directories, changed attributes to lock myself out of my own files, listed all sorts of strange command and system files, and they all worked fine, including the type-ahead feature. The fabled OS-9 was running on a 32K machine with 57 pages of free memory.

I have tried this from Basic with no success. The machine just hangs up when the system disk is loaded. The key seems to be Telewriter, which, I guess, moves memory around and lets the OS-9 system load in and do whatever it has to do.

Here's the sequence to follow: Run Telewriter, get to Disk I/O and press "B" to get into Basic. Now put in the OS-9 boot disk, RUN "*", and answer the prompt with B for boot. Put in the system disk, press enter, and the screen will lock up for a few seconds. Then the disk will spin, the screen clear, the OS-9 logo appear, and you're in business.

Once or twice this routine wouldn't work, so I put something into the editor, aligned and printed it, and then OS-9 booted fine. If you haven't upgraded to 64K yet, you can still run OS-9.

*Duff Kennedy
Santa Barbara, CA*

Disk Basic 1.1 Entry Addresses

Here is a list of the entry addresses for the Disk Basic ROM version 1.1:

C6EF KILL	D102 LSET
C9E0 SAVE	D15C FILES
CA39 MERGE	D233 UNLOAD
CA48 LOAD	D262 BACKUP
CCA9 DIR	D3B9 COPY
CEC5 DRIVE	D4ED DSKI\$
D01B RENAME	D562 DSKO\$
D066 WRITE	D599 DSKINI
DOBC FIELD	D6EC DOS
D101 RSET	D74E VERIFY

Note that the DOS command is not documented in the Disk Basic manual.

*Jim McDowell
Burlington, VT*

Sort by the Date

It takes some planning to sort according to dates. Since our months don't even come in alphabetical order,

it always took a lot of subroutines in order to get dates arranged sequentially. I have a simple method for this.

Suppose you want to arrange the following dates:

Jun 18, 1966
Feb 28, 1942
Oct 27, 1983
Jan , 1970 (only the month and year known)
Dec 30, 1920
Mar 2, 1970
Jan 7, 1935

Enter them as follows:

1966.0618
1942.0228
1983.1027
1970.01
1920.1230
1970.0302
1935.0107

Program Listing 1 arranges them and prints:

1920.1230
1935.0107
1942.0228
1966.0618
1970.0100
1970.0302
1983.1027

I have used a bubble sort here. The variable X in lines 90 and 110 keeps you looping through the sort until no more swaps are made and all dates are in order. Line 150 is necessary to make sure that 1920.1230 does not print as 1920.123. If you want descending order, change the less-than sign (<) in line 90 to a greater-than (>) sign.

The PRINT USING statement requires Extended Color Basic. If you don't have Extended Color Basic, you'll have to make do with PRINT in LINE 150.

*Anna M. Reeves
Española, WA*

```
10 '***** INPUT ROUTINE
20 CLS
30 DIM A(7)
40 FOR X=1 TO 7
50 PRINT"ENTER JAN 2,1965 AS 196
5.0102
60 INPUT"DATE"; A(X)
70 NEXT X
80 '***** SORT ROUTINE (BUBBLE)
90 FOR X=1 TO 6
100 IF A(X+1)<A(X) THEN T=A(X):
A(X)=A(X+1):A(X+1)=T:S=1
110 NEXT X
120 IF S=1 THEN S=0:GOTO 90
130 '***** OUTPUT ROUTINE
140 FOR X=1 TO 7
150 PRINT USING "####.####";A(X)
160 NEXT X
170 END
```

Program Listing 1. Date-Sorting Routine

Reader Service Number	Page Number	Reader Service Number	Page Number	Reader Service Number	Page Number
60	Aleph Unlimited	73	392	Elite Software	27
325	Bacchus Computer Systems	45	164	Foxx Communications	73
335	Cer-Comp	59	98	Green Mountain Micro	21
121	Cognitex	7	440	HJL Products	CIV
17	Colorware	82,83	455	Hard Drive Specialists	55
18	Computer Plus	5	359	Homebase Computer Systems	63
506	Computer Systems Center	47	*	HOT CoCo	
507	Computer Systems Center	87		Dealer Sell	84
223	Computer Systems Consultants	91		HOT CoCo Subscription	16
536	Cybertron	17		Instant CoCo	64
352	Cynwyn	53		Mailing List	84
*	Dataman	29		Moving	84
397	Delker Electronics	22		Subscription Problems	75
243	Deft Systems	3	91	University Micros	53
209	Dorsett Educational Systems	96	190	Incentive Software	53
*	DP Johnson	53	270	JBM Group	35
72	Dynamic Electronics	55	48	John Wiley & Sons	93
216	EAP Company	87	*	Key Color Software	87
363	Electronic Supermarket	48	*	Mark Data Products	49
			185	Micro R.G.S.	19,23
			196	Micro Works	43
			361	Micron Technology	96
			137	Microware Systems Corp.	13
			178	Microware	CIII
			337	Nibble Notch Computer Products	75
			298	Ozone Engineering	84
			214	P.B.J., Inc.	37
			124	Perry Computers	28
			4	Radio Shack	CII.1
			37	Robotic Micro Systems	96
			70	Saguaro Software	18
			205	Selected Software	69
			*	Software Support	14,15
			454	Southwestern Digital	48
			456	Sunlock Corporation	91
			236	T & D Software	55
			387	TCE Programs	37
			388	TCE Programs	67
			342	Tesseract Software Systems	75
			93	True Data Products	10
			97	True Data Products	11

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COMING NEXT MONTH

Computers are causing a revolution in the art world. They provide a media for the artist's creativity that only a few years ago was unimaginable. In February, we'll show you how you and your CoCo can participate in this revolution.

Free-lance author Paul Statt interviews three individuals who have been experimenting artistically with the Color Computer. Their stories will inspire you to try to match their efforts.

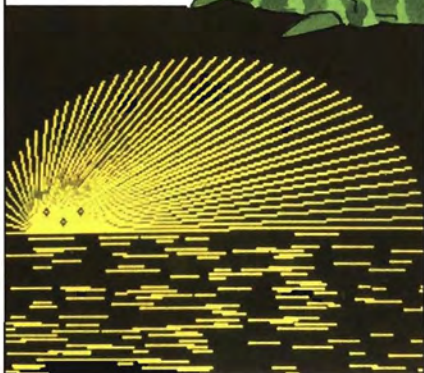
And we'll also provide the means to do just that. Joel Doucet's Paint King is an icon-based drawing program. It is simple to use, yet very flexible.

William Roney will show you how trigonometry and art have much in common. He'll demonstrate how a few algorithms make for an aesthetically pleasing video display.

Other February articles include Space Hawk, a super hi-res arcade game, and a review of Cer-Comp's Textpro III.

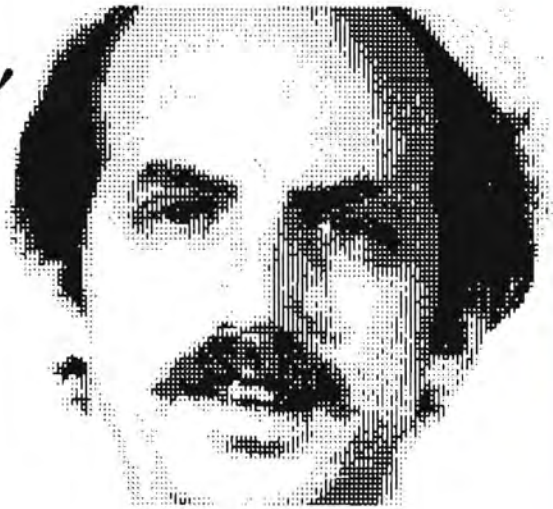
Richard Ramella returns next month with a new column, Mindbusters. Each month, Richard will provide puzzles and other thinking games. Bet you can't solve them all.

And finally, we'll give you the much awaited Worldwide User's Group List update. There are new groups springing up every day, maybe even one in your neighborhood. ■



TALKHEAD FOR THE 'REAL TALKER'

"Way beyond anything you have ever seen for the CoCo"



That's a strong statement, we know. But wait until you see 'TALKHEAD'! It's a dazzling creation—easily the most impressive display of CoCo graphics you can buy!

If you have a 'REAL TALKER' voice synthesizer, DO NOT deprive yourself of this absolutely incredible Talking Head simulation program! TALKHEAD uses the 'Real Talker' and extremely high speed/high resolution machine language to create an audio-visual simulation that clearly goes way, way beyond anything that you have ever seen on ANY home computer!

TALKHEAD's fast, smooth-talking animation is so stunningly life-like that it resembles a movie more than a cartoon! This page shows some still shots of the actual moving image as it will appear on your TV screen.

And, TALKHEAD is a real snap to use in Basic, thanks to a new command that we give you: SAY Type SAY "ANYTHING YOU WANT" and Talkhead instantly appears and speaks ANY text—it has an unlimited vocabulary!

The most impressive CoCo program you can buy . . .

'TALKHEAD' is available on cassette or disk (please specify) for **only \$29.95**. The cassette version can be transferred to disk in case you ever upgrade. TALKHEAD requires 64K of memory and a Colorware 'REAL TALKER' voice pak.

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PROGRAM BY TIM JENISON

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'TALKHEAD's eyes, mouth and jaw move, realistically animating his speech. The effect is amazing!'

MORE SOFTWARE FOR THE 'REAL TALKER' VOICE PAK

STELLAR SEARCH ADVENTURE

If you ever had an urge to command the USS Enterprise, this talking version of 'STELLAR SEARCH' from Owl-Ware is for you! It uniquely combines the best aspects of 'adventure' and graphic 'action' type games and puts the 'Real Talker' voice pak to good use. You'll find graphics galore in this exciting package containing more than 86K of action adventure. Requires 32K and a 'Real Talker' voice pak. **Cassette....\$24.95. Disk....\$26.95**

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ADVENTURE STARTER

The popular 'ADVENTURE STARTER' from Owl's Nest Software is now available in a speaking version for the 'Real Talker' voice synthesizer. Adventure Starter is a painless and enjoyable way to learn about computer adventure games. Included are two adventures. The first is "MYHOUSE", an easy game with plenty of help and hints. A second adventure, 'PIRATES', is more challenging. Both are great fun for the adventure minded. This is the only way to get into CoCo adventuring! Requires 16K Extended Basic and a 'REAL TALKER' voice pak. **Cassette, only \$17.95.**



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FREE TEXT-TO-SPEECH

Included free with 'Real Talker' is Colorware's remarkable Text-to-Speech program. This is a truly powerful machine language utility. What it does is automatically convert plain English to speech. And it has an unlimited vocabulary! For example, use it in the direct mode: Type in a sentence or a paragraph, even mix in numbers, dollar signs, etc., then press enter. The text is spoken. At the same time a phoneme string is generated which can be saved to cassette or disk, modified or used in a Basic program.

We originally planned to sell this major piece of programming for about \$40.00 but decided it was so useful that no 'Real Talker' user should be without it. Besides, it really shows off the capability of 'Real Talker'.

Also included with 'Real Talker' is our unique Phoneme Editor program. It allows you to explore and create artificial speech at the phoneme level. Phenomes are the fundamental sounds or building blocks of word pronunciation. There are 64 different phenomes, as well as 4 inflection levels at your disposal. Creating and modifying speech at the phoneme level is both fascinating and educational. The Phoneme Editor may also be used to customize the pronunciation of speech produced by the Text-to-Speech program.



You don't have to use any of our utility programs though. If you write your own Basic Programs, you will find the pocket sized Votrax Dictionary (included free) is all you need to make your own Basic programs talk. This dictionary gives you quick access to the phoneme sequences used to create approximately 1400 of the most used words in the English language.

How about compatibility? 'Real Talker' is compatible with any 16K, 32K, 64K, Extended or non-extended Color Computer. It works with any cassette or disk based system, with or without the Radio Shack Multi-slot expander. No other synthesizer under \$100 can make this claim. Most other CoCo voice synthesizers require an expensive Multi-slot expander in order to work with the disk system. 'Real Talker' requires only an inexpensive Y-adaptor. This is an important consideration if you plan on adding a disk or have one already.

'Real Talker' comes completely assembled, tested and ready to use. It is powered by the CoCo and talks through your T.V. speaker so there is nothing else to add. Price includes Text-to-Speech and other programs on cassette (may be transferred to disk), User Manual and Votrax Dictionary. ONLY \$59.95

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PRODUCT NEWS

edited by J. Scot Finnie

Information used in the Product News section is supplied through manufacturers' press releases. *HOT CoCo* has not tested or reviewed these products and cannot guarantee any manufacturers' claim.

Selectable

Hard Drive Specialist has released a new disk-drive controller board that has selectable ROM sockets that let you choose between two different operating system ROMs without having to pull them from the board.

The new disk-controller board features gold-plated card-edge connectors, a fully-socketed board, an advanced circuit design that eliminates the need for periodic adjustments, complete compatibility with all versions of the Color Computer, support of up to four disk drives, and single- and double-density capability.

Hard Drive Specialist offers three versions of the controller. The fully assembled and tested controller sells for \$139.95 with the Radio Shack ROM, and for \$119.95 without the Radio Shack ROM. HDS also sells parts separately. The bare board with instructions is \$39.95. The parts for the board cost \$40. The Radio Shack ROM is \$20.

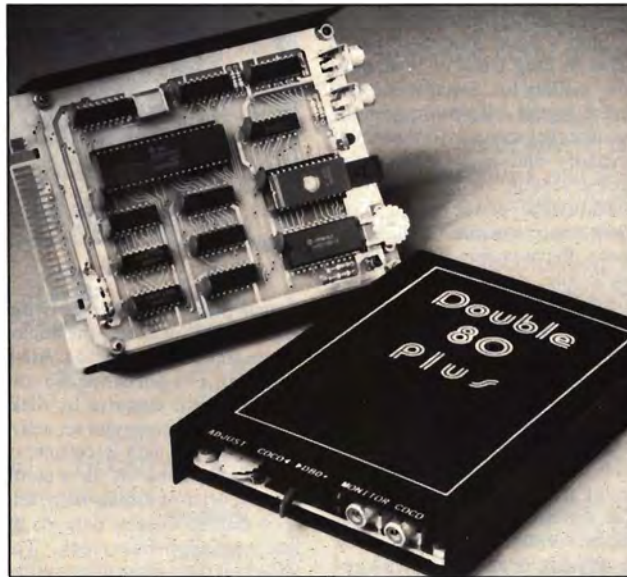
For more information, contact Hard Drive Specialist, a division of Compukit, 16208 Hickory Knoll Street, Houston, TX 77059. 800-231-6671.

Reader Service 554

The CoCo Elite

Radio Shack is now distributing Elite Software's Elite-Calc, Elite-Word, and Elite-File programs for the CoCo. You can place an order at one of the more than 1,100 participating Radio Shack stores with Radio Shack's new Express Order software system. Radio Shack's stores are connected by a direct computer link with the company's Fort Worth headquarters. Orders can be shipped within 24 hours.

Elite Software has recently added another program to its ranks. Elite-Spel quickly looks up words in one pass through its 24,000-word dictionary. For in-



An 80-column card with software support.

formation about Elite's programs, write to Elite Software, P.O. Box 11224, Pittsburgh, PA 15238. 412-487-2931.

Reader Service 562

The Ultra

DSS Peripherals has announced The Ultra Controller, a disk controller that features an LED write indicator, gold-plated contacts, metal enclosure, track-to-track access, multiple sector read/write, single or double-density formats, and soft-sector formatting. The Ultra Controller comes in an off-white finish that matches the CoCo 2. It includes a 5-volt power supply that is compatible with all versions of the Color Computer.

The Ultra Controller handles 8-, 5 1/4-, and 3-inch disk drives and is fully compatible with hard-disk systems. Adding a CP/M board and 8-inch drives to The Ultra turns your CoCo into a respectable CP/M machine. The Ultra is fully compatible with all ROM-Pack interfaces. It is easy on disks because it has selectable motor-off timing. The Ultra Controller comes with an operating system, or you can "burn" your own EPROM operating system. RSDOS and JDOS are available.

The folks at DSS Peripherals

offer a one-year warranty on the Ultra. The completely assembled and tested disk controller costs \$110. For an additional \$5, DSS will install an input buffer that eliminates system hang-ups and glitches. The DSS drive 0 system features The Ultra and sells for \$275. For more information, contact DSS Peripherals Corp., 62 Commerce Drive, Farmingdale, NY 11735. 516-249-3388.

Reader Service 550

80-Column Display

Double Density Software has released Double 80 Plus, an 80-column-by-24-line display for the CoCo and CoCo 2 to create a professional size and style display on any monochrome monitor.

Double 80 Plus features 128 different characters, and the full ASCII character set. You can plug it directly into the CoCo, a Y-cable, or a Multi-Pak interface. The Double 80 Plus comes with the 6845-S CRT controller; switchable video output (CoCo or Double 80 Plus); adjustable video (brightness and contrast); a shielded, two-piece metal case; a gold edge connector with ground tabs; a double-sided PC board; and complete documentation.

You can use Double Density's Double DOS Basic, Ultra Term Plus (a communications pack-

age), and their new Flex and OS-9 software with the 80-column card.

Double 80 Plus costs \$99.95. For more information, contact Double Density Software, 920 Baldwin, Denton, TX 76205. 817-566-2004.

Reader Service 560

Special K

DSL Computer Products has announced a new line of 64K to 128K RAM upgrades for all models of the CoCo. The DSL upgrade mounts inside the computer and is completely compatible with all existing software.

DSL configures the add-on memory in two 64K banks that are divided into 32K pages. One 32K section is common to all banks. You achieve bank switching with POKEs in Basic. When the program selects a memory bank, the other banks switch off while retaining all data, programs, and variables. With this method, you can have as many as three different 32K programs in memory without using any additional software.

The DSL memory upgrade kit comes with 64K of RAM and a logic board that plugs into your SAM Socket. The upgrade requires no soldering, and installation is simple. The complete upgrade costs \$99.95, or you can purchase the logic board alone for \$34.95 if you want to add your own memory. DSL provides an adapter at \$9.95 for CoCos that do not have the F board. The DSL memory upgrade comes with a 90-day warranty. For more information, contact DSL Computer Products, P.O. Box 1176, Dearborn, MI 48121. 313-582-8930.

Reader Service 568

Scourge of The Universe

Mark Data Products has released another in its series of hires graphic-adventure games. In *Trekboer*, life on Earth during the 21st century is threatened by a deadly virus. Your mission is to use the starship *Trekboer* to search the frontiers of space and return with a cure to save humanity from disaster. The name of your starship provides the first clue.

Trekboer requires 32K and costs \$24.95 for cassette and \$27.95 for disk from Mark Data Products, 24001 Alicia Parkway, #207, Mission Viejo, CA 92621. 714-768-1551.

Reader Service 551

Aircraft Simulator

The Aircraft Approach Simulator is now available for the 16K CoCo with Extended Color Basic. The program was designed for pilots to practice all kinds of instrument approaches. The new version for the CoCo employs sound, color, and optional joysticks.

Aircraft Approach Simulator is available on cassette for \$9.95, on disk for \$14.95, and as a source list for \$4.95 from Prof. J.C. Sprott, 5002 Sheboygan #207, Madison, WI 53705. 608-273-0627.

Reader Service 553

Calculated Calculus

Calculus Through the Eye of the Color Computer is a series of four math packages totaling 23 programs. MatheGraphics developed the series under a Radio Shack Corp. Educational Software Development grant. Each program in the series provides computer graphics displays, which when combined cover the important calculus concepts and methods. These programs are intended for classroom demonstration and individual exploration.

Algebra is a package of seven drill-and-practice programs that promote student understanding and mastery of the skills needed for elementary and secondary algebra. The programs feature random problem generation and built-in diagnostics, which identify the most common student errors. They also keep track of the time students use on problems and the scores they achieve.

Calculus Through the Eye of the Color Computer and Algebra are available on cassette or disk and run on the 16K Extended Color Basic CoCo. Algebra comes in a Color Basic version as well. For more information, contact MatheGraphics Software, 61 Cedar Road, East Northport, NY 11731. 516-369-3781.

Reader Service 565

Arithmetutor

Third- and fourth-grade children can learn addition, subtraction, multiplication, and division up to the number 12 with Arith-

metutor, a new math aid program. Arithmetutor is available on cassette for \$9.95 prepaid, from JO, Box 204, Pepperell, MA 01463. 617-433-5784.

Reader Service 564

New Database

Here's what you could have used to keep track of your holiday mailing list. Datalist is a cassette-based file-management system that stores information in memory and uses machine-language sorting for high-speed information processing. You define the structure of the database, the number of records in each file, and the number of fields in each record.

Datalist can sort based on any character or item in each record, and print specialized reports keyed on any character, item, or phrase within each record. It can add, delete, edit, and print individual records. It can print as many as ten items on four lines for mailing labels. And Datalist report formats can select as many as 10 items in any order, with automatic report headings on each page.

Datalist requires 32K and sells for \$24.95 on cassette and \$32.95 on disk. Contact Computer Associates Inc., West Fargo, ND 58078. 701-281-0549. Their BBS number is 701-281-0233.

Reader Service 559

Junior Typer

Junior Typer uses colorful graphic devices to show the correct keyboard fingering for each letter and teach touch typing to elementary students.

Junior Typer requires 32K and Extended Color Basic. For a free copy of the Aquarius catalog, contact Aquarius People Materials Inc., P.O. Box 128, Indian Rocks Beach, FL 33535. 813-595-7890.

Reader Service 563

Data Acquisition

Technical Hardware has announced two new analog-to-digital converters. The AD-8 is an inexpensive data-acquisition system that you install into the cartridge connector of your CoCo. The AD-8 hardware is available for disk or cassette at \$69.95. Disk software for the AD-8 is an additional \$9.95, and cassette software is \$7.95.

The CCAD-B is a 16-channel, 12-bit, analog-to-digital converter that lets you digitize 16 bipolar inputs of plus or minus 4.095 volts with plus or minus one millivolt resolution. The



An easy-to-understand CoCo guide.

board plugs into the cartridge port of the CoCo and the analog input connects to the CCAD-B card with a 44-pin card-edge connector. With cassette or disk-based memory, you can set active channels, save data to cassette or disk, turn on and off three alarm signals, print or display data, and set a time to acquire data via an internal, real-time clock. The CCAD-B data-acquisition system costs \$199. The cassette-based system is \$190.

The AD-8 and CCAD-B are available from Technical Hardware Inc., PO Box 3609, Fullerton, CA 92634. 305-922-7013.

Reader Service 556

Low-Cost Spreadsheet

SPR is a sophisticated spreadsheet program available at a low price. It features fully adjustable column widths, commands for configuring the size of the spreadsheet, and all input/output handling routines. Altogether, SPR has 11 functions, including linear regression and approximation. SPR gives you full print-format control of parameters such as printer baud rate, line length, and page length.

SPR comes on 32K cassette with complete documentation for \$25 from DSN Computers, 37 Stannard Ave., Branford, CT 06405. 203-481-2653.

Reader Service 552

How to Color Compute

Dilithium Press has released the latest member of its "How to Use" series of books about computers. *How to Use the TRS-80 Color Computer* introduces novices to the use of the CoCo with a simple approach that assumes no previous knowledge of computers. It describes and explains

the CoCo's components with step-by-step instructions that help you get started. The book includes chapters that cover peripherals, loading from cassette or disk, programming in Color Basic, graphics, sound, and software. *How to Use the TRS-80 Color Computer* is 128 pages long, has 20 illustrations, and costs \$5.95 from Dilithium Press, 8285 SW Nimbus, Suite 151, Beaverton, OR 97005. 800-547-1842.

Reader Service 567

Three from Computerware

Sam Sleuth is another graphics intrigue by Steve Hartford, author of *Star Trader*. Sam Sleuth changes with every game so you never tire of playing it. Using a joystick or mouse, you search the town of Elmsville in your car, examining grounds and objects, interviewing people, and collecting evidence in real time. Sam Sleuth requires 64K and a joystick or mouse. It costs \$24.95 on cassette and \$27.95 on disk, plus \$2 shipping and handling.

Major Istar combines elements of adventure, simulation, and the arcade. The graphics adventure includes 118 words, 33 objects, and three arcade sequences. The setting is the early 21st century (when undersea cities and interstellar spaceships are realities). Major Istar must travel to Trident Research Dome to answer an urgent call for help from one of the service "droids" stationed there. Your objective is to solve the mystery at Trident in as few moves as possible. Major Istar requires 32K and a joystick. It costs \$24.95 on cassette and \$27.95 on disk, plus \$2 for shipping and handling.

Don't Forget is a personal time-management system and event recorder that uses icons similar to those on the Macintosh. The program can keep track of an entire year of daily memos and appointments. Each day has space for four appointments or occasions, two memos, and hourly notes from 6 a.m. to 9 p.m.

Don't Forget has a 51-column by 24-row upper- and lowercase, hi-res display. You can display or print daily or weekly schedules and print large monthly calendars with room for scribbling notes.

Don't Forget requires 32K and one disk drive and costs \$24.95 plus \$2 shipping. For more information, contact Computerware, P.O. Box 668, Encinitas, CA 92024. 619-436-3512.

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edited by J. Scot Finnie

	performance	ease of use	error handling	documentation
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Application Software

64K Terminal Emulation Package
DSS Peripheral Corporation
 (Saturn Electronics)
62 Commerce Drive
Farmingdale, NY 11735
516-249-3388
\$19.95 64K disk

by Terry Kepner

If you're just getting started in telecommunications and you want a simple and inexpensive terminal program for your 64K Color Computer, then DSS Peripheral's 64K Terminal Package is the one to get. It's not fancy, but it does provide the one thing you'll need most: a massive storage buffer. You can have a buffer anywhere from 24,319-58,367 bytes in length, larger than any other CoCo terminal package I've seen so far.

Before you can use the program you must PCLEAR two or four graphics pages (two for a disk system, four for cassette). Next you decide what size buffer you need. Normally, the program reserves the memory from

\$A000 to \$FEFF for buffer storage (24,319 bytes), but you can use the CLEAR command to drop the lower memory limit and increase the room.

\$1B00 (58,365 bytes) is the lowest limit for a disk system, and \$1F00 (57,341 bytes) is the limit for cassette. Both are almost right on top of the terminal program itself.

The 64K Terminal Emulator redefines the Color Computer keyboard to generate all the ASCII codes from 0-127, with several left over for the following special functions: report buffer space remaining, get a disk directory, clear the screen, upper-/lowercase toggle, start uploading (from tape or disk), start/stop downloading into buffer, dump buffer to disk (prompts for file name), and exit to Basic.

You have no control over the communications settings (baud rate, stop bits, parity, and so forth). The program is set to 8-bit words, one stop bit, no parity, 300 baud, and full duplex. There aren't even instructions on where to POKE should you wish to change any of these.

This makes it very difficult to ad-

just the program to match other systems for data transfer, although in most cases you won't notice the difference. For example, if the system you're communicating with is set to 7-bit words, one stop bit and even parity, the numbers happen to balance out just right.

Every time you toggle the download buffer on, it clears out all previous information. I would rather accumulate the data in memory until I saved it, with a successful save automatically clearing the buffer.

The 64K Terminal Emulator has a unique approach to error handling: It drops you into Basic and prints an error message. This leaves you in a programming environment in which you might fix the problem, while it maintains contact with the host computer so you can EXEC and return to the program and continue working on-line. This has some promising potential for the hacker.

The documentation is just five photocopied pages of instructions. It does present all the necessary information, but requires careful reading before you understand how to use the program.

Certainly there are more powerful programs around, but none as inexpensive as this one. You'll have to read the 64K Terminal Emulator documentation carefully, but after that the program is simple to operate. All you need do is keep the chart of the redefined keyboard in a handy location for quick reference and remember a few simple instructions. ■

REVIEWS

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Educational Software

E.T.T. (Electronic Typing Teacher)
CoCo Warehouse
500 North Dobson
Westland, MI 48185
313-722-7957
16K, Extended Color Basic
\$21.95 cassette

by **Beth Norman**

E.T.T. (Electronic Typing Teacher) is Cherrysoft's well-designed typing tutor. Although the program is aimed at children, adults can use it to brush up on their skills, too—as long as they don't mind working with E.T., the extraterrestrial. This program pays a lot of attention to the little fellow.

The main menu offers a number of lessons, starting with a keyboard introduction that draws a video picture of the CoCo keyboard (that's what you're supposed to watch during your typing) and explains your options for all the exercises that follow. You can choose to have the TV keys blank, as they are on many classroom machines, or you can ask for labeling of either the home row (A,S,D,F, etc.) or the whole keyboard.

E.T.T. teaches a standard brand of typing. The introduction points out the importance of the home row: "E.T.T. likes home. Always remember to go home!" The documentation also contains practical tips on posture, hand and arm position, and so on.

Finger exercises follow the introduction. These are three-letter groups repeated five times each: AQA AQA AQA. . . There are 22 of them, designed to exercise each finger and get the student used to the idea of reaching away from the home row to strike a nearby key.

After you have completed these

"E.T.T. was written by an experienced typing teacher and moves along well, taking you from nonsense syllables to complete sentences at just about the right pace."

exercises (or any of the units in the program), the computer tells you how you did: the number of perfect responses, your average response time, and an approximate words-per-minute score. Unlike conventional typing courses, E.T.T. doesn't deduct points from your "number correct" score for any incorrect responses.

You can also quit at any point in the middle of an exercise and get this information.

The next portion of the program is E.T.T. Talk. This set of exercises creates 30 sentences from a store of words supposedly containing every letter in the alphabet. There are supposed to be more than 1,000 of these randomly determined sentences, and all are grammatically correct. They also draw heavily upon the adventures of the original E.T. for their material. If you haven't seen the movie, the logic of these sentences might escape you. In order to get a fresh set of sentences for E.T.T. Talk, you have to break the program and run it again.

The next feature on the menu lets you create up to 30 sentences of your own, which you then use to test yourself—just as you did with E.T.T. Talk. The computer asks if you want your test sentences given to you in order or randomly, a nice touch. You can also repeat each sentence, and can choose how many times you want to see each one, and save practice sentences on tape.

Nineteen additional sets of exercises are recorded on the second side of the E.T.T. cassette. The first five are words, phrases, and sentences

designed for practicing common letter combinations, the sixth is a set of tips for comfortable typing posture, and the seventh through ninth are common words. The documentation claims that you'll find the 50 words in set 7 in over 50 percent of your usual typing.

Sets 10-19 are assorted "story sets," such as "Jack's Journals" (the true story of Jack and the Beanstalk), and "Mark Twain—Wit and (?) Wisdom." These sets are funny, interesting, and challenging.

I haven't found a single bug in E.T.T. It was written by an experienced typing teacher and moves along well, taking you from nonsense syllables to complete sentences at just about the right pace. The only addition I could suggest would be a way to pause in the middle of things to rest your hands without quitting the exercise you are working on.

As for results: After using E.T.T. for only two weeks, I improved my typing speed from a lowly 15 words per minute to a more respectable 37. E.T.T. is definitely a program to phone home about. ■

	construction set up	quality performance	documentation ease of use
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Hardware

D-200 Printer
Smith-Corona
65 Locust Ave.
New Canaan, CT 06840
\$400-\$600

by **Robert W. Eisman**

If you're looking for one printer that can handle all your needs (listings, graphics, letter writing and so on), then add the Smith-Corona D-200 to your check list. It's equal in quality and price to its competitors, but the D-200 offers some standard features that usually come as options on other printers. The Smith-Corona machine comes with both a serial



Smith-Corona's D-200 Printer

and parallel interface, a fully adjustable, 11-inch tractor feed, and a 2K data buffer.

The smoked plastic lid is a big plus in reducing the dot-matrix, high-frequency squeal to a rumble. The lid does, however, make the D-200 a paper eater. It's approximately seven inches from the print head to the tear bar, so every time you tear off a page, you lose a sheet of paper. Of course, you'll eliminate this if you print continuously or back the paper up.

The D-200 loads from the rear only, which can be an inconvenience if you prefer bottom loading. And the interface plug is located on the

"I find the correspondence print of the D-200 to be the best in its price range."

rear panel of the printer, which puts the cable where it can interfere with paper travel.

The D-200 is a very capable data processor: It prints at 120 characters per second and offers subscripting; superscripting; underlining; proportional spacing; emphasized print modes; and enlarged, condensed, elongated, compressed, or italic characters.

The printer also includes a hex-dump feature. If you press the feed switches when you turn on the unit, it prints all the data in hex code.

The high-resolution graphics give you 120 dots per inch horizontally by 72 vertically. Therefore, a good screen-dump program will let you print out your high-resolution creations.

Normal NLQ CORRESPONDENCE mode
Italic NLQ CORRESPONDENCE mode
 NORMAL BOLD MODE
ITALIC BOLD MODE
 Emphasized NLQ MODE
Emphasized Italic Mode
 Emphasized Bold
EMPHASIZED ITALIC
 E L O N G A T E D

Fig. 1. The D-200's Near-Letter-Quality Print Styles

The D-200 pulls away from its competition as a near-letter-quality printer. Most printers in this price range offer near-letter-quality print in one or two print modes and must use emphasized print, which makes the characters appear too thick. However, the D-200 features italic, normal, elongated, proportional, subs, emphasized or nonemphasized print in the near-letter-quality mode.

The nonemphasized quality is not quite as good as the emphasized, but the clear, sharp characters make this trade off barely noticeable. Note, though, that print speed is cut by more than half in the near-letter-quality mode.

How near is near-letter quality? That's a matter of personal taste, but I find the correspondence print of the D-200 to be the best in its price range (see Fig. 1). Since purchasing the D-200, I only use my daisy-wheel printer for resume-quality printing.

The instruction manual for the D-200 is excellent. You don't have to be a binary giant to set the DIP switches and learn the printer controls. Good diagrams come with the easy-to-follow instructions. Incidentally, you can set the baud rate from 110-9,600 and choose an English or foreign-language character set. ■

	meets objective	maintains interest	documentation ease of use
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Educational Software

Vocabulary Management System
Tom Mix Software
 4285 Bradford, NE
 Grand Rapids, MI 49506
 616-957-0444
 16K, Extended Color Basic
 \$39.95 cassette
 \$42.95 disk

by James K. Hardy

At one time or another all of us have had to learn new words or terms. As you acquire knowledge in

REVIEWS

a new area (e.g., language vocabulary, scientific terms, or Basic programming) you'll have to become familiar with the terms used in the field you are studying. Tom Mix's Vocabulary Management System is designed to help you in your task. The system's 11 Basic programs let a teacher or parent enter words and their definitions and display or print out various tests and games.

Performance

The system comprises three program classes: the data entry/edit program (VMS), four printer-output programs (PTest, PScramble, PCode, and PSearch), and six vocabulary/spelling game programs (Quizzer, Challenge, Code, Scramble, Flash, and Search).

With VMS you can enter and store words of up to 20 characters with definitions of up to three lines. You can use as many as 100 word/definition sets at one time with a 16K system, or 300 for a 32K system, though you can create more than

one file. Menu options for VMS include the ability to load and save a data file from tape or disk, enter a new word list, append or edit an existing one, and alphabetize your list.

When you enter data, the program reformats your definitions to prevent word breaks and give you the option of editing each word and definition before you move to the next. Once you've created a data file, you can use the system's remaining programs.

The four printer-output programs let you create vocabulary tests and games. PTest produces either a list of the vocabulary words with their definitions or a matching test in which the words appear at the top of the page and the definitions with spaces for the answer appear below.

PScramble creates the same matching test, but it scrambles the word order in the definitions. It also produces a vocabulary list in which the letters within each word are rearranged.

PCode doesn't scramble the words or definitions but it does encode them

with a simple character substitution. Cracking the code for single words can be tough, even for those who are moderately adept at solving cryptograms, and a student must be familiar with the vocabulary words if he is to have a chance at breaking the code.

The final printer program, PSearch, produces a word-search puzzle in which you can select the character width and length for the puzzle. You can also produce an answer key with each of these tests.

Each of the printer-output programs lets you load a data file, list and alphabetize the words in the file, select a random seed, or send the printer output to disk as an ASCII text file for later editing.

When your data file contains more words than you want to use at one time, you can select individual words for a list or use the random seed feature. Entering a seed lets you produce a random subset within your data file. If you don't change the file, you can run the program later,

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use the same seed, and obtain the same set of words. This also lets you run one of the other printer output programs and use the same set of words.

Once you've selected a set of words, you can enter up to eight lines for a heading. You can then enter printer control-code sequences (decimal) and three sets of control codes, one of which you send before the heading information, the words, and the definitions.

The system offers enough formatting options to let you produce a nice-looking exam, but you're limited in your use of control codes, since the production of special print fonts often requires you to toggle a feature on and off. Once you get a suitable combination of print features, write them down, because the program doesn't let you save and recall them.

The remaining six programs get the student to interact with the computer. Code, Search, and Scramble are almost identical to their printer-output counterparts. The remaining three (Quizzer, Challenge, and Flash) present vocabulary words in a manner not possible with written exams. Flash flashes words on the screen and you retype them. You set the flash rate, and when you make a mistake, the program displays the corrected word with the misspelled part highlighted.

Quizzer presents one definition and up to eight possible answers. You can scramble the word order in the definition to add an extra challenge.

Challenge displays a number of diamonds representing the number of letters in the word. Incorrect guesses (or pressing enter), get you one word from the definition as a clue.

I did find a problem with the keyboard response in these last three programs. The games often dropped characters when I typed quickly to beat a time limit.

Ease of Use

Each program is menu driven, and all are similar in printer output and keyboard relationship, which makes them relatively simple to operate. However, a master-menu program would certainly improve the disk version, and it would be nice if you

could press something besides the break key to exit from the VMS or the printer-output programs.

Error Handling

With some of the programs, if you press enter as a file name when you're trying to open a file for ASCII output, you get an error. Other than that, the system caught every attempt to make a mistake, even when I tried to use a disk file without the disk drive attached, tried to edit questions before loading a file, or attempted to print a test with the printer turned off.

Documentation

The documentation is massive. Forty-one pages cover each phase of the system's operation, and a 15-page appendix lists typical output for each of the four printer programs. The text does an excellent job of explaining each program and is geared toward the parent or teacher, who in turn must explain the programs to the student who will be using them.

In most cases this amounts to little more than explaining the program objectives, but sometimes the student will need special commands that are not listed in the program (e.g., entering XXX as a letter substitution in the Scramble program results in it displaying the final answer). A one- or two-page instruction set geared towards younger users would be of benefit.

Although the documentation doesn't say so, you could also use the system to learn math formulas or other groups of characters that aren't standard words. For example, as a "word" you could enter "pi x R x R," with "area of a circle" as the definition.

Conclusion

Despite its limitations, the Vocabulary Management System does offer a number of useful features. The ability to produce exams and study sheets as well as scrambled and word-search games should hone vocabulary skills. The games with which you work on screen stress the need to get the right answer rapidly, and they provide immediate positive reinforcement. The programs that encode words and definitions might be beyond younger users, but it could prove useful in challenging more advanced users. ■

	performance	ease of use	documentation	error handling
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Application Software

Color Compac
Radio Shack
1400 One Tandy Center
Fort Worth, TX 76102
Cat. no. 26-3330
\$29.95 cassette

by Jeffrey S. Parker

Radio Shack's Color Compac is more than a stand-alone program; actually, it's a terminal kit, because with it you get a subscription to and a free hour on both CompuServe and the Dow Jones Information Service. Therefore, if you have a modem, you're ready to telecommunicate as soon as you get the package home.

The Color Compac has features of both a "dumb" terminal and a "smart" terminal. Whereas dumb terminals only let you receive data on your screen, smart terminals let you manipulate data (save or load data while on line, send data directly to printer, transmit programs directly to another computer, and so on).

The Color Compac won't let information go directly to your printer, even if you have Radio Shack's Deluxe RS-232 Program Pak (cat. no. 26-2226) that lets you connect your modem through the cartridge port, freeing the serial port for a printer.

Other than this limitation, however, this has some nice features. It is very easy to define the settings required for a given host computer, and the manual is very direct in giving detailed instructions. It even includes a sample log-on session. Color Compac is more than a dumb terminal too in that you can save and load information into the computer's memory, and transmit and receive Basic and machine-language programs very easily.

You can load the program into

REVIEWS

higher memory addresses to free up more RAM space in the computer. You can also exit to Basic and reenter the program while it is in memory, and change the communications settings while on line.

Color Compac should work with any modem.

Your subscription to Compu-Serve connects you to a home-computing-network that includes an electronic mall, an electronic mail service, banking, airline bookings, sports, news, weather, games, and much more. It is ideal for the home enthusiast or, in some cases, the small businessman. A CB simulator lets you talk to people from all over the country via your computer, and you pay only for the connect time, not the long distance service.

Dow Jones is a financial news retrieval network that brings Wall Street right into your own home. Dow Jones is more expensive than CompuServe, but priceless if you're dealing in stocks or need up-to-date information on stock trading. This service can also



The Color Compac

provide surveys and reports on recent financial histories of stock-exchange companies and their holdings, dealing, earnings, and losses.

Color Compac, even with its limitations, is a simple, straight forward, easy-to-use communications program. It is designed for the home user, and with its included subscriptions to CompuServe and Dow Jones is well worth its price. Its documentation and ease of use make the program especially excellent for first-time users. ■

meets objective maintains interest documentation ease of use

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Educational Software

Happy Birthday, Mr. Gift
Teksym Corp.

14504 County Road 15
Minneapolis, MN 55441
612-471-8320

16K, Extended Color Basic
ages 5-7
\$16.95 cassette

by Richard Ramella

A lot of loving computer craft went into this machine-language program, which teaches beginning readers vowel discrimination. It's aimed at kindergartners through second graders.

The other source.

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Computer

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REVIEWS

The graphics are excellent; a drawing of a vest, for example, looks like a vest. There is a mix of sound: computer-generated music, recorded piano music, and a female narrator's reassuring instructions. The verbal responses vary according to the answer the child gives, and this is a technically interesting capability of the program. The drill is in the form of a game that I think will interest small children, for it combines drawings, a scoreboard, large characters, and a timer made of a round face that smiles at correct answers. The motif is a birthday party.

So much went into the aforementioned good points that there was room left for only 10 questions. They are the same 10 questions each time the program is run—a serious consideration for the potential buyer. This strictly limits the replay value: How much would you pay for a book that taught your child 10 words?

It was difficult to write the previous paragraph, because I like this program very much. However, since I'm 44 years old, what I think is not so important as judging the program as a child might—through eyes of wonder. Therefore, I borrowed a frighteningly precocious four-year-old to test Mr. Gift. She loved it the first time through. On the second play she lost interest at question 5. However, a few days later she asked to play again and went through the game perfectly. She asked me to leave her alone, and I had to spy on her fourth play, in which she disre-

"So much went into the good points that there was room left for only 10 questions."

garded the rules in an effort to create as much color and sound as possible. For this kid, I'd say Mr. Gift was a 9.5 out of 10.

Now, let's shoo the kid away and look at the program as hard-nosed adults: The documentation is excellent. It's a 10-page booklet that clearly explains the philosophy of what is being taught, the educational objectives, the play and program-loading instructions, and some general material on how to make programs load correctly.

The control program loads in about a minute and a half. You can choose from five play levels that give you from unlimited answer time to five seconds for a response to the question.

I was surprised to hear music emanating from the speaker. It took me a moment to realize I was hearing piano music that the program set into play from the tape. Then came the large words: "Mr. Gift is having

a birthday party and you're invited." The narrator slowly reads these words.

To receive an invitation to the party, the child types her or his first name and presses enter. From that point the program displays the child's name in large letters when it asks questions.

As play begins, the program draws a scoreboard at the bottom of the screen. With each question, the screen displays a picture of an object and two choices for the spelling of the object's name. For example, the first question shows a tie in the top right corner of the screen. In the top left corner, two possibilities, "1. tie" and "2. tee," appear.

The narrator gives verbal clues and asks the child to press key 1 or 2, depending on the answer. You don't get credit for a wrong answer, but you do get another try, with more clues. The narrator's responses are always positively phrased.

It takes about 15 minutes to go through the 10 questions. Each right answer draws a brief rendition of the "Happy Birthday" song done via computer sound, and the scoreboard number changes color. If you answer all questions correctly, you'll see a picture of a birthday cake.

The instructions suggest replay value in mastering the game at different time levels, though questions and answers are always the same.

This program is a companion piece to Old McDonald's Farm, and Teksym promises new programs. ■

Two Screens from Happy Birthday, Mr. Gift



Gameware



Touchstone

We've got three of Tom Mix's new arcade-style games this month and they're a real treat. If you have a taste for action, one of these should hit the spot.

The Touchstone (Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506, 32K, joystick, \$27.95 cassette, \$30.95 disk) is a one- or two-player game in which you, as a priest of Ra, must search the maze-like passages of the temple to find the Touchstone and become high priest.

You enter the temple alone, but of course you don't stay that way for long. Monsters by the handful start popping out of the poof chambers (there's at least two per screen) and zeroing in on you, wherever you may be. You do have a couple of things on your side, though. For one, the joystick control in this game is very good, allowing you to make quick turns and get through tight spots when you must. You also have the power to shoot death rays from your eyes—right and left simultaneously—a big help in warding off those swarming monsters.

You begin each screen with a time allotment. If your time should run out, you'll suddenly find that your magic eyes don't work anymore (ain't it the truth?) and you have little defense against those priest-seeking monsters.

When the menacing hordes just get to be too much to handle, you can press the spacebar to break a flask of paralyzing gas that will render them immobile for a few seconds. But those flasks are hard to come by, so use them sparingly.

The Touchstone requires quick reflexes, strategic planning and lots of derring-do. Things get especially hectic the farther you go. You can only carry one key at a time, and sometimes there will be two keys hidden on a screen, or a set of double locks that you'll need to open. Therefore, you must grab one key, run to the locked door and open it, and then head back for the second key. Can you zip through that swarm of monsters, grab the second key, and

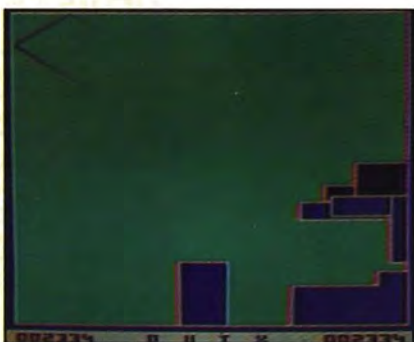
make it back to the door before your time runs out? And there's a treasure down that hallway that you missed the first time through.

The Touchstone is a lot of fun, and a real challenge.

Quix (32K, joystick, \$24.95 cassette, \$27.95 disk) is kind of a moving-puzzle strategy game in which you try to draw lines to box in the bouncing Quix (a red line) and gain control of at least 75 percent of the screen.

If you have careful planning and judgement, tempered by a good amount of patience, you'll love this game. You begin at the midpoint of the bottom screen border and try to stake your claim on portions of the screen by drawing lines and enclosing areas. Well, that sounds easy enough, but if the bouncing Quix hits your line before you've completed a box, you lose a life.

Therefore, you've got to box in territory in small pieces, venturing out and back be-



Quix

fore Quix touches your line. The best strategy seems to be to create a small area into which Quix will bounce while you quickly close off the entrance, trapping him. To do that requires careful planning at even the easiest levels, but wait until you have to contend with the two Quixes and the sparklers that follow you. Their touch, as you might guess, also brings your demise.

Quix is a program for the thinking arcade gamer.

Elec*TRON (32K, joystick, \$24.95 cassette, \$27.95 disk) is Tom Mix's version of Tron, the popular arcade game consisting of four subgames.

You begin by moving the joystick up, down, right or left to select one of the subgames. In Beam Buggy, you start in the lower center of the screen and begin moving, leaving a light trail as you go. Pressing the fire button makes you go faster and releasing it slows you down. The computer

controls a second beam buggy, and your object is to trick it into crashing into the screen borders or into one of the light trails that either of you have created. Of course, the computer is trying to pull the same trick on you. At higher levels, you'll have to deal with more than one computer-controlled buggy at a time. You'll need high-speed reflexes and thinking for this one.

Prachnids begins with you as a small human at the bottom of the screen. Your task is to run up to and enter the transporter at center screen. However, the menacing prachnids come moving downward, blocking the entrance to the transporter and encroaching towards wherever you happen to be standing. And every once in a while they split in two, just to make things interesting.

Oh yes, there's a timer on this task, too. You can pick up a few extra points by blasting an extra prachnid or two, but make sure you're in that transporter come blast-off time.

Force Field finds you at the bottom of a chamber, with a colorful force field descending on you. You can blast away at the field a block at a time with your trusty ray gun, but the blocks keep moving, and new ones will fill in what was once empty space. If you're fast enough, and cunning enough, though, you just might be able to dart through the hole you blast in the field.

Maze puts you in a tank, traveling the corridors of a maze while you search for enemy tanks. You have to hit the enemies three times before you destroy them (although they only have to hit you once), and your bullets don't go in a straight line, which means you can do unusual things like shoot around corners—good, if the enemy happens to be around that corner; bad, if he doesn't.

If you've played Tron in the arcade and liked it, you'll be pleased with this version from Tom Mix—P.P.



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