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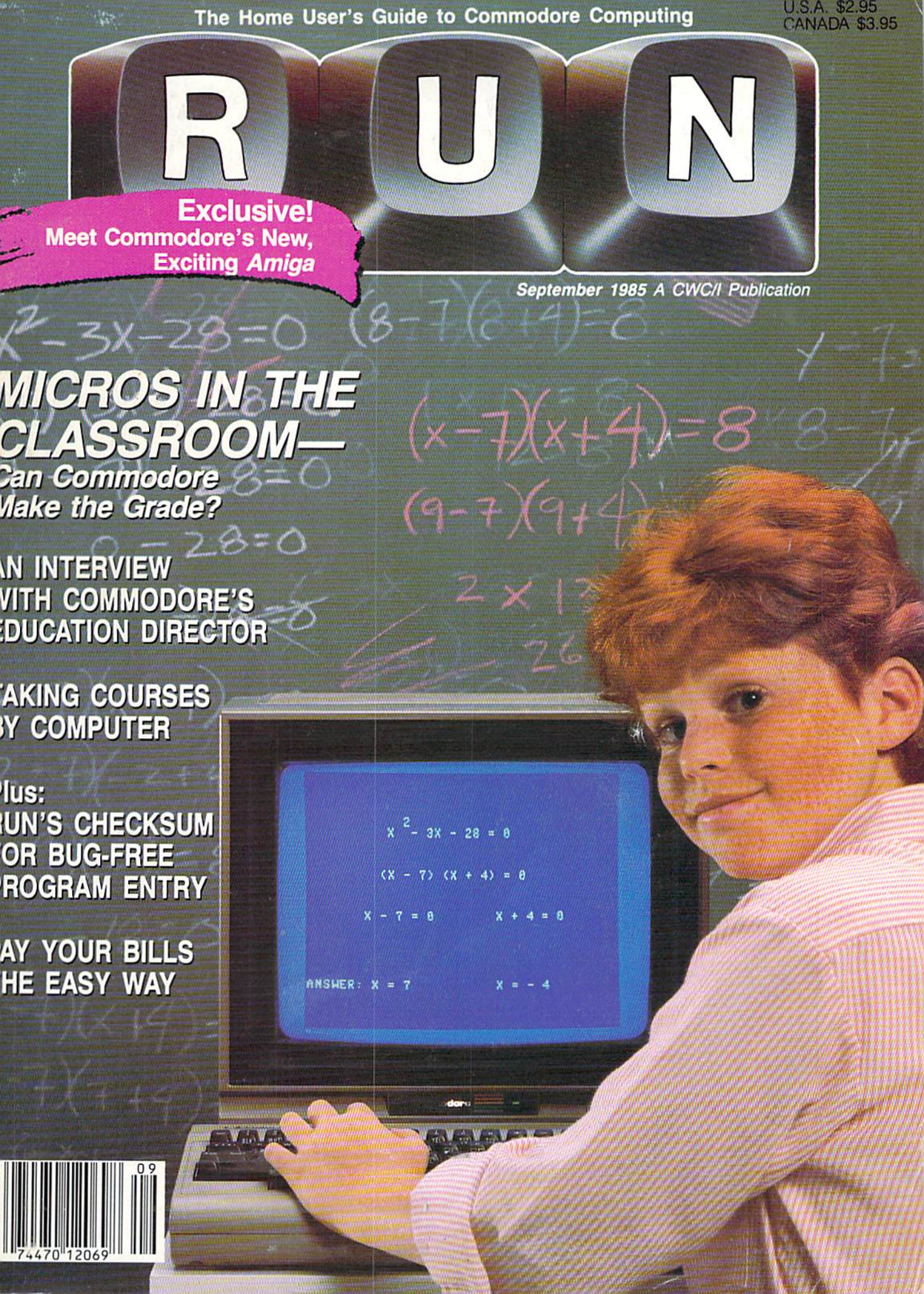
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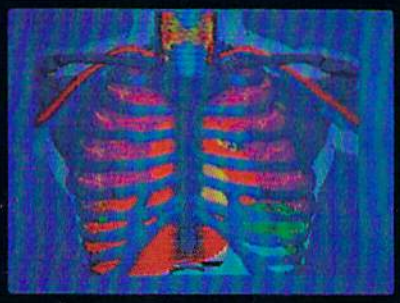


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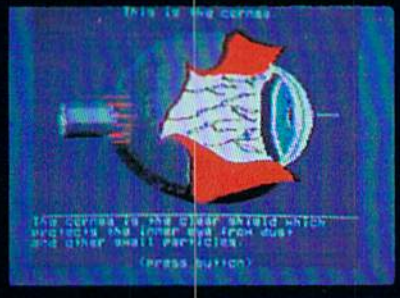
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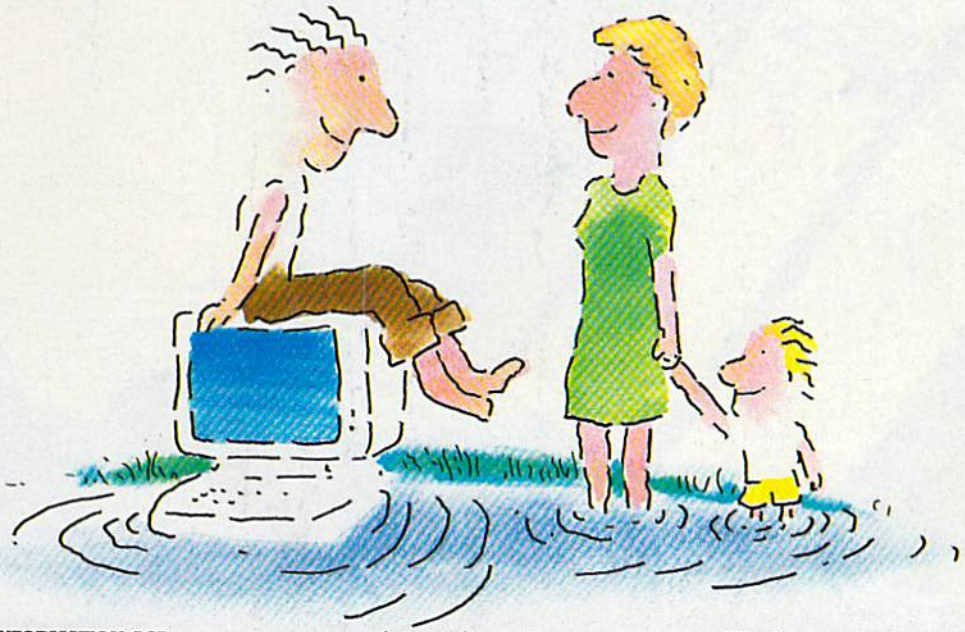
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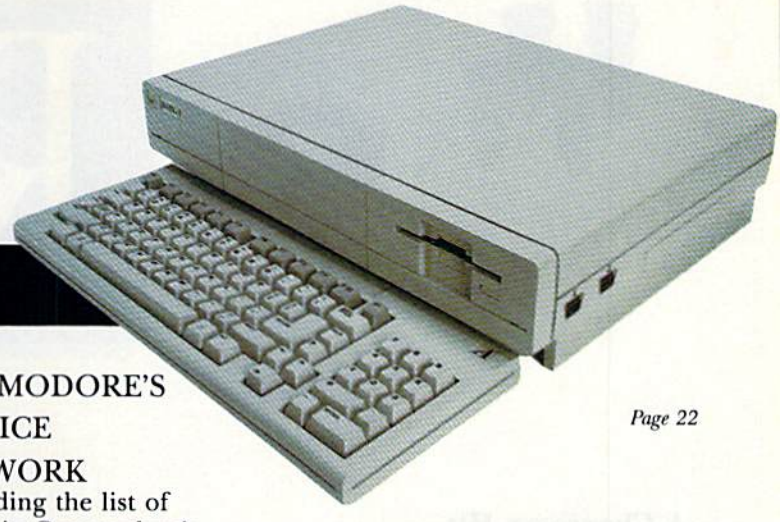
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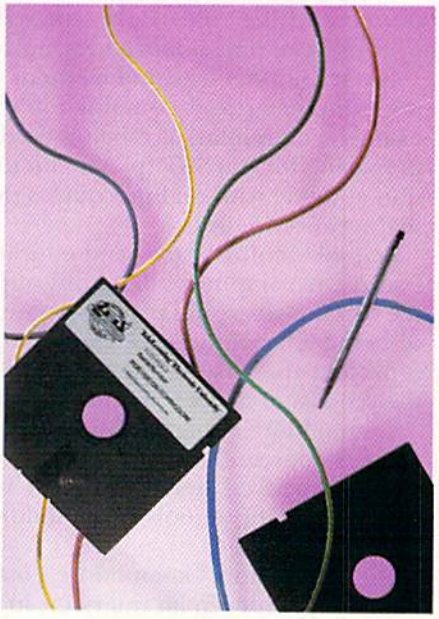
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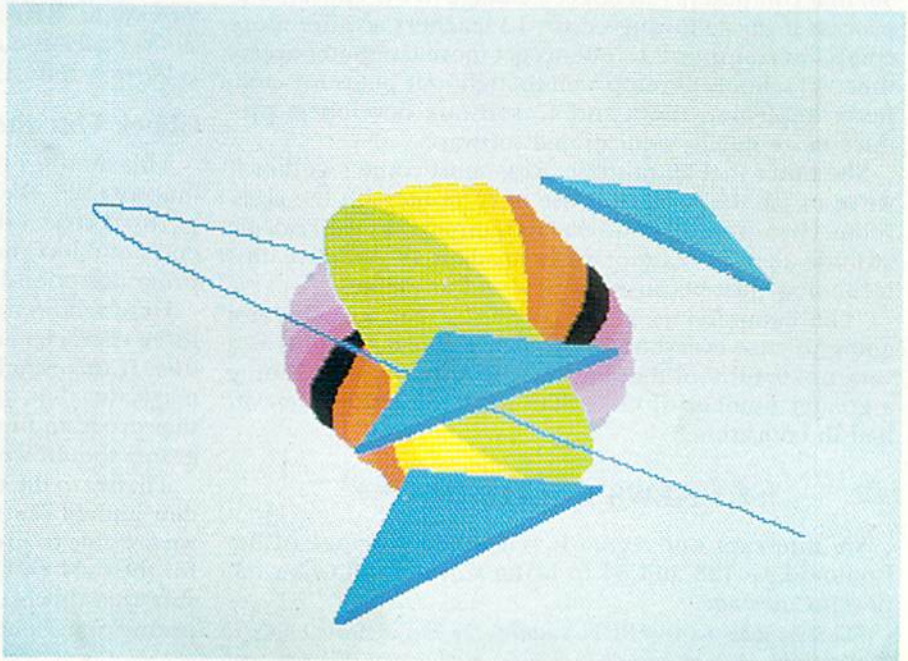


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RUNNING RUMINATIONS



A Classroom Hit

Teachers who adhere to traditional methods are like devotees of the "old" Coke—they don't want to tamper with proven, time-honored formulas.

But traditional teaching methods are in jeopardy, judging from the articles contained in this month's issue. For example, computers are being used to assist students in preparing for the SAT (p. 52) and they also offer instruction at home with on-line courses through the Telelearning network (p. 68)

School administrators and educators are beginning to realize the computer's flexibility and its potential to alter the teaching-learning process. Acting out of either a fear of being left behind or a genuine belief that computers represent the answer, they are bringing computers into the schools at an ever-increasing rate.

Commodore's share in the U.S. educational market is about 18 percent. But with the introduction of the C-128 and a proposed beefed-up plan to support computer programs in the schools, Commodore may garner an even larger percentage.

Pat Walkington, Commodore's manager of educational marketing, states in an interview in this month's issue (p. 38) that computers can effect a change in the educational process if the following occur: 1.) teachers acquire more computer training; 2.) students get more computer-access time; 3.) schools develop well-thought-out plans for computer implementation; and 4.) software developers produce more quality educational software.

She notes that all of these areas must come together if we're to see the successful use of computers in the classroom. Her optimism, however, is tempered by the realistic attitude that we cannot rush head-on to embrace this technology just because it's new and available.

"The computer is a tool; it's not a panacea. It's not going to cure everybody's problems. But it certainly is a very powerful tool that has the capability of performing a greater number of tasks than anything else we've ever had in education."

* * * NEWS BULLETIN * * *

We interrupt our regularly scheduled coverage of the Commodore 128 and 64 to bring you the following important message:

The September issue of RUN *contains the first in-depth analysis of the Amiga by a Commodore-specific publication. Six pages of this issue (beginning on p. 22) contain colorful photos of the new machine and its graphics capabilities and examine the features of Commodore's exciting high-end computer.*

The review, which is the result of a close working relationship between CW Communications/Peterborough and key personnel at Commodore-Amiga over the past several months, states that the Amiga "represents a giant step forward in desktop computer technology."

RUN *editors predict that the Amiga name will become synonymous with quality sound and graphics at a price that will appeal to the professional/serious computer user who is willing to spend over $1000 for a computer. For the current C-64 enthusiast who is looking to upgrade his computer system, however,* RUN *editors are convinced that the C-128 has more than enough power to handle his computing needs.*

In response to queries from industry analysts about what the introduction of the Amiga means for the RUN *reader, one editor remarked, "*RUN *remains dedicated to reporting significant advances in the Commodore field. The announcement of the Amiga represents just such a breakthrough.* RUN *will continue its coverage of the Commodore home computers—specifically the C-128 and the C-64—while its sister publication,* AmigaWorld, *will highlight the Amiga."*

Another editor summed up the feelings of the entire staff with these words: "What we're offering through this one-time-only report on the Amiga is a glimpse of the future."

We now return you to our regularly scheduled program.

Check Out the Checksum

This month's issue features the introduction of *RUN*'s long-awaited checksum program, 64 Perfect Typist (see p. 78). Perfect Typist takes the debugging out of program entry and lets you enjoy the many useful and interesting programs published in *RUN*.

Here's how it works: The program generates up to three characters on the screen after you enter a program line. If this number matches the digits published in the magazine, then you know that you have correctly entered that program line. With this checksum feature, your programs should work the first time without errors.

Thanks to the efforts of author/programmer James Borden and *RUN*'s technical manager, Margaret Morabito, we are able to present this top-quality checksum program for the C-64. (A C-128 version will be forthcoming.) We're sure that this program will make your Commodore computing experience much more enjoyable.

db

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"combines some of the best features of languages like Logo, Modula, Pascal, and Ada in an easy-to-use format"
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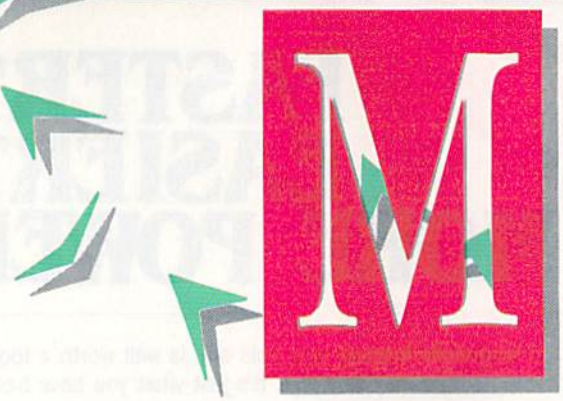
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MAGIC



Compiled by LOUIS F. SANDER

MAGIC is tricks, MAGIC is fun.
MAGIC is doing what cannot be done.

Every month, Magic brings you brief and useful computer tricks from around the world—tricks to make computing easier, more enjoyable or more exciting. We number our tricks in hex, the counting system of sorcerers and computerists.

Magic solicits your simple hardware ideas, short programs, useful programming techniques, little-known computer facts and similar items of interest. We look for new or recycled material that can be implemented with a minimum of time, effort or theoretical knowledge and that is of current value to Commodore computerists (Plus/4 and C-16 owners, too). We typically pay $10 for each trick accepted. Really super ones get $20–$50. Send your tricks to:

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If you enclose a self-addressed stamped envelope, we'll send you a Trick Writer's Guide. International readers may omit the stamp.

As you read these words, work on *RUN*'s second Special Issue is already under way. Our plans are to reprint all of 1985's tricks, indexed and grouped by subject matter, plus over a hundred brand-new items. Get your orders in early, since we expect another sellout.

Attention all programmers: If you're seeking fame and fortune, send your short programs to Magic. As you can see from this month's trickery, we look for useful or entertaining items whose listings fill less than one screen. Our readers love utilities, but we publish good software from any subject area.

$23F Klawretaw—We don't know who sent this, but it's well worth keying in. Can you tell what it does before running it?

```
1Ø REM KLAWRETAW - UNKNOWN MAGICIAN
2Ø A$="KLAWRETAW":FORA=9TO5STEP-1:B$=B$+MID
   $(A$,A,1):NEXT:B$=B$+B$+B$+B$
3Ø FORA=4TO1STEP-1:C$=C$+MID$(A$,A,1):NEXT
4Ø PRINTCHR$(147)CHR$(17)B$B$:FORJ=1TO35:PR
   INTCHR$(19)TAB(J)C$;:FORK=1TO5
5Ø PRINTCHR$(157):NEXT:PRINTTAB(J-1)CHR$(14
   5)" ":FORL=1TO1ØØ:NEXT:NEXT:GOTO4Ø
```

Mystery Magician
Secret City

$240 Autostart programs for the C-64—Here's a simple routine that adds the autostart feature to Basic programs on tape or disk. Type it in and run it, and if your Data statements are correct, you'll be asked to delete lines 11–13. Delete them, then save the program.

Now, when you want to save an autostart version of a program, just run Autostart and follow the instructions on the screen. Once it is saved, a syntax error message will appear on the screen; disregard it. At this point, your computer is in an altered state, so you must reset it or turn it off then back on.

Programs saved in this manner must be loaded using the form:

```
LOAD"filename",8,1
```

They will run as soon as they are loaded, with no further action from you. Because the autostart process puts characters onto the screen, it's helpful if the saved program clears the screen as one of its first operations. (If you're using tape, change the 8 to a 1 in the Load statement and in the screen message in line 80.)

```
1Ø REM AUTOSTART - BILL GIEL
11 FORX=1TO48:READY:CS=CS+Y:NEXT
12 IFCS<>5991THENPRINT"DATA ERROR":STOP
13 PRINT"DELETE LINES 11-13":END
2Ø FORA=679TO726:READB:POKEA,B:NEXT
3Ø Q$=CHR$(34):PRINTCHR$(147)CHR$(18)"TO MA
   KE AN AUTOSTART COPY OF A PROGRAM:"
4Ø PRINT:PRINT"LOAD YOUR PROGRAM, CLEAR THE
    SCREEN,"
5Ø PRINT"AND MOVE THE CURSOR TO THE BOTTOM
   LINE.":PRINT
6Ø PRINT"THEN ENTER THIS AS A SINGLE COMMAN
   D:":PRINT:PRINT"POKE43,166:";
7Ø PRINT"POKE44,2:POKE77Ø,167:POKE771,2:SAV
   E"Q$"FILENAME"Q$",8"
8Ø PRINT:PRINTCHR$(18)"** YOU MUST ALWAYS L
   OAD"Q$"FILENAME"Q$",8,1 **
9Ø DATA 169,147,Ø32,21Ø,255,169,Ø82,Ø32
```

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Listing continued.

```
91 DATA 21Ø,255,169,Ø85,Ø32,21Ø,255,169
92 DATA Ø78,Ø32,21Ø,255,169,Ø19,Ø32,21Ø
93 DATA 255,169,131,141,ØØ2,ØØ3,169,164
94 DATA 141,ØØ3,ØØ3,169,ØØ1,141,198,ØØØ
95 DATA 169,Ø13,141,119,ØØ2,Ø76,131,164
```

Bill Giel
Yonkers, NY

$241 Star Trek tip—This Sega game for the C-64 has a small bug that you can use to your advantage. The M key puts you into warp drive, which speeds you up and protects you from all enemies. When you lose warp drive energy, of course, you can no longer move faster, but that's where the bug comes in. As long as you hold down the M key, your invincibility persists. You can still use your phasers, photon torpedoes and non-warp engine power. Death to the treacherous Klingons!

David Bloyd
Reedley, CA

$242 Input with default—Input parameters are often known in advance, but sometimes you may want to make a change. If the Input statement itself contains the most-used parameter, you can select it just by pressing the return key. If another parameter is desired, you merely type it in the usual way. Here's a simple example:

```
INPUT "DEVICE NUMBER{2 spaces}8{3 CRSR LFs}";D
```

The number 8 will appear under the cursor and can be selected by hitting the return key.

E. Dam Ravn
Olstykke, Denmark

$243 Filename finder—On the C-64, SYS 62913 displays the name of the currently active file. Did you ever load a program or open a disk file, then later forget its name? Or have you saved something, then wondered what you called it? Try this magic SYS call, and the forgotten filename will materialize before your eyes! Usable in Direct or Program mode, it displays the filename at the current cursor position. JSR $F5C1 is the machine language version.

Rick Crone
Jackson, TN

$244 Load address finder—This short program finds the load address for any program saved on disk and is useful for investigating machine language files. It gives the load address plus the low byte and high byte of that address—all in decimal form. Since many machine language programs are executed by a SYS command to their first byte, knowing the load address is often the same as knowing the enabling SYS.

```
1Ø REM LOAD ADDR - M. TRANCHEMONTAIGNE
2Ø INPUT "{7 SPACEs}FILENAME";F$
3Ø OPEN2,8,2,F$+",P,R"
4Ø GET#2,LO$ : LO$=LO$+CHR$(Ø)
5Ø GET#2,HI$ : HI$=HI$+CHR$(Ø)
6Ø CLOSE2 : LA=ASC(LO$)+256*ASC(HI$)
7Ø PRINT"LOAD ADDRESS IS:" LA
8Ø PRINT"{4 SPACEs}LOW BYTE IS:" ASC(LO$)
9Ø PRINT"{3 SPACEs}HIGH BYTE IS:" ASC(HI$)
```

Mike Tranchemontaigne
Nashua, NH

$245 End address finder—You can find the ending address of a program on disk or tape by using Verify, then Peeking the pointer at 174–175. To find the highest address into which the program loads, verify it, then enter:

```
EA = PEEK(174) + 256*PEEK(175) - 1:PRINT EA
```

If you also know the load address, you can find the length of the program by:

```
Length = 1 + End Address - Load Address
```

Douglas Marshall
Bell, CA

$246 Renaming disks—The 1541 New command is capable of more than most people think. The command

```
N0:diskname,id
```

completely formats a disk, giving it the name *diskname* and the ID *id*. If you use the abbreviated command

```
N0:diskname
```

you erase the directory without doing the time-consuming complete reformatting process. But if you use the command

```
N0:anothername
```

you'll end up with a blank disk called *anothername*. It will still have its original ID, but it most surely will have a brand-new name.

Charles Lavin
Coral Gables, FL

$247 Directories on non-CBM printers—Users of non-Commodore printers may have trouble printing directory listings, since the reverse-field characters in the first line can be interpreted as printer-control characters. The way around the problem is to remove the reverse-field characters.

Loading the directory, then pressing zero and the return key will delete the problem line. But your listing will have no disk name. Alternatively, leave line 0 in the directory, but replace both quotes with apostrophes or some other character, and then hit the return key. Your printed directory should turn out all right. If problems persist, you can retype line 0 without the quotes or reverse field, and enter the corrected line by pressing the return key.

Gary Fields
Asheville, NC

Continued on p. 97.

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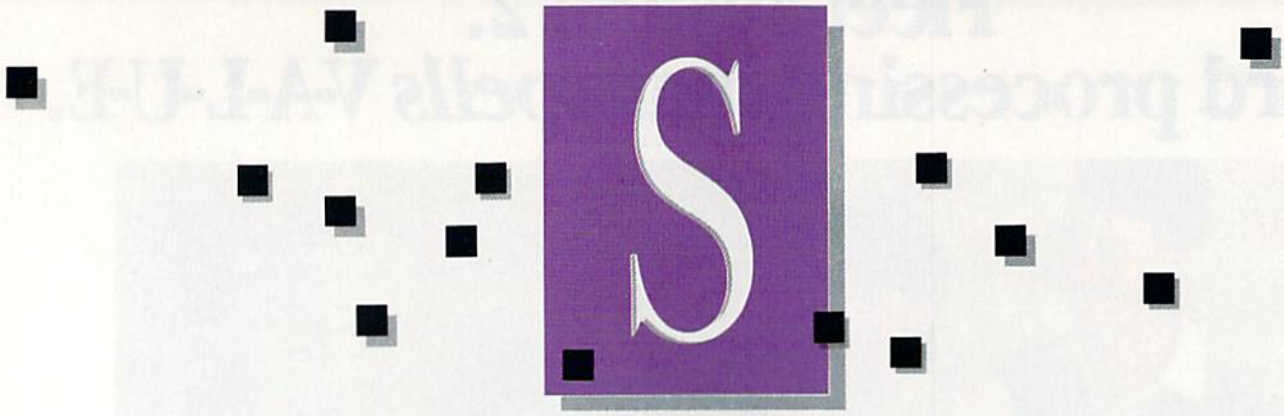
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Circle 93 on Reader Service card.



Compiled by SUSAN TANONA

Script/Plus

A

Increase the Productivity Of Your Plus/4 and C-16 With this Word Processor

Plus/4 and C-16 owners should be pleased to see Script/Plus, a versatile and powerful word processor that's available on cartridge. Script/Plus has dozens of high-quality features, but those that make it stand out from the Plus/4's internal word processor are what will interest most users.

Script/Plus allows you to control line spacing, so you're not limited to single-spaced hard copies. It also has on-screen word wrap, allowing you to avoid haphazardly broken words as you type in your document. Furthermore, the cartridge works with both cassette and disk.

While the Plus/4's word processor only allows 80 columns per line, Script/Plus offers between 40 and 240 columns per line. This feature alone will attract people who bought their Plus/4 for more serious applications, as it lends itself to the creation of large tables with many columns.

There is also a view option that allows you to see your document (with its print format implemented) before you actually print it out. You use scrolling to utilize this feature, as you do for any input that requires more than 40 columns.

You may wonder what good a wide working area is if you can't integrate it with a spreadsheet or database program. This is an important point, and it's one that Script/Plus addresses. This word processor actually has its own built-in calculator and a decimal-tabbing feature. These options let you create columns and rows of neatly formatted numbers that can be added, subtracted, multiplied, divided and calculated into percentages.

Script/Plus also has a database feature that allows you to create files for merging into your documents.

The calculator and the database aren't nearly as extensive as the 3-Plus-1 spreadsheet and file manager built into the Plus/4, but they do add a great deal of versatility to Script/Plus.

The 99-line limitation for a single document in the Plus/4's word processor does not exist when using Script/Plus. Now you can have up to 501 lines per document. This will accommodate a 20-page double-spaced report. For even longer documents, there is also a link-file feature.

You can keep Script/Plus plugged into the expansion port at all times, since it doesn't interfere with the 3-Plus-1 software inside the Plus/4. All programs are easily accessible through the function keys.

The manual accompanying Script/Plus reflects Commodore's goal in providing a serious word processor for Plus/4 and C-16 owners. It is quite detailed and includes suggestions for business and accounting applications, as well as explanations of each command.

Overall, Script/Plus is a great value, as it really makes the Plus/4 the productivity machine that it is billed to be. *(Commodore Business Machines, Inc., 1200 Wilson Drive, West Chester, PA 19380. Plus/4, C-16/$49 cartridge.)*

Margaret Morabito
***RUN* staff**

Report Card

A ***Superb!*** An exceptional program that outshines all others.

B ***Very Good.*** One of the better programs available in its category. A worthy addition to your software library.

C ***Good.*** Lives up to its billing. No hassles, headaches or disappointments here.

D ***Mediocre.*** There are some problems with this program. There are better on the market.

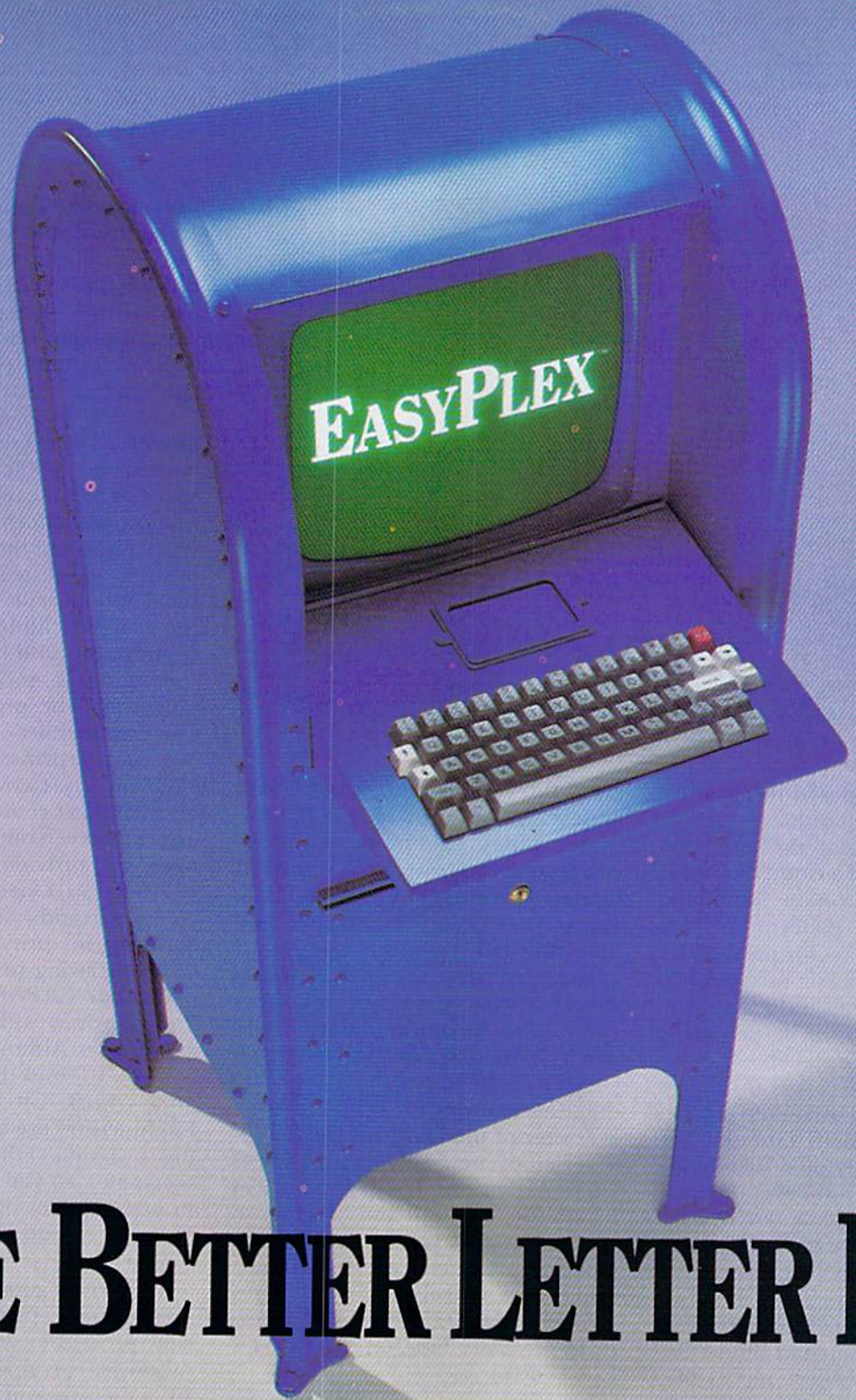
E ***Poor.*** Substandard, with many problems. Should be deepsixed!

Master of The Lamps

A

A Flying-Carpet Ride Through a Land Filled With Magic and Evil

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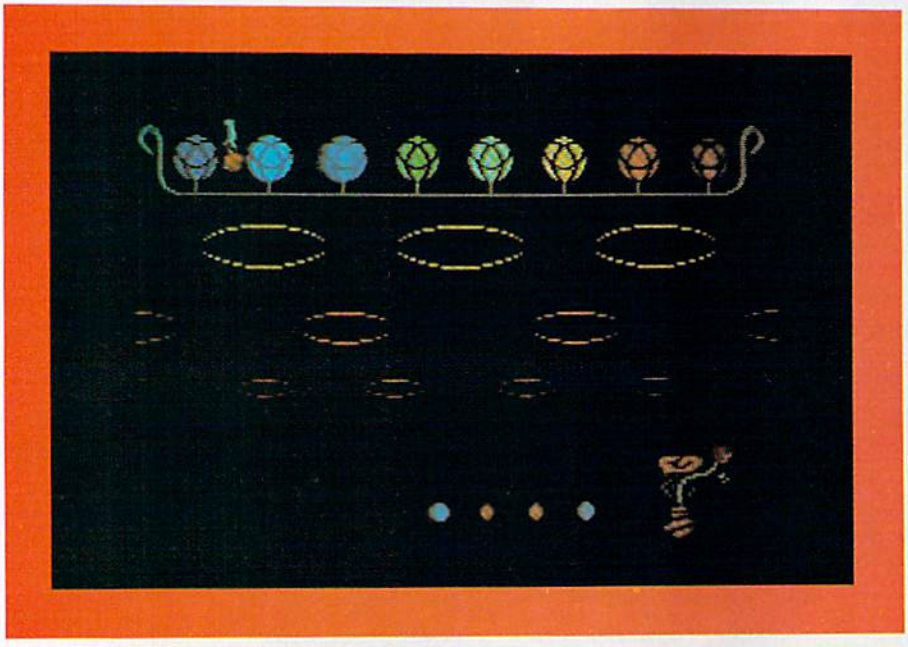
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to show you things you never knew your computer could do.

From the moment the animated titles appear out of a cloud of smoke, you know you're on to something special. Flashing patterns of diamonds appear, accompanied by appropriate music. You use your joystick to move the little Arabian-Nights figure onto the carpet at the lower center of the screen.

You must fly the carpet through a moving tunnel of diamond shapes that are displayed in fantastic colors. With 41 levels of difficulty, all your piloting skills will eventually be called upon. And while you're navigating through this tunnel, you are treated to an original jazz score with an engaging beat.

The real purpose of the game is to solve a series of sight and sound puzzles in order to collect pieces of a broken lamp, in which you will eventually imprison the evil genie.

The first choice from the Main menu allows you to seek only one lamp. Since it has been broken into seven pieces, this means seven journeys and seven trials. The second choice requires you to seek all three lamps.

The next choice permits you to practice your flying, with the option to select any of the 41 tunnels and to practice for as long as you like.

Next, you must solve the puzzle. Before you are seven gongs, each of a different color and tone. Strike any gong three times and a genie will appear. As he puffs on his hookah (water pipe), the puffs of smoke freeze and take on color. You must then strike the matching gongs in the appropriate order, and do so before time runs out.

Your first trial consists of matching three colors, your second, four colors, and so on. In higher levels, you'll have only the tones of the gongs to help you, so let's hope you don't have a tin ear.

Master of the Lamps is the first of a series of new software packages from Activision. It's software that makes use of sound and graphics in such a way that you'll swear they've made a quantum leap in programming. This is truly a quality game. *(Activision, Inc., 2350 Bayshore Frontage Road, Mountain View, CA 94043. C-64/ $29.95 disk.)*

Ervin Bobo
St. Peters, MO

Kid Pro Quo

C

Here's a Simple Drawing And Word Processing Program for Children

Kid Pro Quo is a terrific idea that needs work. It combines a word processor with drawing, sprite animation and music, and allows you to create illustrated stories that you play to the screen with accompanying sound and moving sprites. Unfortunately, Kid Pro Quo is too difficult for kids to use, and too slow and limited to attract adults.

Kid Pro Quo's word processor is quite primitive. Editing functions are limited to the delete key and the space bar; you can't even use Insert. The program does not support word wrap, either on the screen or on the printer. Its custom-character set is small and difficult to read, especially for younger children who are more comfortable with larger letters.

Printing is entirely in Graphics mode, and the program warns that non-Commodore printers tend to overheat. I printed only part of a page on my Gemini 10X before I decided that I could use Kid Pro Quo only for screen output. The program does not provide for interrupting printing, so I had to turn off the computer (and lose my page) to stop battering my print head.

The drawing program is the best of the four Kid Pro Quo applications. You can draw with a joystick or the cursor keys. Although I prefer cursor control, I found that the keys didn't always work. Circle, Box, Line and Fill functions are built into the drawing program. Fill works only with rectangles, so you have to add color to other shapes one pixel at a time. You can use up to three colors per screen.

You need a good-quality joystick to create precise pictures, as it is a very slow process to draw and to correct mistakes. Fortunately, once you finish a picture, you can copy it to any other page. The program disk includes a library of pictures, animation and music that are charming and simple enough that children may be encouraged to imitate them.

The instruction book really doesn't provide enough information to get you past problems. Children who are not already proficient with computers are likely to become confused when something doesn't work. (*I* had trouble understanding how to make the animation work.)

The music composer has seven octaves and the sound envelopes of

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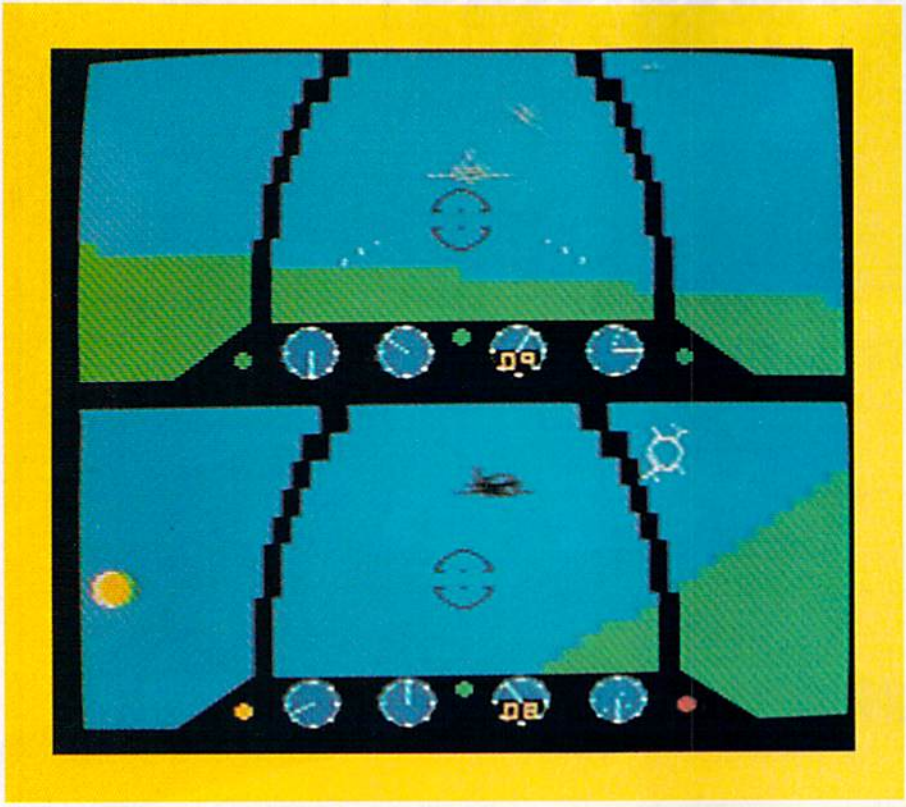
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nine musical instruments. You can easily experiment with sound, but you must be able to read music to enter a particular song. Music is limited to one voice, and I could find no provision for changing a composition once I had entered a note.

Any page can include text, drawings, animation and music. All the parts can be developed separately, saved and assembled in a series of up to 14 pages. You can play pages to the screen in succession.

Kid Pro Quo has exciting creative potential for children who are patient enough to learn how to use it (with an adult's help). Parents who can overlook its slow pace and its limitations may enjoy creating stories with color, movement and sound for their children.

However, this program is not suitable for word processing purposes. Children would probably gain more from separate programs for writing and for drawing that are easier to use and have greater capabilities than Kid Pro Quo. *(Softsync, Inc., 162 Madison Ave., New York, NY 10016. C-64/ $29 disk.)*

Annette Hinshaw
Tulsa, OK

Mig Alley Ace B

Pilot Your F-86 Sabrejet To Victory in Head-to-Head Battle over Korea

Mig Alley Ace is an authentic simulation of air combat in Korea between September 1950 and June 1951. In five separate scenarios, you must pilot early U.S. fighting jets (such as the F-80 Shooting Star and the powerful F-86 Sabrejet) in aerial combat against enemy fighters.

What distinguishes Mig Alley Ace from some of the other MicroProse aerial-combat simulations is the use of a split screen that allows two pilots to play simultaneously, either against each other or in a cooperative effort against the computer.

You may add additional computer-controlled wingmen to each squadron, up to a total of four planes. By teaming up with two computerized allies, for instance, and taking to the skies after a single enemy, you're almost assured easy victories in the early battles. At the most difficult levels, however, you're likely to spend a lot of time watching the computer battle against itself as you sit on the sidelines after being shot down.

You pilot your F-86 Sabrejet with a joystick, and the weapons are triggered by pressing the fire-button. The throttle and bail-out functions are controlled by the keyboard. Since the two-player mode requires both players to use the keyboard simultaneously, make sure both of you can reach the computer and know which keys correspond to what plane.

Each player also has his own instrument panel displayed on the screen below his view out the cockpit window. The instrumentation consists of an engine-power gauge, a speedometer, an altimeter and a radar display. Three indicator lights warn of high exhaust-gas temperature, low altitude and a dwindling ammunition supply.

Although it sounds like a lot to keep track of, the F-86 instrument panel is actually quite bare compared to the dashboard of a lot of automobiles. After just a short time aloft, you'll feel at home in the cockpit and ready to try more advanced maneuvers.

If you've already logged several hours with MicroProse's F-15 Strike Eagle, you may find that piloting the F-86 isn't quite challenging enough. Also, except for a slight change in the capabilities of the enemy aircraft, the five scenarios from which you can choose aren't significantly different from one another.

What makes Mig Alley Ace an excellent addition to any fighter pilot's software library, however, is the realistic simulation of three-dimensional airspace, and the thrill of competing against the unpredictability of a human opponent. *(MicroProse Software, 120 Lakefront Drive, Hunt Valley, MD 21030. C-64/$34.95 disk.)*

Bob Guerra
Charlestown, MA

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Trivia Plus

A

This Package Will Surely Test Your Talent for Trivia

It's not surprising that the trivia craze has found its way into home computing. After all, computers are great for storing a lot of information and retrieving it at a moment's notice.

Operation of Trivia Plus is simple. A single instruction sheet accompanies the disk and adequately describes the game.

One feature of Trivia Plus caught my attention immediately. When asking music-related questions, it makes use of the superb sound of the C-64.

There are eight categories from which your questions are chosen: History and Politics, Geography, Humanities, Sports and Games, Movies, Science, Television and General Knowledge. You can play the game alone or match wits with a maximum of five other players. You may elect to keep score or just play for fun.

Category selection is performed randomly by the computer. You may also elect a wild-card category by pressing one of the function keys.

With more than 3500 questions on the disk, you aren't likely to see the same ones very often. There are over 100 songs included in the Humanities category, adding a dimension to the game that provides a break from the text questions.

The graphics in the game show the same attention to detail. Trivia Plus comes across as a very professional-looking program.

To help vary the action, Trivia Plus offers a Challenge option, where the computer chooses a player and a challenger for each question. Play rotates so that in each round, each person is a player once and a challenger once. During normal play, the computer asks questions of individual players without the added feature of the challenges.

If trivia has captured your imagination, Trivia Plus deserves your consideration. It is an excellent game. *(Academy Software, PO Box 6277, San Rafael, CA 94903. C-64/$24.95 disk.)*

Jim Grubbs
Springfield, IL

Racing Destruction Set

A

Rev Up Your C-64 And Head for the Checkered Flag

One of the latest construction-set programs to be released by Electronic Arts is Racing Destruction Set. It's easy to use, and its excellent use of sound and graphics creates a

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realistic world that draws you in and holds you enthralled. The program offers you more features and options than you'll probably ever have time to explore.

Although you can boot Racing Destruction Set and begin racing immediately (either against a computer-controlled vehicle or a human opponent), you'll soon want to leave behind the Can-Am racers and grueling demo-track to experiment with some of the eight other available racing machines and the 50 race tracks that are supplied on Side 2 of the program disk. You can test your racing skill with stock cars, formula-1s for Grand Prix races, dirt or street bikes, jeeps, baja bugs, pickup trucks and even out-of-this-world lunar rovers.

You can customize each vehicle by selecting spiked, knobby, street tires or slicks, and a variety of engine sizes, depending on the vehicle you select. To help you decide how to modify your racer, the Edit Vehicle mode shows you how your vehicle's traction, weight, top speed, acceleration rate and shock strength is affected each time you make a change.

Once you've chosen and modified your vehicles, it's time to pick out a track. These range from one-of-a-kind originals to real tracks such as Monaco or Daytona. There are even a few European test tracks. Using the built-in track editor, you can completely redesign these courses or simply wipe them out and construct your own track from scratch.

There are several kinds of track pieces from which to choose, including straightaways, forks, curves, crossovers, jumps and sections with start or finish lines. In addition, most pieces can be narrowed down to a single lane or bent to provide the exact shape and incline that you want for your jumps. Finally, you can individually select the surface of every section of track, choosing from pavement, dirt or ice. Both customized vehicles and race courses can be saved on a blank disk.

Even when you've selected vehicles and decided on a track, there are still more options to consider. Will you race under normal, advanced or severe conditions? Will your computer-controlled racer drive as a pro, expert or novice?

How many laps will be required to win? Will it be a simple contest of speed and driving skill, or will it be a no-holds-barred race to destroy the opponent?

Did you ever wonder what it would be like to race on the moon? Saturn? Mars? Now you can find out, with a choice of 14 possible gravity settings. You could even create a Grand Prix circuit spanning the entire solar system!

Racing Destruction Set is the kind of software that will keep you up nights designing tracks, testing racers and challenging your favorite opponent to just one more race. *(Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403. C-64/$32.95 disk.)*

Bob Guerra
Charlestown, MA

Sixth Sense



An Advanced Terminal Program for the Serious Telecommunicator

For intermediate and advanced telecommunicators, Sixth Sense, from Microtechnic Solutions, Inc., is a terminal program that's worth looking into. This program (for the C-64) is called a thinking terminal, and offers many features for on-line communications that go beyond those provided by many other terminal programs.

This disk-based terminal will work with one or two 1541 disk drives, the 4040 drive and both of the MSD drives (single and dual). It is compatible with the Commodore 1525 and 1526 printers, as well as with any transparently connected ASCII printer.

As for modems, the Sixth Sense package claims to work with the Commodore 1600, 1650, 1660, 1670, Westridge, Mitey Mo, HesModem I and II and any RS-232 modem. I used the program successfully with the 1600 and 1660 modems.

Not only does Sixth Sense offer hardware versatility; it also has dozens of software features that place you on a high plane of telecommunicating.

The Sixth Sense program has a 700-line virtual screen that scrolls forward and backward at a high rate of speed when the program is searching for menus and other text files.

There are 16 help screens that give you access to submenus for controlling your terminal. Features include auto-answer, auto-dial, automatic redial, buffer control, disk commands, modem settings, print options, a clock and uploading and downloading capabilities.

Furthermore, Sixth Sense provides utility routines for text-to-program conversion, and vice versa. It allows you to use DOS 5.1 wedge commands and handle ASCII/PETASCII text and program files, using either text, XModem or CompuServe-B protocol modes. It also offers you the ability to fine-tune the computer's internal baud rate to suit your own particular modem.

Programmers will appreciate the 16 macros that are programmable through the function keys and can handle up to 80 characters per key. You can program system functions into these macros and set conditional tests.

Sixth Sense's screen editor lets you create text files for uploading and also allows you to edit downloaded text files before you save them to disk. There is an 80-character screen window that is set off for your text entry at the same time that you are receiving text from a host computer.

You must thoroughly read the user's manual in order to get the most out of this terminal package. Both the manual and the program itself are probably too complicated for the newcomer to telecommunications, but others will really appreciate the thorough documentation and the program's many features and options.

Sixth Sense should appeal to the person who likes to get technical, and advanced users will like this terminal package because it offers virtually everything that could possibly be needed. All of the options are impressive, but keep in mind that, for many people, they may not be necessary. *(Microtechnic Solutions, PO Box 2940, New Haven, CT 06515. C-64/$89.95 disk.)*

Margaret Morabito
***RUN* staff**

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Meet the Amiga

By MARGARET MORABITO

Here's the scoop on the Amiga, Commodore's new business and personal computer that offers speed, extraordinary graphics capabilities, 4-channel sound and multitasking.

For months, the Amiga has attracted much positive, though unspecific, coverage in computer columns. We at *RUN* would like to fill you in on the exact details of this new Commodore computer, which has been in development at the Commodore-Amiga Corporation ever since March 1983.

The Amiga is the first of a new breed of computers that will strongly challenge the more expensive graphics-oriented personal computers like the Apple Macintosh and those using the GEM system. It represents a giant step forward in personal computer technology, supplying its owners with the capability for truly extraordinary graphics, sound and multitasking.

The Amiga is built around the Motorola 68000 microprocessor, which is being used more frequently in personal computers. This 16/32-bit processor greatly increases the speed of operation and has the capability of addressing a full eight megabytes of memory.

The Amiga is different from other 68000 computers because of its three specially designed custom chips, which handle much of the burden of implementing the Amiga's extraordinary graphics and sound features, as well as its input/output operations. These chips serve to free up the 68000, allowing it to run at full speed most of the time. This makes it possible for the computer to execute several applications simultaneously.

Depending upon the peripherals and the amount of expansion you wish to purchase for the Amiga, this computer will meet a wide range of needs. In its minimal configuration, it will attract the person who is planning to pay from $1500 to $2000 for a computer. When it is expanded to 512K and has been outfitted with a hard disk drive, VCRs and other video equipment, business and professional people will find the Amiga very attractive.

Custom Chips

The custom graphics chip and the custom animation chip make possible the Amiga's superior color graphics output. These graphics chips provide multidimensional displays, a selection of 4096 colors and video resolution to match that of a modern television set.

Both 40- and 80-column text displays can be combined with the Amiga's graphics modes, creating visual quality and versatility that rival the mini- and mainframe computers. The Amiga also has line-drawing and area-fill functions, which occur at the amazing rate of one million pixels per second.

The sound/peripherals chip handles both the sound and input/output


AMIGA
Text
Fonts
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features. The Amiga can duplicate multivoiced sounds on any of its four sound channels. By combining the power of this chip with the dual stereo output ports, the Amiga can easily match the quality of commercial synthesizers.

Peripheral Ports

In the Amiga, Commodore upholds its tradition of providing built-in ports for most peripherals, rather than making the user buy costly interfaces and adapters.

There are three separate video output ports that make it possible to use a television set, a composite monitor and an RGB analog/digital monitor. The Commodore 1702 composite and the 1902 RGBI monitors will work on the Amiga, as will third-party monitors; however, only the Amiga HR monitor will be advertised for sale with the Amiga.

Commodore has provided an expansion disk-drive port, so you can add up to three 3½- or 5¼-inch disk drives. In addition, there are two separate stereo jacks for sound output. There are also plans for a hard-disk drive.

The Amiga's standard RS-232 and parallel ports will handle most off-the-shelf modems. Commodore is selling its own 1200-baud modem for the Amiga, and there is also a 2400-baud modem available.

Many brands of printers will work with the Amiga, but owners will probably want to get one that will take advantage of this machine's color graphics. The Okimate and the Diablo color printers will work with the Amiga.

Two built-in controller ports will accommodate joysticks, a mouse, graphics tablets and light pens. The system box also has a port for the detached keyboard cable.

The Keyboard and System Box

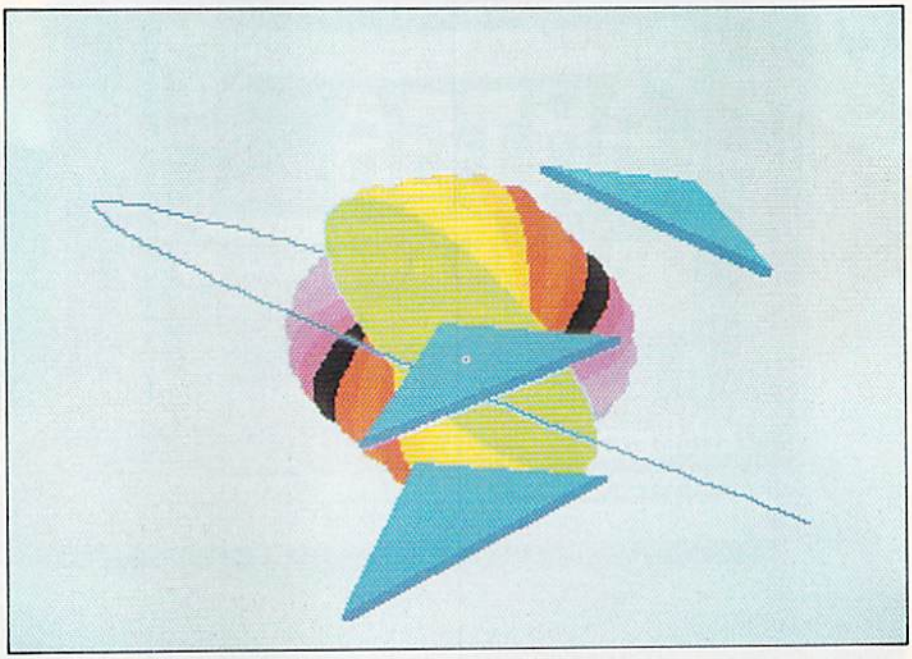
The Amiga comes with an 89-key detached keyboard and a separate system box, which houses the internal hardware and a disk drive. The keyboard very conveniently slides under the system unit when you don't need to use it. For example, if you are using the mouse extensively, you might prefer to slide the keyboard out of the way.

The keyboard has a numeric keypad for easy data entry on a large scale. Also, across its top are ten function keys for software control. Also for software control are two special Amiga keys to the left and right of the space bar.

There are 256K bytes of RAM and a very large amount of ROM, 192K. This is plenty of RAM for most personal and small-business applications. However, for more demanding applications, you can expand the Amiga's memory up to 512K by simply inserting a 256K RAM module into the front of the system box.

The Amiga's built-in disk drive accommodates double-sided, double-density 3½-inch disks and has a storage capacity of 880K.





Graphics

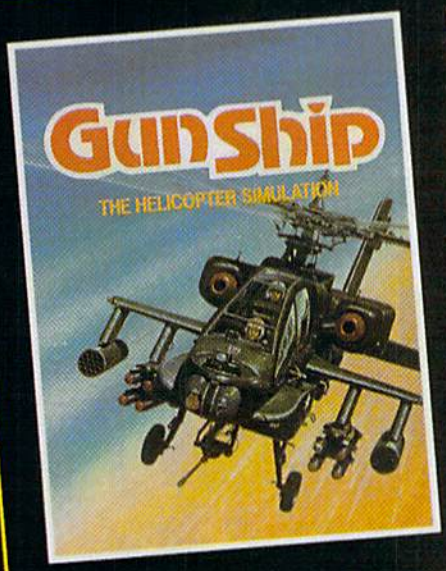
The Amiga is already highly respected for its superior graphics, and this will open up its use for applications far different from those of most traditional personal computers. The Amiga will provide a tool for serious graphics applications and will likely attract engineers, architects, creative artists and other professionals who rely on detailed designing in their work.

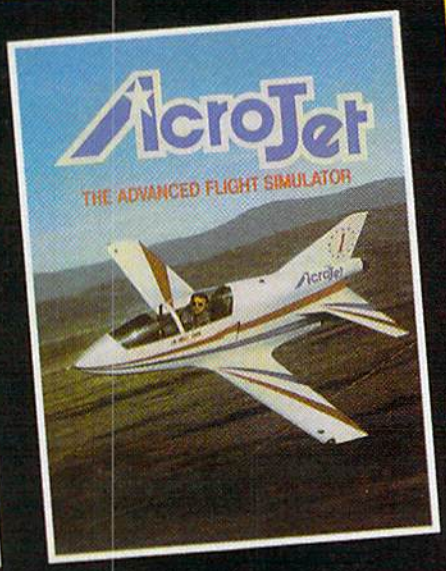
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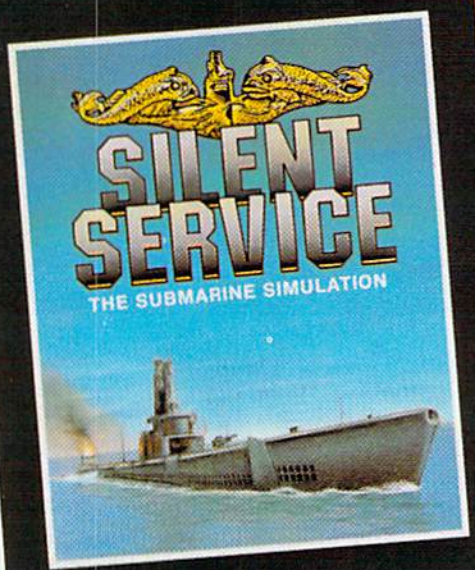
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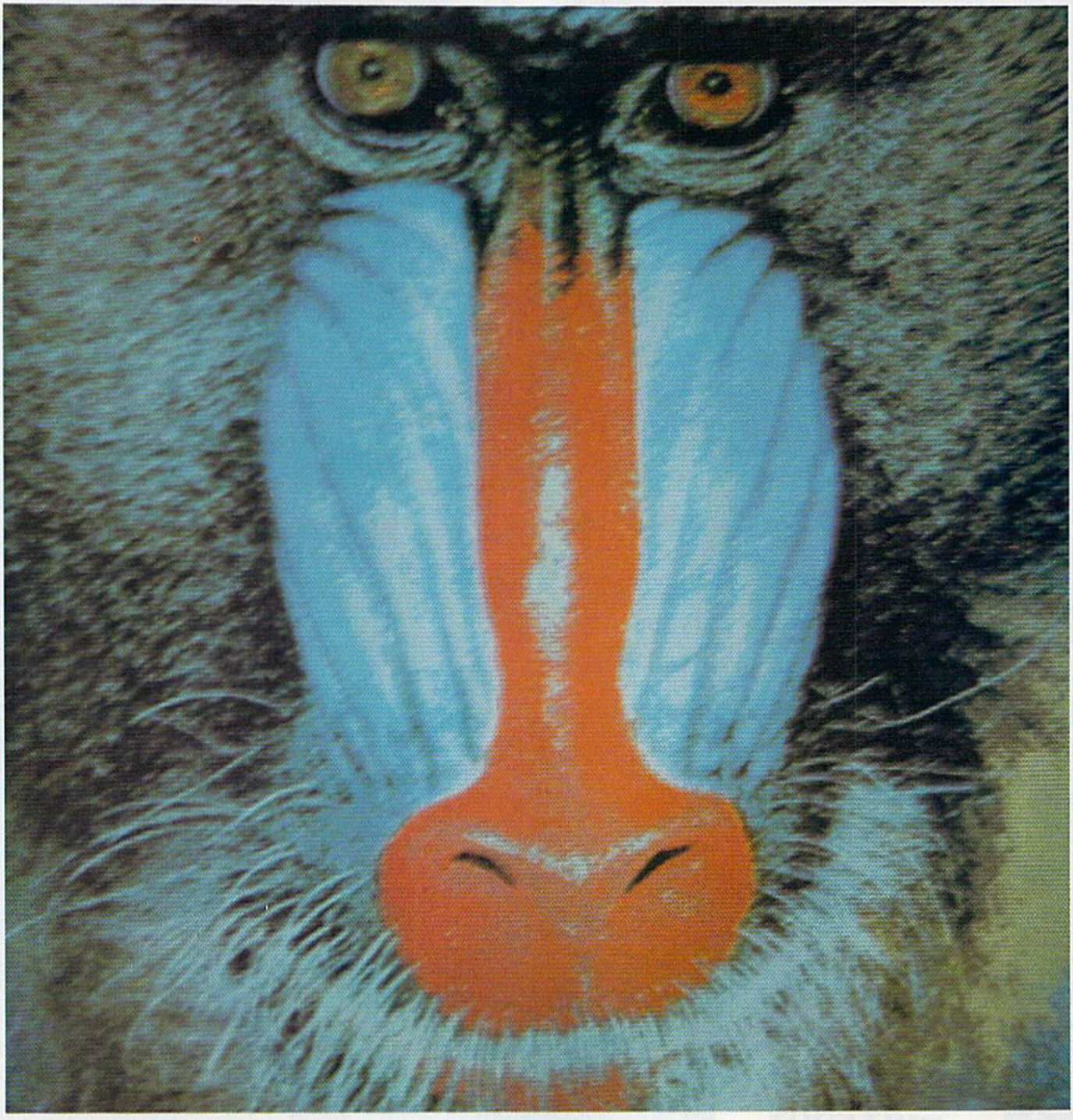
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There are two basic screen displays on the Amiga: playfields and sprites. Playfields are backgrounds upon which you may display sprites, text and other graphics objects. You have available two playfields, which you can scroll vertically and horizontally on the same screen. You may define objects on a playfield, animate them and make them interact with sprites.

The Amiga has a hardware device called a blitter, which controls the partitioning and movement of background objects. The blitter acts so quickly in performing its tasks that even the Amiga's low-resolution animation is as impressive as sprite animation. Playfield animation is actually preferable in many cases because it allows the use of more colors and imposes no size limit on an object.

The Amiga's low-resolution modes are 320 × 200 and 320 × 400. Each of these low-resolution modes can simultaneously display 32 different colors, chosen from the 4096 available.

There is a special low-resolution mode that lets you control the color even more. This mode can simultaneously display 4096 colors.

In high-resolution mode, the Amiga offers 640 × 200 and 640 × 400 pixel resolution. You can display 16 colors in each high-resolution mode.

You can also simultaneously display all four of the resolution modes, with their own specifically chosen colors.

Text and Sprites

You can place text characters on any of the Amiga's screens in any resolution mode. Each character is treated as a special graphics element and is defined as a series of pixels in an 8 × 8 grid. This means that there are no limitations to the mixing of text with graphics. You also can mix

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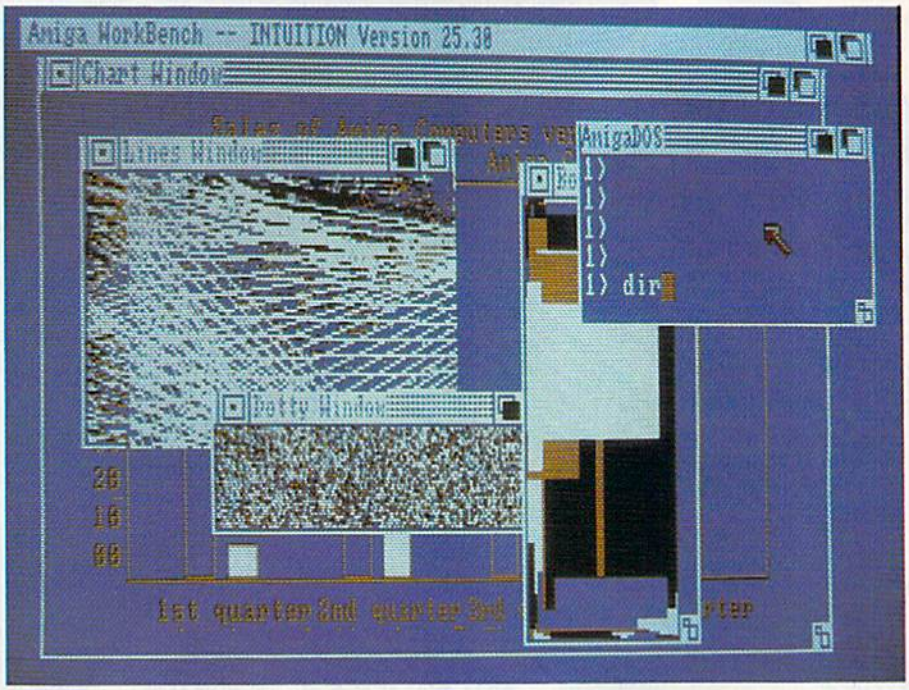
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color with text and can customize your own text fonts.

Sprites are a Commodore tradition in the C-64 and now in the C-128. The Amiga also has sprites, a feature not often found in personal computers.

The Amiga offers eight programmable sprites, all hardware-driven. A sprite can be up to 16 pixels wide and can be any height. Each pixel of a sprite can have any of four colors, including transparency. There is a special mode in which two sprites can be attached, thereby increasing the number of colors to 16.

Although you are given a limit of eight sprites, you can get around this by reusing them on the same screen. The Amiga lets you reuse any sprite as many times as you wish. The hardware provides for collision detection between sprites and playfield objects and also lets you create up to seven layers of sprites within the two layers of playfields.

User Interface

The Amiga's user interface is made up of a group of system software programs and is controlled with either a mouse or the keyboard. This system software lets you control the multitasking capabilities through the use of pull-down screens, windows and menus.

You have available multiple overlapping windows, each of which can fully utilize all of the Amiga's hardware resources. In these windows, you can change text fonts or window size and completely control the activities within each.

Separate application programs can be simultaneously active in these windows without conflicting with each other. This is because each application actually has its own distinct terminal, called a virtual terminal.

These terminals are possible because of the extraordinary speed of the 68000 microprocessor in coordination with its three custom chips. This can be visualized as a mainframe computer being simultaneously accessed by many terminal work stations, all performing different tasks.

Icons

Icons are the pictures that you see displayed within menus; they represent different tasks for the computer to perform. A trash can, for example, is where you would drop an old file or a program that you have finished using. You simply move the mouse, which in turn controls the screen location of the cursor. When the cursor is positioned on top of the desired task icon, you simply press the button on the mouse and the action takes place. This alleviates the need for actually typing in system commands.

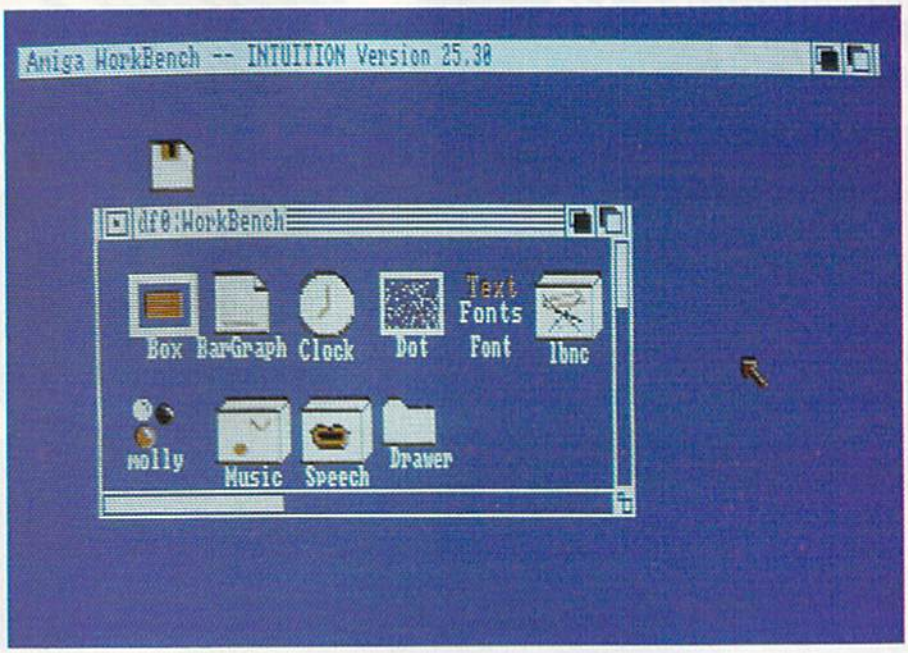
Menus

Each window has its own menu that can hold icons and words. In the Amiga, you can custom-design the menus to fit your particular purposes. You can move from menu to menu without having to return to a main menu each time, thereby avoiding wasted time and effort.

The Amiga's user interface will allow the non-computerist to easily control the multiple features of this computer, whether he is working with just one program or several simultaneously. Today, computer operating systems are being developed that let you move away from Command mode, allowing you to become less involved with traditional computer keyboard activities. While the Amiga encourages this trend in computer usage, it also allows for command input from those users who wish to have more direct involvement.

Bundled Software

The Amiga comes with separate software packages on disk that let you



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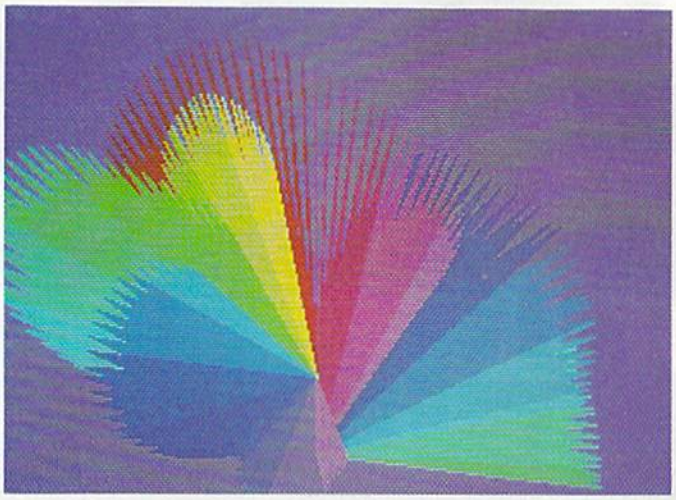
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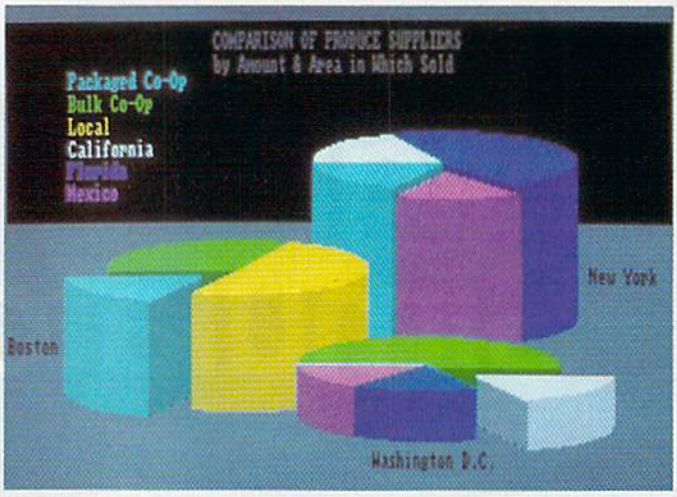
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immediately start using its features. It gives you AmigaDOS, the Amiga's operating system and user interface. A diagnostic program is provided to keep you informed on the internal condition of your computer. There is also a Basic language included.

You can purchase two word processors when buying the Amiga. TextCraft is provided as an entry-level word processor. For a more sophisticated program, you can ask for Enable. There is also a music program, called MusicCraft. Also available is a graphics program called GraphicCraft, which will give you access to many of the computer's graphics features.

Most of the major software companies are working on other programs for the Amiga. Unfortunately, Commodore computer owners who want to upgrade to the Amiga won't be able to use any of their present software on this new computer, nor does the Amiga run CP/M.

Is the Amiga for You?

The Amiga will be sold in computer stores, not by mass merchandisers. It promises to appeal to varying markets because of its versatility, power and speed. It will tap the home-user market, but many home users won't need all of its capabilities. For example, someone who doesn't need to perform multitasking at lightning speed probably won't be drawn to the Amiga.

As a practical matter, the new C-128 will offer the home user and the small-business person everything they need at a fraction of the Amiga's cost. However, for those users who feel that they need more, the Amiga will serve perfectly. It definitely will attract the home user who may have been thinking of getting a Macintosh or an IBM PC, because the Amiga provides far more than they do and yet costs much less.

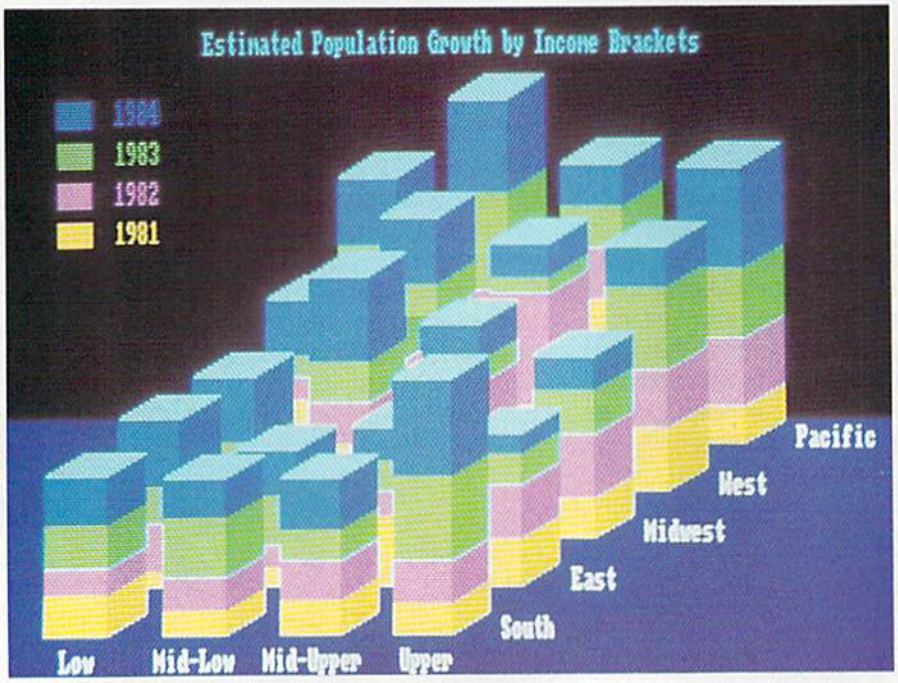
Furthermore, professional draftsmen, architects, engineers, programmers and designers will really appreciate this new machine. Its cost and performance are just too good to pass up.

The potential of the Amiga in business graphics applications, as well as in traditional number-crunching and word processing, is tremendous. These capabilities, in addition to the multitasking, make the Amiga a sound investment.

Lastly, the Amiga is bound to penetrate the market of professional artists and musicians. It promises to be a key to unlocking the barriers between computers and creative artists. It is both affordable and refined.

The cost of this powerhouse has been unofficially quoted at approximately $1500 for the system unit with disk drive, keyboard, RGB color monitor and bundled software.

The Amiga has been highly touted for good reason during the past year. When you actually see this computer in action, you will find that none of the rumors were exaggerations. R



Margaret Morabito, RUN's technical manager, is the author of The Commodore 128 Personal Computer Handbook *and is currently working on a second book covering the Amiga. Both books are published by DataMost and will be available this fall. Address all author correspondence to Margaret Morabito, c/o* RUN *editorial, 80 Pine St., Peterborough, NH 03458.*

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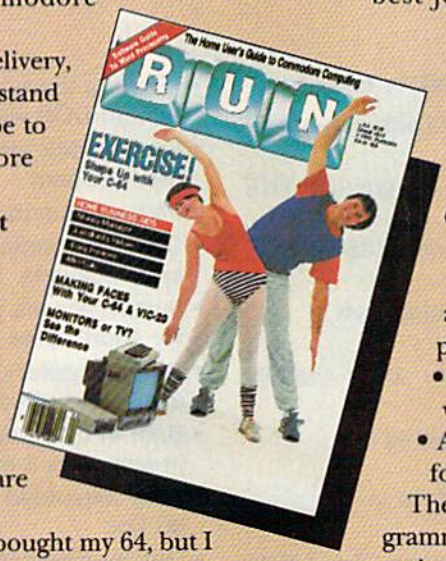
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Fraction Action

By J. MICHAEL DICKEY

Get out your pencil and paper and take your time practicing fractions with your own personal math tutor.



Shannon's Fractions is a relatively complete tutorial on adding fractions that includes a bit of sound and color to reinforce the objectives of the program.

You may choose one of five levels of difficulty. The first four options increase in difficulty, while the last option presents three problems at each level during the lesson, starting with level 1.

All problems are randomly generated. This occasionally results in some repetition of problems or problem types. On the hardest level, this means that every once in a while a problem will be presented that is "easier" than the others in the set.

Every lesson contains 12 separate problems. You're guided through the process of adding the fractions one step at a time. You will be asked to reduce all fractions, but if you end up with an improper fraction, you won't be asked to change it into a mixed number. Errors made during the process are caught, and you're given another opportunity to reenter the proper response. For this reason, there's no summary with the number or percent correct.

No tutorial program can predict all possible student errors. If the student in your home is having difficulty, you'd be wise to be available to offer some help.

The program as listed will run on the C-64 and the C-128 (in C-64 mode) with sound. It will also work on the Plus/4, C-16 and VIC-20 with 3K expansion, but without sound. You may want to change the sound routine in lines 127–128, although sound is not necessary.

I hope Shannon's Fractions will be useful to many students in mastering the complexities of numerators, denominators and lowest common denominators. R

Address all author correspondence to J. Michael Dickey, 7056 Styers Ferry Road, Clemmons, NC 27012.

RUN It Right

C-64; C-128 (in C-64 mode); Plus/4; C-16; VIC-20 with at least 3K expansion

Listing 1. *Shannon's Fractions program.*

```
1 DIMN(2),D(2),A(4)                          :REM*147
2 FORX=ØTO4:READA(X):NEXT                    :REM*78
3 DATA1,2,3,5,7                              :REM*73
4 DN$="{HOME}{2Ø CRSR DNs}"                  :REM*84
5 DEFFNA(X)=INT(LOG(X)/LOG(1Ø))+1:DEFFNB(X)
  =INT(X+.5):DEFFNC(X)=INT(RND(1)*X)+1
                                             :REM*235
6 SP$="{5 SPACEs}":POKE53281,1               :REM*188
7 PRINT"{SHFT CLR}{3 CRSR DNs}{3 CRSR RTs}S
  HANNON'S":PRINT"{CRSR DN}{9 CRSR RTs}FRAC
  TIONS"                                     :REM*243
8 PRINT"{7 CRSR DNs}{7 CRSR RTs}CLS 1984"
                                             :REM*62
9 FORP=1TO8ØØ:NEXT:GOSUB127                  :REM*169
1Ø PRINT"{SHFT CLR}{4 CRSR DNs}ALWAYS REDUC
  E YOUR":PRINT"ANSWER IF YOU CAN."
                                             :REM*246
11 PRINT"{2 CRSR DNs}LEAVE IN FRACTION":PRI
  NT"FORM, DO NOT CHANGE"                    :REM*65
12 PRINT"TO MIXED NUMBERS."                  :REM*5Ø
13 PRINT"{2 CRSR DNs}PENCIL AND PAPER WILL"
  :PRINT"HELP!!"                             :REM*111
14 PRINT"{2 CRSR DNs}12 QUESTIONS PER SET."
                                             :REM*26
15 PRINT"{2 CRSR DNs}ANY KEY ..."            :REM*213
16 GETA$:IFA$=""THEN16                       :REM*254
17 GOSUB127                                  :REM*219
18 PRINT"{SHFT CLR}{3 CRSR DNs}{5 CRSR RTs}
  PICK LEVEL"                                :REM*82
19 PRINT"{2 CRSR DNs}"SP$"{CTRL 9}1{CTRL Ø}
   BEGINNER{CRSR DN}":PRINTSP$"{CTRL 9}2{C
  TRL Ø} LEARNER{CRSR DN}":PRINTSP$"{CTRL
  9}3{CTRL Ø} MASTER{CRSR DN}"               :REM*227
2Ø PRINTSP$"{CTRL 9}4{CTRL Ø} SUPER STAR{CR
  SR DN}"                                    :REM*114
21 PRINTSP$"{CTRL 9}5{CTRL Ø} VARIABLE"
                                             :REM*17
22 GETB$:IFB$=""THEN22                       :REM*172
23 GOSUB127                                  :REM*225
24 IFVAL(B$)<1ORVAL(B$)>5THEN22              :REM*186
25 IFVAL(B$)=5THEN27                         :REM*157
26 K1=VAL(B$)                                :REM*88
27 FORZ=1TO12                                :REM*57
28 IFVAL(B$)<>5THEN3Ø                        :REM*68
29 K1=INT(Z/3-.Ø5)+1                         :REM*159
3Ø PRINT"{CTRL 3}":GOSUB91                   :REM*14Ø
31 PRINT"{SHFT CLR}{CTRL 1}{3 CRSR RTs}ADD
  THE FRACTIONS"                             :REM*1
32 PRINT:PRINT"{CTRL 3}{CTRL 9}FIRST{CTRL Ø
  }{2 SPACEs}{CTRL 6}{CTRL 9}SECOND{CTRL Ø
  }"                                         :REM*24
33 K=5:CN=3:I=Ø:PRINT"{CTRL 3}";:GOSUB124:P
  RINT"{CTRL 1}"                             :REM*53
34 PRINTLEFT$(DN$,K+1)SPC(6)"+"              :REM*252
35 CN=9:I=1:PRINT"{CTRL 6}":GOSUB124:PRINT"
  {CTRL 1}"                                  :REM*161
36 PRINTLEFT$(DN$,K+1)SPC(11)"="             :REM*52
37 INPUT"{2 CRSR DNs}THE LCD ={3 SPACEs}{SH
  FT SPACE}{4 SPACEs}{8 CRSR LFs}";A1$
                                             :REM*221
38 GOSUB127                                  :REM*24Ø
39 A1=VAL(A1$):IFA1<1ORA1>1ØØØTHENPRINT"{4
  CRSR UPs}":GOTO37                          :REM*255
4Ø IFA1=LCTHEN49                             :REM*116
41 IFINT(A1/LC)-A1/LC=ØTHEN45                :REM*3
42 PRINT"{2 CRSR DNs}NOT A COMMON":PRINT"DE
  NOMINATOR,":PRINT"TRY AGAIN"               :REM*18Ø
43 PRINT"WHEN SCREEN":PRINT"RETURNS."
                                             :REM*73
44 FORX=1TO3ØØØ:NEXT:GOTO31                  :REM*2Ø2
45 PRINT"{3 CRSR DNs}A COMMON DENOMINATOR,"
                                             :REM*225
46 PRINT"BUT {CTRL 9}NOT{CTRL Ø} THE LOWEST
  ":PRINT"COMMON DENOMINATOR."               :REM*148
```


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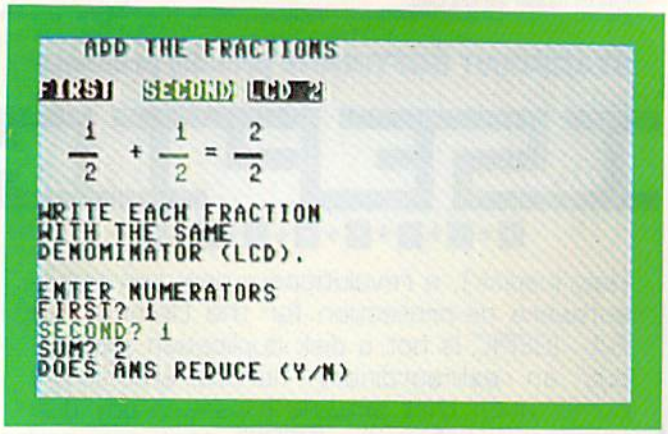
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Listing 1 continued

```
47 PRINT"{CRSR DN}TRY AGAIN, WHEN SCREENRET
   URNS."                                  :REM*85
48 FORX=1TO3ØØØ:NEXT:GOTO31                :REM*2Ø6
49 PRINT"{HOME}{2 CRSR DNs}"TAB(14)"{CTRL 9
   }LCD"A1;"{CTRL Ø}"                      :REM*83
5Ø PRINTLEFT$(DN$,9);"{CTRL 1}WRITE EACH FR
   ACTION"                                 :REM*162
51 PRINT"WITH THE SAME":PRINT"DENOMINATOR (
   LCD)."                                  :REM*63
52 PRINT"{CRSR DN}ENTER NUMERATORS":REM*176
53 INPUT"{CTRL 3}FIRST{6 SPACEs}{6 CRSR LFs
   }";A2$                                  :REM*37
54 REM GOSUB127                            :REM*246
55 A2=VAL(A2$):IFA2<1ORA2>1ØØØTHENPRINT"{2
   CRSR UPs}":GOTO53                       :REM*2Ø7
56 INPUT"{CTRL 6}SECOND{6 SPACEs}{6 CRSR LF
   s}";A3$                                 :REM*48
57 GOSUB127                                :REM*3
58 A3=VAL(A3$):IFA3<1ORA3>1ØØØTHENPRINT"{2
   CRSR UPs}":GOTO56                       :REM*48
59 INPUT"{CTRL 1}SUM{6 SPACEs}{6 CRSR LFs}"
   ;A4$                                    :REM*69
6Ø GOSUB127                                :REM*6
61 A4=VAL(A4$):IFA4<1ORA4>1ØØØTHENPRINT"{2
   CRSR UPs}":GOTO59                       :REM*145
62 IFA4=FNB(LC/D(Ø)*N(Ø)+LC/D(1)*N(1))THEN6
   5                                       :REM*1Ø6
63 PRINT"ERROR IN WORK"                    :REM*53
64 PRINT"{5 CRSR UPs}":GOTO53              :REM*244
65 N(Ø)=A4:D(Ø)=LC:I=Ø:CN=14:GOSUB124:PRINT
   LEFT$(DN$,16)                           :REM*129
66 PRINT"DOES ANS REDUCE (Y/N)"            :REM*3Ø
67 GETA$:IFA$=""THEN67                     :REM*17
68 GOSUB127                                :REM*14
69 IFA$<>"Y"ANDA$<>"N"THEN67               :REM*165
7Ø IFA$="Y"THEN73                          :REM*5Ø
71 IFLC<>D(2)THEN81                        :REM*39
72 GOTO83                                  :REM*1ØØ
73 INPUT"NEW NUMERATOR IS{5 SPACEs}{5 CRSR
   LFs}";A1$                               :REM*93
74 GOSUB127                                :REM*2Ø
75 A1=VAL(A1$):IFA1<1ORA1>5ØØTHENPRINT"{2 C
   RSR UPs}":GOTO73                        :REM*167
76 INPUT"DENOMINATOR IS{5 SPACEs}{5 CRSR LF
   s}";A2$                                 :REM*54
77 GOSUB127                                :REM*23
78 A2=VAL(A2$):IFA2<1ORA2>599THENPRINT"{2 C
   RSR UPs}":GOTO76                        :REM*198
79 N(Ø)=A1:D(Ø)=A2:CN=19:GOSUB124          :REM*239
8Ø IFA1/A2=N(2)/D(2)ANDA2=D(2)THEN83
                                           :REM*174
81 PRINTLEFT$(DN$,2Ø)"{CTRL 9}ADDITION OK B
   UT ":PRINT"{CTRL 9}REDUCTION ERROR.{CTRL
    Ø}"                                    :REM*25
82 PRINT"{5 CRSR UPs}":GOTO73              :REM*38
83 FORX=1TO1ØØØ:NEXT:PRINT"{SHFT CLR}{3 CRS
   R DNs}{5 CRSR RTs}VERY GOOD !":FORX=1TO1
   5ØØ:NEXT                                :REM*27
84 GOSUB127                                :REM*3Ø
85 NEXT                                    :REM*95
86 PRINT"{SHFT CLR}{2 CRSR DNs}MORE PRACTIC
   E? (Y/N)"                               :REM*176
87 GETA$:IFA$=""THEN87                     :REM*1Ø3
88 GOSUB127                                :REM*34
89 IFA$="Y"THENCLR:RUN                     :REM*187
9Ø END                                     :REM*92
91 ONK1GOSUB94,99,1Ø5,1Ø9                  :REM*1
92 GOSUB114                                :REM*182
93 RETURN                                  :REM*151
94 D(Ø)=1                                  :REM*32
95 FORI=1TOFNC(2):D(Ø)=D(Ø)*A(FNC(4)):NEXT
                                           :REM*227
96 D(1)=D(Ø):D(2)=D(Ø)                     :REM*18
97 N(Ø)=FNC(D(Ø)/2):N(1)=FNC(D(Ø)/4)
                                           :REM*177
98 RETURN                                  :REM*156
99 D(Ø)=A(FNC(4))                          :REM*165
1ØØ D(1)=D(Ø)*A(FNC(4))                    :REM*246
1Ø1 D(2)=D(1)                              :REM*255
1Ø2 N(Ø)=FNC(D(Ø)/1.5)                     :REM*22Ø
1Ø3 N(1)=FNC(D(2)/3.5)                     :REM*15
1Ø4 RETURN                                 :REM*162
1Ø5 Z1=FNC(4):Z2=FNC(4):IFZ1=Z2THEN1Ø5
                                           :REM*39
1Ø6 D(Ø)=A(Z1):D(1)=A(Z2)                  :REM*25Ø
1Ø7 N(Ø)=FNC(D(Ø)/2):N(1)=FNC(D(1)/2)
                                           :REM*2Ø3
1Ø8 RETURN                                 :REM*166
1Ø9 D(Ø)=1:D(1)=1                          :REM*79
11Ø FORI=1TOFNC(2):D(Ø)=D(Ø)*A(FNC(4)):NEXT
                                           :REM*242
111 FORI=1TOFNC(2):D(1)=D(1)*A(FNC(4)):NEXT
                                           :REM*131
112 N(Ø)=FNC(D(Ø)/2):N(1)=FNC(D(1)/2)
                                           :REM*2Ø8
113 RETURN                                 :REM*171
114 FORI=1TOD(1):IFINT(D(Ø)*I/D(1))-D(Ø)*I/
    D(1)=ØTHEND(2)=D(Ø)*I:LC=D(2):GOTO116
                                           :REM*188
115 NEXT                                   :REM*125
116 N(2)=FNB(D(2)/D(Ø)*N(Ø)+D(2)/D(1)*N(1))
                                           :REM*146
117 I=1                                    :REM*69
118 IFINT(N(2)/A(I))-N(2)/A(I)<>ØTHEN122
                                           :REM*234
119 IFINT(D(2)/A(I))-D(2)/A(I)<>ØTHEN122
                                           :REM*159
12Ø N(2)=FNB(N(2)/A(I)):D(2)=FNB(D(2)/A(I))
                                           :REM*8Ø
121 GOTO117                                :REM*35
122 I=I+1:IFI>4THENRETURN                  :REM*92
123 GOTO118                                :REM*71
124 PRINTLEFT$(DN$,K)SPC(CN-FNA(N(I)));N(I)
                                           :REM*4Ø
125 PRINTLEFT$(DN$,K+1)SPC(CN-1);:PRINT"{2
    SHFT Fs}"                              :REM*135
126 PRINTLEFT$(DN$,K+2)SPC(CN-FNA(D(I)));D(
    I):RETURN                              :REM*21Ø
127 POKE54295,Ø:POKE54296,15:VV=54272:POKEV
    V+6,8:POKEVV+5,31:POKEVV+1,18Ø :REM*193
128 POKEVV+4,33:FORM=1TO1ØØ:NEXTM:POKEVV+4,
    Ø:POKE54296,Ø:RETURN                   :REM*88
```

Line changes to Listing 1 for VIC-20 users.

```
3 DATA1,2,3,5,7:POKE36879,25
9 FORP=18ØTO24ØSTEP4:GOSUB127:NEXT:P=24Ø
83 PRINT"{SHFT CLR}{3 CRSR DNs}{5 CRSR RTs}
   VERY GOOD !"
84 FORP=25ØTO24Ø-Z*3STEP-2:GOSUB127:NEXT:P=
   24Ø
127 FORX=15TOØSTEP-1:POKE36878,X:POKE36876,
    P:NEXT:RETURN
```

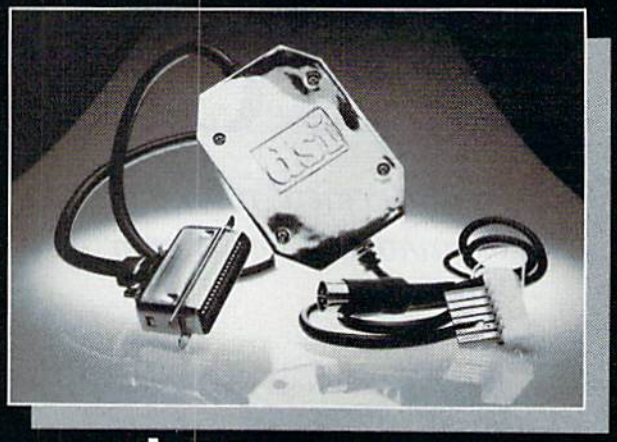
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Commodores in The Classroom

An interview with Pat Walkington, Commodore's manager of educational marketing.

Pat Walkington is manager of educational marketing at Commodore. She has earned two master's degrees—one in education with a specialization in reading, and the other in administration. Ms. Walkington has extensive experience in the field of education, having taught for nine years from kindergarten through junior high, as well as groups of gifted children. She has also taught in the area of computer education and has had several articles published, including a curriculum guide for the use of computers in education.

RUN: A recent front-page article in *The Wall Street Journal* argued that computers in education are overemphasized and that students derive no measurable benefits from having exposure to computers in the classroom. Are computers effective in helping students learn better, or, as the article asserts, are computers overstressed?

Walkington: The article is very misleading. In fact, there are studies to indicate that computers *do* have an influence on student achievement.

A 1985 study done by M. D. Roblyer (printed in the *Publication of the Association on Educational Data Systems*) stated that students made a three-month gain in math and a two-month gain in reading when the computer was used to supplement the instructional programs.

However, several other factors are involved if students are to derive measurable benefits from computers. These include the ratio of the number of students to the number of computers and the presence of quality software and trained teachers.

Teacher training is a key factor. Schools should budget for teacher training in computer use in the classroom, as well as in hardware and software. Salary incentives should also be available to teachers who take university courses in computer instruction.

Another factor is quality software beyond "drill and practice." Publishers are not making serious efforts to develop the second generation of education software referred to by some as the "intelligent tutor." By this I mean software that will be able to identify what the student's strengths and weaknesses are and to keep track of individual progress until there is more student-access time. In other words, the national average of students to computers is 97 to 1. It's difficult for computers to have an impact on student learning when exposure is limited.

Bill Rothenbach, Commodore's VP of administration, coined a slogan for our national education advertising campaign: Don't run out of computers before you run out of students.

RUN: Do you see any misuses or harmful effects of computers in the classroom?

Walkington: I see misuses of computers in the classroom when chil-



Remember, the computer is a tool; it's not a panacea. It's not going to cure everybody's problems. But there's never been one tool that could do so much, and I think that's the real value of computers.

dren are required to become computer literate by learning to program a computer without the programming activity being integrated with problem-solving.

An example of this is when a teacher gives a student a program that someone else has developed and instructs the child to type the code into the machine; or, the teacher gives students exercises to carry out in order to master programming languages like Logo. When used in the context of problem-solving, most languages become tools that put the child in control of the computer.

Teaching programming, however, requires that the teacher have excellent problem-solving skills as well as an in-depth knowledge of Logo or Basic. It should be noted that learning to program is not a prerequisite to learning to use computers.

RUN: Do you see a reluctance on the part of teachers to bring computers into the classroom?

Walkington: The biggest reluctance may be confusion on how to integrate the computer into the daily academic routine of the classroom.

David F. Lancy, of the department of elementary education at Utah State University, suggests using the computer as an activity corner within the classroom. This is especially appropriate for elementary schools.

In the activities corner, as few as three computers with a small software collection can provide enrichment, reinforcement, supplementary instruction and motivation to a class of 30 or more students. Dr. Lancy suggests software from companies like Spinnaker, Sierra, Electronic Arts, The Learning Company, Mindscape, Sunburst, Broderbund, Xerox and Grolier, all of which produce programs that run on the C-64 and the new C-128.

RUN: Does Commodore have training programs to help teachers set up computer equipment and purchase the programs that will work best for a particular class?

Walkington: Yes, we do this in a variety of ways. For example, Commodore supports all the national trade shows, where we conduct demonstrations and hands-on workshops with computers. We respond to requests from consultants in school districts who need loaned equipment.

Commodore has also placed computers in 25 state departments of education for the purpose of teacher training. When a state department requests computers, we ask them to submit a plan for teacher training.

From the plan and its objectives for accomplishing teacher training statewide, we determine the amount of equipment that Commodore can provide. Therefore, equipment needs will vary from state to state.

For example, the state of Texas has mandated that all students in the eighth grade must have a half semester of hands-on computer literacy training, using applications software.

This means that a teacher from each junior high in Texas must receive training by the state. Commo-

Commodore Launches New Program

We can send men and women into space, but how can we motivate young students to study science, mathematics and technology?

The answer may well be the Young Astronaut Program, a private sector initiative proposed by syndicated columnist Jack Anderson and developed with the support of President Ronald Reagan.

Commodore International Ltd. is serving as one of 14 sponsors of this program, whose purpose is to involve young people, from age six to 16, in projects related to America's space exploration activities.

Each group of participants in the program is annually sent at least four project packages to work on together. In addition, members receive monthly newsletters and participate in field trips, contests and visits to Young Astronaut summer camps. A telecommunications network called AstroNet has been established for chapter leaders to provide supplementary educational information.

Commodore is supplying all computing systems for the program. Activities involving several Commodore software packages, including Sky Travel and Just Imagine, will be incorporated into the educational materials distributed to participating chapters.

Dr. Daniel W. Kunz, Director of Educational Software at Commodore, noted that the response to the program has exceeded everyone's expectations, and the reaction of the participants in the program has been "absolutely unbelievable."

Kunz stressed that this is a supplemental program. "We're not trying to replace any of the methods or topics covered in the schools. In the classroom, the teachers and the school administrators are the experts. Commodore is simply offering teachers the flexibility to use the educational material as they see fit."

The Young Astronaut Council, based in Washington, DC, hopes to establish similar programs in other countries and has proposed an exchange program with the Soviet Union's Young Cosmonauts program. Also, the Council is working closely with NASA.

To stimulate interest in the program, a Saturday morning TV series, "The Young Astronauts," will air over CBS beginning in September. The animated series, which is designed to be as scientifically accurate as possible, will depict the year 2015 and the environment that Young Astronauts may someday inhabit.

Students interested can form a chapter of the program in their school or other organization by applying to the Young Astronaut Council, PO Box 65432, Washington, DC 20036, and paying an annual fee of $20.

Once a chapter is officially registered with the Young Astronaut headquarters, it receives study items and other forms of support as they're developed. The continuing manned and unmanned missions of the U.S. space program provide the major theme for the curricular material.

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dore donated some 60 computer systems in the summer of '84 to help Texas accomplish its teacher training objectives.

RUN: Do you see the new C-128 becoming a factor in schools? If so, will Commodore continue to give support to the C-64?

Walkington: Yes, the C-128 will be targeted for schools. We're especially excited about the 128's full compatibility with the C-64; the C-128 runs all of the C-64's software.

Also, we think some very fine courseware will be developed for the 128 mode. In this mode, teachers will be able to use integrated software utilizing the larger memory. For high school use, the C-128 has a third mode, CP/M mode. The greatest benefit of CP/M is to teach advanced programming languages and also advanced business applications.

We see the C-128 as an across-the-curriculum computer, but we also see the C-64 continuing to be very important at the elementary level.

RUN: Is there any software on the market today that you would consider top-quality educational programs?

Walkington: Teachers who use computers in activity corners within the classroom can choose from a wide array of excellent programs developed for both the education and consumer markets.

Two programs developed by Commodore include Sky Travel, an astronomy simulation in which students can look into the future or past and view the sky from any location on earth, and Just Imagine, an open-ended creative-writing program. Software is on the market and under development utilizing the computer as a tool.

As a tool, the computer can work in a variety of ways. For example, utility programs are being developed to help students organize their ideas, analyze what they have written and develop a better style of expression. Database management programs are being used in subjects such as science and social studies to help students learn how to analyze and collect data, test experimental designs and predict future trends.

Textbook companies are beginning to develop courseware programs correlated to their textbook series. In some cases, they are working with third-party software developers, taking existing software and developing materials and methods that teachers can use within the practical structure of their curriculums. For example, The Learning Company, a developer of a series of simulations for elementary schools, is working with Addison-Wesley, a major mathematics textbook company.

Commodore will aggressively work with third-party developers and textbook companies to ensure their software runs on our hardware.

Commodore will continue to support very strongly the education market. We will provide special pricing for education and grant programs for schools. We will continue to support teacher training. We will become much more aggressive in terms of getting involved with major school districts.

RUN: What new educational software will Commodore be releasing in the near future?

Walkington: Commodore is interested in promoting third-party software. We're working with companies to develop an integrated database manager, spreadsheet and word processor.

One such program, entitled Jane, will not only enable students to understand how integrated programs work, but its picture menus will enable students to learn the system easily. Commodore has marketed some in-house software, such as Sky Travel and Just Imagine, which I've already mentioned, to go with our new machines, but mostly we're going to be working with third-party developers, especially in the area of education.

Also, programs such as the Print Shop and the Newsroom are becoming very popular with teachers and students in the classroom. With these, students can put in their own data and generate various kinds of worksheets.

RUN: Any other plans, programs or announcements of which our readers should be made aware?

Walkington: Commodore will continue to support the education market very strongly. We now have a computer that is compatible with the C-64. We will provide special pricing for education.

We also have a school service program and a grant program. Schools that would like information on any of these programs should write to the Education Department, Commodore, 1200 Wilson Drive, West Chester, PA 19380.

We will continue to give support to teacher training through state-developed programs, and we will become aggressively involved with major school districts.

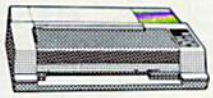
RUN: Have you received any feedback from schools regarding at what age level and in what areas of study computers are most effective?

Walkington: Computers are effective with any group of children at any age. The key is teacher commitment and enthusiasm.

Remember, the computer is a tool; it's not a panacea. It's not going to cure all the problems facing education today. But it certainly is a very powerful tool that has the capability of performing a greater number of tasks than anything we've ever had in education. R

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Short-Order Typist

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Improve your typing skills by learning not to burn toast.



KATHERINE MAHONEY

Nine hungry customers order toast on your first day as a short-order cook. Though you have nine toasters with which to fill their orders, none of the toasters works properly. You have to pull out the toast when it pops up or it will fall back into the toaster and burn. You'll lose a customer each time you ruin an order, and you'll lose your job if you lose enough customers.

Playing Toaster

To begin the game, enter a skill level from 1 (hardest) to 4 (easiest) and press the N key. The more difficult the skill level and the longer you play, the quicker the toast appears and disappears. This is a test of your reflexes.

Nine toasters appear on the screen and toast begins to pop out. Each toaster is labeled with a letter. To keep the toast from falling back into the toaster, you must quickly press the corresponding key.

For each slice of toast you pull out in time, you're awarded 25 points, and the running total is displayed in the upper-left corner of the screen. For each slice you miss, the number of customers decreases by one. This is displayed in the upper-right corner. You lose when you run out of customers. Of course, your typing reflexes improve as you improve your score. To play again, press any key.

Typing Tutor

To play Typing Tutor, choose your skill level and press the Y key. Nine toasters appear on the screen as in Toaster, but this time, the letters on the toasters change with every four slices toasted. Scoring and errors allowed are the same as in Toaster.

If you want to try your hand (or fingers) using more difficult skill levels, change the last number in lines 520 and 620 to a lower number.

To customize the toasters for any letter, number or symbol, change the CHR$ codes in lines 60 and 70. All the letters on the toasters are stored by their CHR$ codes in the array Y$. Please note that if you change the letters, they'll appear on the screen only if you press the N key after choosing a skill level.

If you don't want to type in the program, I'll mail you a copy if you send me $3, a blank cassette and a self-addressed stamped mailer. But remember to specify either the VIC or C-64 version. R

Address all author correspondence to George Decker, 251 N. Luzerne Ave., Baltimore, MD 21224.

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C-64; C-128 (in C-64 mode); unexpanded VIC-20

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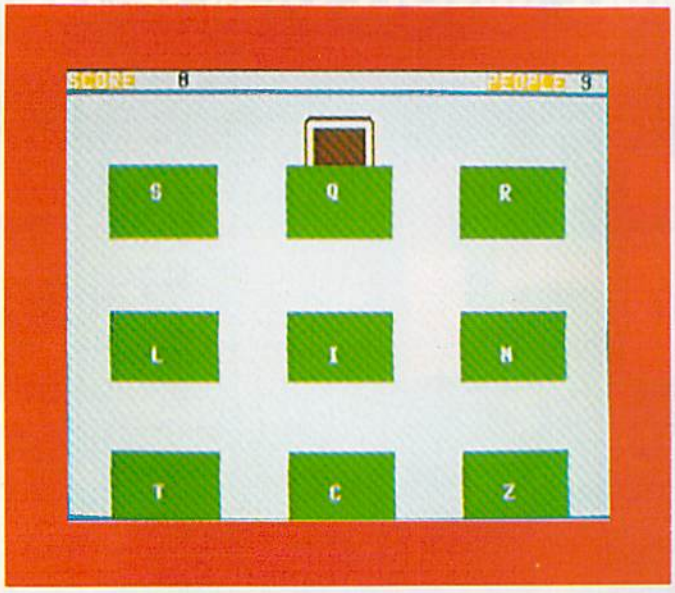
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Listing 1. *Toaster/Typing Tutor program for the C-64.*

```
1Ø REM TOASTER GAME (C/64)          :REM*244
3Ø REM G. RICHARD DECKER            :REM*56
41 POKE54276,Ø                      :REM*49
43 POKE54296,15:POKE54273,45:POKE54272,128:
   POKE54277,4:POKE54278,34         :REM*153
44 REM SET VOLUME AND NOTES         :REM*54
5Ø DIMZ(9):DIMY$(9):Z(1)=4:Z(2)=17:Z(3)=3Ø:
   Z(4)=324:Z(5)=337:Z(6)=35Ø:Z(7)=644
                                    :REM*58
55 Z(8)=657                         :REM*249
6Ø Z(9)=67Ø:Y$(1)=CHR$(82):Y$(2)=CHR$(84):Y
   $(3)=CHR$(89):Y$(4)=CHR$(71)     :REM*4Ø
7Ø Y$(5)=CHR$(72):Y$(6)=CHR$(74):Y$(7)=CHR$
   (86):Y$(8)=CHR$(66):Y$(9)=CHR$(78)
                                    :REM*114
9Ø REM DIMZ PLACES TOAST            :REM*236
1ØØ REM DIMY$ CHECKS LETTERS        :REM*28
12Ø POKE5328Ø,6:POKE53281,1:CL=Ø:C1=Ø:
                                    :REM*198
14Ø REM BORDER BLUE-SCREEN WHITE    :REM*15Ø
16Ø PRINT"{SHFT CLR}{14 CRSR RTs}{CTRL 6}{C
   TRL 9}TOASTER GAME"              :REM*182
17Ø PRINT:PRINT"{2Ø CRSR RTs}{CTRL 1}BY":PR
   INT                              :REM*118
18Ø PRINT"{12 CRSR RTs}{CTRL 6}G.RICHARD DE
   CKER"                            :REM*94
19Ø PRINT"{CTRL 1}{8 CRSR DNs}{11 SPACEs}EN
   TER SKILL LEVEL":PRINT           :REM*92
2ØØ PRINT"{1Ø SPACEs}1(HARD) TO 4(EASY)
                                    :REM*234
21Ø GETF$:IFF$<"1"ORF$>"4"THEN21Ø   :REM*144
22Ø F=VAL(F$):F=F*3Ø:PRINT:PRINT"{9 SPACEs}
   CHANGING LETTERS?(Y/N)":POKE198,Ø
                                    :REM*24
23Ø GETA$:IFA$=""THEN23Ø            :REM*74
24Ø IFA$="Y"THENCL=1                :REM*4Ø
26Ø REM FIND SKILL LEVEL-MULTIPLY BY 3Ø
                                    :REM*255
275 PRINT"{SHFT CLR}":FORT=55376TO56136:POK
   ET,9:NEXT                        :REM*224
28Ø PRINT"{HOME}{CTRL 9}{CTRL 8}SCORE{26 CR
   SR RTs}PEOPLE"                   :REM*71
29Ø PRINT"{CTRL 7}{4Ø COMD Ys}"     :REM*2Ø9
3ØØ SCO=Ø:PEO=9                     :REM*75
32Ø REM SET SCORE & PEOPLE          :REM*41
34Ø FORA=ØTO64ØSTEP32Ø:FORB=ØTO26STEP13:FOR
   C=ØTO12ØSTEP4Ø:FORD=ØTO7         :REM*1Ø1
35Ø POKEA+B+C+D+1227,224:POKEA+B+C+D+55499,
   5                                :REM*25
36Ø NEXTD:NEXTC:NEXTB:NEXTA         :REM*141
38Ø REM PLACE TOASTERS              :REM*89
4ØØ IFCL=ØTHENGOSUB1ØØØ             :REM*9
41Ø IFCL=1THENGOSUB95Ø              :REM*115
42Ø PRINT"{HOME}{7 CRSR RTs}{CTRL 1}"SCO"
                                    :REM*213
43Ø PRINT"{HOME}{37 CRSR RTs}"PEO   :REM*115
44Ø C1=C1+1:IFC1=4ANDCL=1THENC1=Ø:GOSUB95Ø
                                    :REM*123
46Ø REM UPDATE SCORE & PEOPLE - INSURES SPE
   ED REMAINS ABOVE 1Ø              :REM*249
48Ø IFPEO=ØTHEN83Ø                  :REM*249
5ØØ REM IS GAME LOST?               :REM*117
52Ø X=(-TI):X=INT(RND(1)*F)+5       :REM*76
53Ø FORL=1TOX:POKE54276,33:FORC=1TO1Ø:NEXTC
                                    :REM*42
54Ø POKE54276,32:FORC=1TO1Ø:NEXTC:NEXTL
                                    :REM*2Ø6
56Ø REM TIME REQUIRED FOR TOAST TO POP - CL
   ICKING SOUND                     :REM*28
58Ø POKE54276,17:N=INT(RND(1)*9)+1:K=9:GOSU
   B89Ø                             :REM*198
6ØØ REM POP TOAST                   :REM*16
62Ø POKE54276,16:X=INT(RND(1)*F)+3Ø :REM*96
64Ø REM - STOP SOUND                :REM*228
66Ø POKE198,Ø:FORL=1TOX             :REM*2
68Ø REM CLEAR KEYBOARD - START COUNTDOWN
                                    :REM*56
7ØØ GETA$:IFA$=Y$(N)THENSCO=SCO+25:F=F-4:K=
   1:GOSUB91Ø:GOTO42Ø               :REM*24Ø
73Ø REM UPDATE SCORE - SPEED UP POPPING
                                    :REM*46
76Ø NEXTL:K=1:GOSUB91Ø              :REM*128
77Ø FORU=1TO75:POKE54276,129:NEXTU:POKE5427
   6,128                            :REM*95
78Ø PEO=PEO-1:GOTO42Ø               :REM*123
8ØØ REM ERASE TOAST - MISSING TOAST SOUND
                                    :REM*191
83Ø PRINT"{HOME}{1Ø CRSR DNs}{8 CRSR RTs}GA
   ME OVER!"                        :REM*137
84Ø PRINT"{8 CRSR RTs}TO PLAY AGAIN HIT ANY
    KEY."                           :REM*219
85Ø POKE198,Ø:WAIT198,1:RUN         :REM*233
87Ø REM WANT TO PLAY AGAIN?         :REM*189
89Ø J=11Ø4:I=Z(N):POKEJ+I,85:POKEJ+I+1,67:P
   OKEJ+I+2,67:POKEJ+I+3,67         :REM*89
9ØØ POKEJ+I+4,67:POKEJ+I+5,73:POKEJ+I+4Ø,93
   :POKEJ+I+41,16Ø:POKEJ+I+42,16Ø   :REM*151
9Ø5 POKEJ+I+44,16Ø                  :REM*218
91Ø POKEJ+I+43,16Ø:POKEJ+I+45,93:POKEJ+I+8Ø
   ,93:POKEJ+I+81,16Ø:POKEJ+I+82,16Ø
                                    :REM*219
92Ø POKEJ+I+83,16Ø:POKEJ+I+84,16Ø:POKEJ+I+8
   5,93                             :REM*19
925 FORUD=I+55375TOI+55375+8ØSTEP4Ø:FORID=1
   TO6                              :REM*228
927 POKEID+UD,K:NEXTID:NEXTUD:RETURN:REM*64
95Ø FORG=1TO9:Y$(G)="Ø":NEXTG       :REM*11
96Ø FORG=1TO9:X=INT(RND(1)*26)+65   :REM*39
97Ø FORY=1TO9:IFCHR$(X)=Y$(Y)THENG=G-1:NEXT
   G                                :REM*193
98Ø NEXTY                           :REM*171
99Ø Y$(G)=CHR$(X):NEXTG             :REM*1
1ØØØ PRINT"{CTRL 6}{HOME}{6 CRSR DNs}{6 CRS
   R RTs}{CTRL 9}"Y$(1)"{12 CRSR RTs}"Y$(
   2)"{12 CRSR RTs}"Y$(3)           :REM*223
1Ø1Ø PRINT"{8 CRSR DNs}{6 CRSR RTs}{CTRL 9}
   "Y$(4)"{12 CRSR RTs}"Y$(5)"{12 CRSR RT
   s}"Y$(6)                         :REM*199
1Ø2Ø PRINT"{7 CRSR DNs}{6 CRSR RTs}{CTRL 9}
   "Y$(7)"{12 CRSR RTs}"Y$(8)"{12 CRSR RT
   s}"Y$(9):RETURN                  :REM*1Ø3
1Ø3Ø ---------                      :REM*184
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Listing 1 continued

```
107Ø ******************          :REM*2Ø
108Ø VARIABLES                  :REM*134
109Ø ---------                  :REM*244
11ØØ SCO-SCORE                  :REM*21Ø
111Ø PEO-PEOPLE                  :REM*5Ø
112Ø X-RANDOM NUM.               :REM*9Ø
113Ø K-COLOR OF TOAST           :REM*188
114Ø A-DRAW TOASTER              :REM*26
115Ø B-DRAW TOASTER              :REM*4Ø
116Ø C-DRAW TOASTER              :REM*54
117Ø D-DRAW TOASTER              :REM*68
118Ø F-SKILL LEVEL              :REM*186
119Ø F$-SKILL LEVEL             :REM*226
12ØØ N-WHICH TOAST POPS UP      :REM*126
121Ø L-HOW LONG TOAST TAKES TO POP  :REM*56
122Ø J-STARTING PLACE FOR TOAST     :REM*12
123Ø I-GETS VALUE FROM DIMZ     :REM*198
```

Listing 2. *Toaster/Typing Tutor program for the VIC-20.*

```
1Ø REM TOASTER GAME VIC-2Ø
3Ø REM G. RICHARD DECKER
5Ø DIMZ(9):DIMY$(9):Z(1)=2:Z(2)=1Ø:Z(3)=18:
   Z(4)=134:Z(5)=142
51 Z(6)=15Ø:Z(7)=266:Z(8)=247
6Ø Z(9)=282:Y$(1)=CHR$(82):Y$(2)=CHR$(84):Y
   $(3)=CHR$(89):Y$(4)=CHR$(71)
7Ø Y$(5)=CHR$(72):Y$(6)=CHR$(74):Y$(7)=CHR$
   (86):Y$(8)=CHR$(66):Y$(9)=CHR$(78)
9Ø REM DIMZ IS FOR PLACEMENT OF TOAST
1ØØ REM DIMY$ CHECKS FOR CORRECT LETTER
12Ø POKE36879,25:POKE36864,3:CL=Ø:C1=Ø
16Ø PRINT"{SHFT CLR}{5 CRSR RTs}{CTRL 6}{CT
   RL 9}TOASTER GAME"
17Ø PRINT:PRINT"{CTRL 7}{9 CRSR RTs}BY"
18Ø PRINT"{2 CRSR RTs}G. RICHARD DECKER"
19Ø PRINT"{CTRL 1}{8 CRSR DNs}{4 SPACEs}ENT
   ER SKILL LEVEL":PRINT
2ØØ PRINT"{3 SPACEs}1(HARD) TO 4(EASY)
21Ø GETF$:IFF$<"1"ORF$>"4"THEN21Ø
22Ø F=VAL(F$):F=F*3Ø:PRINT:PRINT"CHANGING L
   ETTERS?(Y/N)":POKE198,Ø
23Ø GETA$:IFA$=""THEN23Ø
24Ø IFA$="Y"THENCL=1
28Ø PRINT"{SHFT CLR} {CTRL 9} {CTRL 1}SCORE
   {9 SPACEs}PEOPLE"
29Ø PRINT" {CTRL 9}{CTRL 5}{21 SPACEs}"
3ØØ POKE36878,15:SCO=Ø:PEO=9
32Ø REM SET SCORE & PEOPLE - TURN ON VOLUME
34Ø FORA=ØTO16STEP8:FORB=ØTO264STEP132:FORC
   =ØTO44STEP22:FORD=ØTO4
35Ø POKEA+B+C+D+7791,224:POKEA+B+C+D+38511,
   5
36Ø NEXTD:NEXTC:NEXTB:NEXTA
38Ø REM PLACE TOASTERS
4ØØ IFCL=ØTHENGOSUB1ØØØ
41Ø IFCL=1THENGOSUB95Ø
42Ø PRINT"{HOME}{CRSR DN}{3 SPACEs}"SCO
43Ø PRINT"{HOME}{CRSR DN}{19 CRSR RTs}"PEO:
   IFF<1ØTHENF=1Ø
44Ø C1=C1+1:IFC1=4ANDCL=1THENC1=Ø:GOSUB95Ø
46Ø REM UPDATE SCORE & PEOPLE
48Ø IFPEO=ØTHEN83Ø
52Ø X=(-TI):X=INT(RND(1)*F)+5
53Ø FORL=1TOX:POKE36874,2Ø9:FORC=1TO1Ø:NEXT
   C
54Ø POKE36874,Ø:FORC=1TO1Ø:NEXTC:NEXTL
56Ø REM TIMING TOAST SOUND
58Ø POKE36876,236:N=INT(RND(1)*9)+1:GOSUB89
   Ø
6ØØ REM POP TOAST
62Ø POKE36876,Ø:X=INT(RND(1)*F)+3Ø
64Ø REM STOP SOUND
66Ø POKE198,Ø:FORL=1TOX
68Ø REM START COUNTING
7ØØ GETA$:IFA$=Y$(N)THENSCO=SCO+25:F=F-4:K=
   1:GOSUB91Ø:GOTO42Ø
76Ø NEXTL:K=1:GOSUB91Ø
77Ø FORU=135TO2ØØ:POKE36877,U:NEXTU:POKE368
   77,Ø
78Ø PEO=PEO-1:GOTO42Ø
8ØØ REM ERASE TOAST
83Ø PRINT"{HOME}{2Ø CRSR DNs}{5 CRSR RTs}TO
    PLAY AGAIN"
84Ø PRINT"{6 CRSR RTs}PUSH ANY KEY
85Ø POKE198,Ø:WAIT198,1:RUN
89Ø J=7746:I=Z(N):POKEJ+I,85:POKEJ+I+1,67:P
   OKEJ+I+2,73
9ØØ POKEJ+I+22,66:POKEJ+I+23,224:POKEJ+I+24
   ,93:K=Ø
91Ø J=38466:POKEJ+I,K:POKEJ+I+1,K:POKEJ+I+2
   ,K
92Ø POKEJ+I+22,K:POKEJ+I+23,K:POKEJ+I+24,K:
   RETURN
94Ø B-DRAW TOASTER
95Ø FORG=1TO9:Y$(G)="Ø":NEXTG
96Ø FORG=1TO9:X=INT(RND(1)*26)+65
97Ø FORY=1TO9:IFCHR$(X)=Y$(Y)THENG=G-1:NEXT
   G
98Ø NEXTY
99Ø Y$(G)=CHR$(X):NEXTG
1ØØØ PRINT"{CTRL 6}{HOME}{6 CRSR DNs}{3 CRS
     R RTs}{CTRL 9}"Y$(1)"{7 CRSR RTs}"Y$(2
     )"{7 CRSR RTs}"Y$(3)
1Ø1Ø PRINT"{5 CRSR DNs}{3 CRSR RTs}{CTRL 9}
     "Y$(4)"{7 CRSR RTs}"Y$(5)"{7 CRSR RTs}
     "Y$(6)
1Ø2Ø PRINT"{5 CRSR DNs}{3 CRSR RTs}{CTRL 9}
     "Y$(7)"{7 CRSR RTs}"Y$(8)"{7 CRSR RTs}
     "Y$(9):RETURN
1Ø6Ø REM
1Ø7Ø ******************
1Ø8Ø VARIABLES
1Ø9Ø ---------
11ØØ SCO-SCORE
111Ø PEO-PEOPLE
112Ø X-RANDOM NO.
113Ø K-TOAST COLOR
114Ø A-DRAW TOASTER
115Ø B-DRAW "{5 SPACEs}"
116Ø C-DRAW "{5 SPACEs}"
117Ø D-DRAW "{5 SPACEs}"
118Ø F-SKILL LEVEL
119Ø F$-SKILL LEVEL
12ØØ N-WHICH TOAST POPS
121Ø L-TIME TO POP
122Ø J-STARTING PLACES
123Ø I-GETS DIMZ VALUE
```

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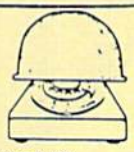
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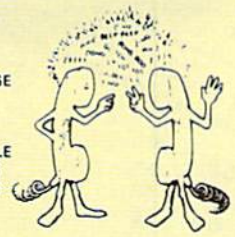
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9. Of the following numbers, which is the LEAST?
(A) 0.102
(B) 0.11
(C) 0.1201
(D) 0.101
(E) 0.1001

10. In the figure above, one side of
diameter of the circle. If the ar
is p and the area of the square
the following must be true?
I. $s > p$
II. $s \geq 2p$
III. $s < p$
(A) None (B) I only (C)
(D) III only (E) I and II

11. For how many diffe
x is a number from
List II, is $x +$
(A) Nine
(D) Fo

12. If a
ing n
even in
ue?
which of the follow.

14. Points A, B, X, and Y lie on the same line but not necessarily in that order. Given the lengths $AB = 12$, $BX = 2$, and $XY = 8$, what is length AY?
(A) 2
(B) 6
(C) 18
(D) 22
(E) It cannot be determined from the information given.

15. When x is divided by 7, the remainder is 4. What is the remainder when $2x$ is divided by 7?
(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

16. In $\triangle ABC$ above, what is the length of side AC?
(A) 24 (B) 18 (C) 12 (D) 8
(E) It cannot be determined from the information given.

17. If one hundred equally priced tickets cost a total of d dollars, then, in terms of d, five of these tickets cost how many dollars?
(A) $\frac{d}{20}$
(B) $\frac{d}{5}$
(C) $5d$
(D) $\frac{5}{d}$
(E) $\frac{20}{d}$

GO ON TO THE NEXT PAGE

2

$\frac{3}{2}$, which of the following

(B) I only (C) II only
(E) I and III

If the area of the circle

e figure above, points
circle into 5 equal arcs.
.5π, what is the length of arc CDE?
(A) 2π
(B) 4π
(C) 5π
(D) 8π
(E) 10π

sum of the next

If x is an odd number,
two odd numbers greater than
(A) $6x + 8$
(B) $6x + 6$
(C) $6x + 5$
(D) $6x + 4$
(E) $6x + 3$

25. In a race, if Bob's running speed was $\frac{4}{5}$ Alice's, and Chris's speed was $\frac{3}{4}$ Bob's, then Alice's speed was how many times the average (arithmetic mean) of the other two runners' speeds?
(A) $\frac{3}{5}$ (B) $\frac{7}{10}$ (C) $\frac{40}{31}$ (D) $\frac{10}{7}$ (E) $\frac{5}{3}$

or spaces blank.

ON 2

26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44

ONLY.

The SAT may be one important factor in getting you into college, so why not be as prepared as possible? There's software available that can give you practice. Find out what these programs have to offer.

Are You Prepared For the SAT?

By SWAIN PRATT

In the late 1950s and on into the '60s, a swelling tide of college-bound students put college admissions, especially to the more selective colleges, under a spotlight. This also made the SAT—the Scholastic Aptitude Test of the College Entrance Examination Board—one of the most familiar acronyms in America.

Then, as now, there were, in the most sought-after colleges, fewer places available than good students applying. This loomed as a threat to many an ambitious parent, creating an atmosphere of anxiety and pressure for the students who had to do the work and confront the exams that would get them admitted.

Of all college admission tests and other requirements, the SAT was the most ubiquitous and, hence, easiest for the public to identify as *the* passport to "acceptance in the college of your choice." Of course, a student's high school record, class rank and special skills counted, but in the media-encouraged popular view, the SAT acquired an almost magical stature. High SAT scores would get you in, the myth said; low scores would keep you out.

In spite of reiterated assurance by both the colleges and the College Board that the SAT (or any other entrance exam) is merely one of several important predictors of success in college work, this test is still a focus of anxiety. All sorts of tutoring courses, books and, lately, computer software have been developed to take commercial advantage of this concern to improve SAT scores. Do these various aids really help? If so, in what ways?

The Educational Testing Service, which publishes and administers the SAT and other tests for the College Board, says that studies of high school and commercial coaching programs show results ranging from no improvement to an average of 25–30 points over and above the score increases that occur without any special preparation. Of course, these are *average* results. Who can say how any individual might benefit?

During some 15 years of high school college admissions counseling, I saw students' SAT scores both increase and decrease with special coaching—and without it. In a few cases, the increases were spectacular—well over 100 points from one testing to the next—while in some other instances, students were thrown into temporary despair when their scores dropped.

Let the Record Speak

Whatever the pros and cons of special preparation for the SAT, my experience convinced me that a high school record reflecting hard and steady work in challenging courses would almost always outweigh modest test scores in the admission process. So I was always sorry to see students become so concerned about their SATs that they neglected the much more important day-to-day work.

I also observed over the years how well SAT scores correlated—at least in my school—with the students' supposedly more or less immutable IQs. In my mind, this fact lent much support to the College Board's assertion that the skills and knowledge tested by the SAT were those that can be developed and acquired only through many years of reading and study; that crash courses could do little to improve test results for students lacking that background of experience.

Does all this mean that I scorn special SAT preparation as useless? Not at all. But it is important to keep matters in perspective. What can the student reasonably expect the courses, the books and the software packages to do—and not do—for him or her?

I believe these aids, if well constructed, can contribute by increasing the students' familiarity with the SAT's format and the types of questions asked, and, of course, by providing the opportunity for practice with the content.

What they *cannot* effectively do is to teach a chronic math avoider the vast span of arithmetic, simple geometry and algebra on which the SAT math is based; nor can they make up

for a young lifetime of not reading, not writing, not speaking and not listening to the English language.

In the following reviews of five SAT-preparation software packages for the C-64 (and the C-128 in C-64 mode), I shall try to describe and evaluate them in the light of the comments above.

Mastering the SAT

Of the five programs reviewed here, Mastering the SAT approaches most closely the format and content of the SAT. Developed by CBS Software in cooperation with the National Association of Secondary School Principals, Mastering the SAT combines skill-building and practice-testing on four single-sided disks. It also provides two full-scale simulated SATs (including the Test of Standard Written English) that are printed—along with answer sheets, answers and explanations—in the manual.

The package's four disks offer you a full pretest and posttest, as well as skill-building exercises. The manual recommends that you start with the pretest. When you're finished, the program calculates your score and analyzes your performance on the various sections.

You can then use the skill-building exercises in accordance with the computer's diagnosis of your weaknesses. The recommendation is that you follow these exercises by taking both of the tests printed in the manual. This is good practice, for the instructions, the format and even the answer sheets resemble those of the actual SAT, except that they're much smaller physically.

The final recommended step is to see how you make out on the computer posttest. Of course, you can do all of the above in a different order and can repeat the computer materials as you wish. You can share the program with friends, too, since a built-in management feature allows computing and storing the scores of up to three users.

The manual, clear and well-organized, is mainly devoted to the two printed tests, but it also includes a brief section on test-taking strategies that describes the types of SAT questions and gives a thumbnail synopsis of math facts. The locations of the various programs on the disks are listed, as are the disk menus.

The one thing that is *not* clearly stated is how to get to the review and explanations of the test questions on disk. On each menu, you have the option of Score and Analysis, but this does not lead to review or explanation, as you might expect. I became very frustrated before discovering that you first have to go back and choose the Pre- or Posttest option from the main menu of whichever disk you are on and then the *Instruction* option from the resulting sub-menu. The manual barely touches on this and does not make it clear what to do.

As with most of the other programs covered in this review, the verbal sections of Mastering the SAT come off with higher marks than the math. I suppose this is because an error, omission or ambiguity in a math question shatters the precision of right vs. wrong, while shades of meaning in language can always be debated. In math, it's (almost invariably) correct or incorrect; in language, especially in English, it is often a question of better or worse.

In any case, though I spotted a number of things in the verbal sections that I disagreed with, there were a few egregious goofs (and too many misprints!) among the math questions, notably item 25 on page 33 of the manual. My note at that point reads, "utter confusion!"

Mastering the SAT, however, comes

What *is* the SAT?

The Scholastic Aptitude Test (SAT) is developed and produced by the Educational Testing Service of Princeton, NJ, as part of the College Entrance Examination Board's Admissions Testing Program (ATP). One of the requirements for admission to several hundred colleges and universities in the United States, the SAT consists of six half-hour sections, two verbal, two mathematical, one experimental (either verbal or mathematical, but not scored) and the Test of Standard Written English (TSWE), which is intended primarily as a guide to placing the student in an appropriate English course, rather than for admission. *Taking the SAT*, a booklet describing both the SAT and the TSWE, is available for $4 from the College Board. For copies of the booklet or for other information, write to College Board ATP, CN6200, Princeton, NJ 08541.

For those readers not familiar with the SAT, the following, reprinted from the booklet *Taking the SAT*, are samples of each type of question appearing on the test.

Verbal sections:

Antonyms: DISPARITY: (A) fearfulness (B) punctuality (C) prejudice (D) similarity (E) notoriety

Word analogies: NOTES:SCALE :: (A) solos:harmony (B) sentences:punctuation (C) attitudes:fact (D) fractions:numerator (E) letters:alphabet

Sentence completion: One of the paradoxes of life is the friction between our hunger for _____ and our grudging _____ that there is indeed nothing new under the sun.

(A) variety . . . denial (B) infamy . . . acceptance (C) novelty . . . awareness (D) security . . . insistence (E) conformity . . . admission

Reading comprehension: A factual or narrative passage, ordinarily of several paragraphs and typical of material that might be encountered in college courses, is followed by five or six multiple-choice questions based on statements or implications in the passage.

Mathematical sections:

Standard multiple-choice questions:

If $x^2 - y^2 = 27$, then $3(x + y)(x - y) =$

(A) 9 (B) 24 (C) 27 (D) 36 (E) 81

If $\frac{x}{y} = \frac{2}{3}$ and $\frac{y}{z} = \frac{-3}{2}$, which of the following must be true?

I. $\frac{x}{z} = -1$ II. $xy = 6$ III. $(x + z)^2 = 0$

(A) None (B) I only (C) II only (D) III only (E) I and III

Quantitative comparison questions: In this type of question, expressions for two quantities are given, one under Column A (so headed at the top of the page) and the other under Column B. For some of the questions, certain information is first given pertaining to the two quantities. You have four answer choices:

(A) if the quantity in Column A is the greater;
(B) if the quantity in Column B is the greater;
(C) if the two quantities are equal;
(D) if there is not sufficient information to determine which quantity is the greater.

For example:

	Column A	Column B
Q1:	$a(b+c)$	$b+c$

(The answer is D, since nothing is known about "a")

Q2: $x = -2$, $y = 1$

$3y^2 - 2x$	0

(The correct choice is A, since $3(1)^2 - 2(-2) = 3 + 4 = 7$)

The Test of Standard Written English:

The TSWE has two types of questions. One asks you to identify the (one) error in four underlined words or phrases (labeled A, B, C, D) in a sentence, or to choose E if there is no error at all. For example:

Most people listen to the weather forecast every day, but (A) they know hardly nothing (B) about (C) the forces that influence (D) the weather. No error. (E)

The other type displays a sentence with one underlined portion and five (A–E) selections of different ways of expressing the underlined portion. You are asked to select the version that is best. Choice (A) is always a repeat of the underlined portion, in case that seems to be the best. For example:

Young people are not rejecting marriage, but some postponing it.

(A) some postponing it
(B) some are postponing it
(C) it is postponed by some of them
(D) it is being postponed
(E) some having postponed it

Sample SAT questions are reprinted by permission of the College Entrance Examination Board and the Educational Testing Service

far closer than the other programs to presenting consistently the type of question and the range and quality of mathematical subject matter that you would find on the SAT. A student can get quite a realistic and helpful picture of the test from this package. If you want to buy a computerized SAT practice and preparation program, I recommend Mastering the SAT as the best I have so far seen. *(CBS Software, One Fawcett Place, Greenwich, CT 06836. $79.95 disk.)*

SAT Review

SAT Review is a tutorial package from Quality Input that includes two double-sided disks and two small, stapled, printer-generated booklets. The documentation, at least in the package received for this review, is unfortunate to a ludicrous degree.

The little booklets are in no way differentiated on the covers. Only by opening and reading can you learn that one is the manual and the other is a 43-page recital of disassociated facts—mathematical, historical and scientific—arranged as three appendices.

Mathematics you'd expect, but historical and scientific subject matter? The SAT does not at all test you on these as such. The explanation is found in the legend printed at the top of each page (but not on the cover): "ACT/SAT Review." It appears that this package purports to prepare also for the ACT, the American College Testing program, the chief and virtually only rival of the SAT.

(The ACT differs from the SAT in that it includes tests of social studies and science as well as English and mathematics, and so renders scores in four areas. It is required, often with the SAT as an optional alternative, by numbers of small private or state colleges, primarily in mid- or far-western states.)

Having solved the ACT mystery, you read the manual to see how to use SAT Review. Page 2 tells you to place disk 1, side 1, in the drive "as explained in chapter 1." Chapter 1? No chapters visible anywhere, but there's an introduction that includes disk-handling directions that, among other cautions, tell you to "hold the diskette as shown in Figure 1." Figure 1? No figures anywhere, either; not even a drawing of a triangle.

Oh, well. You type LOAD "QI",8, then RUN, and in nearly a minute Quality Input's logo appears. Suppressing sarcasm, you note that the manual tells you you'll now see test options, giving you the choice of the ACT or the SAT. Not so. Nothing whatever appears about the ACT; instead, you get (after another minute or so) an SAT menu of English Usage, Math Usage or Test of Standard Written English (TSWE). It is now evident that the two disks in this package concern only the SAT.

From this point, matters improve, except for long loading waits after you make menu choices. You eventually get fairly decent, if very simple, tutorials on the various types of SAT questions; or, at your option, practice questions, explained, with number and percent correct when you finish or elect to return to the menu. An option to print your scores is available, but there's no multiuser capability.

The questions in the program can possibly be of some help for review and practice, but too many in the math sections are of the straightforward, textbook type, often requiring extensive computation. By contrast, the SAT poses many math questions in unfamiliar or non-standard forms or contexts, and all of them require only minimal figuring to determine an answer. The SAT challenges your thinking, not your ability to multiply or divide.

SAT Review also contains an inexcusable number of errors, especially in the math areas. For example, number 5 of the geometric problems reads, "If the perimeter of an equilateral triangle is 24 and the area is 52, find the height of the triangle." The problem is overdetermined. If the perimeter is 24, the base (any of the three equal sides) is 8, the height is 4 times the square root of 3, and the area is, *not* 52, but 16 times the square root of 3. It's possible, of course, to have a triangle with base 8 and area 52 (and hence a height of 13, as the program's solution states!), but such a triangle cannot be equilateral.

Another problem asks you to find the sum of $16x-5$, $-7x+15$ and $21x-7$. The erroneous answer given is $30x-3$.

Two other non-SAT sorts of quirks in the math deserve frowning mention. First, problems involving circles ask you to use 3.14 as the approximate value for *pi* in computation. I would be very surprised to learn that the SAT has ever used anything but the *pi* symbol in such problems. The second departure from SAT practice is that questions on the Pythagorean Theorem all seem to give three sides of a triangle and ask you to determine whether it is a right triangle. This may be all right as an exercise, but surely it's misleading to a student who's trying to get a better grasp of the SAT.

Finally, again in the math section, there are tutorials and problems in logarithms and other more advanced algebra topics that are clearly outside the range of the SAT subject matter.

As for the English sections, these appear less prone to error, although I did find hypocrisy spelled hipocrisy, vacillating spelled vascillating and this sentence-completion question, quoted exactly:

Classified by Linneas in 1735 as Homosapiens, which means "wise man," are thus _____ from other animals by their ability to _____.

a) known . . . walk upright
b) differentiated . . . reason
c) similar . . . have instincts
d) seperated . . . work

As well as sentence completion, the program adequately covers the other SAT-Verbal areas of antonyms, analogies and reading comprehension. Coverage of the TSWE is also provided. In all topics, there are tutorial introductions prior to the practice questions.

A correct answer selection triggers a flashing screen, and the program computes your score when you're finished and asks if you want it printed. Menu-handling is good, and key-pressing directions are clear and consistent.

Outside of the deplorable documentation, SAT Review is reasonably friendly. Its one serious drawback is that it keeps shunting you from disk to disk and menu to menu, with waits such that it seems to take forever to get what you want.

How useful is SAT Review? The tutorials are possibly helpful as a review or as refresher material, but they're generally far too brief and simplified to *teach* any subject matter not already studied. The practice material, though often too elementary to provide much challenge, is good as to form, and so can provide a tune-up as long as you are wary of errors. The package would be greatly improved by the inclusion of a full-scale sample test.

If $3 = b^x$, then $3b$ must equal
(A) b^{x+1} (B) b^{x+2} (C) b^{x+3}
(D) b^{2x} (E) b^{3x}

The number 99,999,999 is not divisible by
(A) 9 (B) 11 (C) 99
(D) 111 (E) 9,999

I cannot resist ending with one word relationship I came across in the analogy section. One of the answer choices was *oboe : windwood*. It's really a more descriptive word, when you come to think about it. *(Quality Input, Inc., 309 W. Beaufort, Normal, IL 61761. $69.95 disk.)*

Preparing for the SAT

Preparing for the SAT, produced by Program Design, has a subtitle (And Other Aptitude Tests) that points to an identity problem besetting this package. It wants to be all things for all purposes, but succeeds in being very little for anything.

It certainly falls far short as adequate SAT preparation, for it essentially covers only three types of SAT questions: quantitative comparisons, antonyms and word analogies. (See sidebar for examples of all the types of SAT questions.) Moreover, the quality of the material is often mediocre or uselessly simple.

This product consists of two large, well-printed booklets, six single-sided disks and presumably four cassette tapes, of which my package contained only one. One manual, with the title and subtitle of the package cover, first describes the program and how to load the disks. Then it goes on to analyze, with examples, synonyms, antonyms and word analogies, number series and, at great length, quantitative comparisons.

Outside of the number series, which occupy one disk and are far more useful for IQ tests than for the SAT, all the math is in the quantitative-comparison format, which applies only to about one-third of the SAT math questions, the rest being standard multiple-choice.

The other manual—*Making the Grade*, with the subtitle *How to Take and Pass a Test*—gives advice on test-taking strategies and goes into some detail on vocabulary, word analogies, reading comprehension, math and the TSWE. The author, PDI's president, John Victor, voices some strong opinions, one of which is that women are particular victims of no-good-at-math inferiority feelings, and thus are defeated before they start.

In Victor's discussion of math, there are some good points made, but also some misprints, curious statements and outright errors. For example, in explaining steps to solve an algebraic equation, he uses the archaic-sounding phrase "rid $^2/_7$ from left side," and, later, he asks, "What are supplementary, complementary, and *perpendicular* angles?" (Italics mine.) By perpendicular, does he mean right angles, vertical angles or what? Still further along comes the statement, "A straight line equals 180°," and in his discussion of the TSWE appears the explanation: "*Being* is a verb, and it's subject must be *I*."

I point out these aberrations, not to nag Mr. Victor, but to suggest that programs like this need to undergo meticulous review and proofreading simply to achieve basic credibility. You may remember that a few years ago the SAT itself embarrassed its makers with a couple of errors discovered by students. Surely, no one is perfect, and errors in commercial programs like these are certainly not

as crucial as on the SAT, but even a little expert attention would help enormously.

As for the disks in this package, the best I can say is that they provide some pallid practice. One of them, labeled Taking Aptitude Tests, first tells you to turn on the cassette for voice accompaniment to the program on the screen. The only cassette in my package, however, involved number series, so I could only look.

Anyway, Taking Aptitude Tests makes some good points on how to take aptitude tests. The same disk includes an SAT Timer Program that you can use to time and score yourself in taking a practice SAT that you select from any college entrance examination practice book of your choice. (Mr. Victor recommends Barron's *How to Prepare for College Entrance Examinations*, and I concur.)

The ability to estimate distance comes only with _____; a baby reaches with equal confidence for its bottle or the moon.
(A) tranquility
(B) talent
(C) experience
(D) assurance
(E) distress

Of the five other disks, two give practice with synonyms (irrelevant to the SAT) and antonyms, one with word analogies, one with quantitative comparisons and the last with number series. All provide tutorials, examples and practice questions, and all but the number series end with tests.

Menus and directions are clear, but the level of difficulty provides little challenge compared with the SAT, and the quality is often just poor or silly. This could certainly mislead a student who is not at all familiar with the College Board tests.

Further shortcomings, as already mentioned, are the lack of more than a mere mention of the reading comprehension and sentence completion questions, and, in the math, the omission of the standard multiple-choice questions. You might justly conclude that the package is somewhat misnamed.

Ten people meet and everybody shakes hands exactly once with everybody else. What is the total number of handshakes?
(A) 9 (B) 10 (C) 45
(D) 50 (E) 90

Better buy Barron's. It's a lot cheaper and will give you more. *(Program Design, Inc., 11 Idar Court, Greenwich, CT 06830. $69.95 disk.)*

Computer Preparation For the SAT

Computer Preparation for the SAT is essentially a $9 book dressed up with two double-sided disks in a heavy plastic cover. You'll have to judge whether the package is worth the price.

The book is Harcourt Brace's counterpart to other college entrance examination test-preparation volumes. It is thick, full of tutorial passages and practice material, and it contains four full-length SAT practice exams. The material seems largely appropriate, except that some of the math is clearly beyond the range that the SAT covers.

Accuracy in this product is again not what it should be. By no means did I read the entire book, yet, just while skimming, I found three misprints (pages 208, 383 and 385, if you'd like to play detective), which suggests that there may be quite a few more. Also, the book rightly states, following the SAT form, that figures in the math sections are drawn to scale *except* when a question specifically states that the figure is *not* to scale. Unfortunately, I found a number that were not to scale, but with no mention of this, and at least one that appeared accurate even though the problem said it wasn't.

But this is a review of computer software, not books. The fact that I appear preoccupied with the book is an indication of this package's problem: the book is *it*; the two disks don't offer much. You are advised by the clear and informative manual to begin by taking one or more of the tests that are in the book, using the program on disk side A to enter your answers.

The program scores the tests you take and sets up a study plan in accordance with your evident weaknesses. But the study plan refers you heavily back to the book! Use *is* made of disk sides B, C and D (verbal and math items and vocabulary flash cards), but the package is designed around the book.

Once you're into the practice material on the disks, the program works smoothly and rapidly, but you'd probably be just as well off with the book alone. Better off, in fact—by some $70. *(Harcourt Brace Jovanovich, Inc., 1250 6th Ave., San Diego, CA 92101. $79.97 disk.)*

The Perfect Score

The Perfect Score, a product of Mindscape, Inc., is a fairly comprehensive, well-designed package for SAT review. The manual—clear, readable and well-organized—is loose-leaf bound in a hard cover with six double-sided disks.

The first four disks, labeled A–D, include tutorials and practice on the principal types of questions on the verbal section of the SAT: antonyms, analogies, sentence completion and reading comprehension. Disk E deals with math, and disk F is, on one side, a full, timed verbal and math SAT practice test, and on the other side a practice Test of Standard Written English (TSWE). There is no tutorial for the TSWE, however, except for a few examples in the manual.

PHILISTINE: CULTIVATED::
(A) regionalist : authoritarian
(B) anarchist : disorderly
(C) capitalist : greedy
(D) visionary : practical
(E) eccentric : artistic

Operation of the program is easy and straightforward, with clear menus and directions. On each of disks A–E, you can choose a Learning mode or Testing mode (with ten sets of ten questions in each). The former guides you through each question, telling you if your answer choice is right or wrong and giving you three chances before explaining the correct answer. Your score is displayed at the end of each set.

The Testing mode allows you to complete each set of ten questions before giving you your score and time elapsed. Then you can get explanations for any missed questions you wish to review.

A clock option for timing yourself is always available in either mode by pressing the C key. Another good feature, applying, however, only to the timed test on disk F (where you really need it), is the use of function keys to take you easily back and forth within the test and to let you pause if interrupted.

One operational drawback, aside from slow loading (and what else is new?), is the use of the cursor to indicate your answer choices. This is not only slower than pressing the A, B, C, D or E keys, but inferior in that the conscious letter choice conforms with the way it's done on the SAT, and thus helps develop good habits.

As far as content is concerned, the verbal sections on the tutorial disks are more than adequate, with a wealth of examples. Especially good are the 30 reading-comprehension passages, which are printed in the manual—a definite advantage over showing them in fragments on the screen.

I wish I could be as positive about the math material, but there are serious faults, the most glaring being that many questions are of the straightforward, textbook variety. Seldom do you find such questions on the SAT. There are also numerous problems that require extensive computation—far more than ever needed on the SAT. For example, one question asks you how many miles per hour is equivalent to a speed of 100 feet in four seconds, a problem that requires the division of 90,000 by 5280!

Many other math questions in this program are far out of the SAT's range. One asks for the points of intersection of the graphs of a linear and a quadratic equation. Another gives you one root of a cubic equation and asks for the other two, an operation that involves algebraic long division and trinomial factoring. A few questions are just plain incorrect or incomplete.

There are also technical drawbacks in the math sections. In the quantitative comparison questions, the four choices are written out each time ("A is greater than B..."), rather than using the A, B, C, D format so that the user becomes more thoroughly familiar with the meanings of those four choices. The geometric figures are also a problem in this program. Some are not to scale, yet with no statement to that effect, and, in a few cases, drawings simply lack information necessary to reach a solution.

Granted, it is not at all easy to write good SAT-type math questions or to spot all errors and omissions, but it's hard to understand why irrelevant topics are included, when even a casual examination of the College Board's sample SAT materials should make clear what is and is not covered. I think it is unfairly misleading to the student, and, in the case of The Perfect Score, it mars what is otherwise a good and useful program. *(Mindscape, Inc., 3444 Dundee Road, Northbrook, IL 60062. $69.95 disk.)*

Computer-Motivated Study

To refer back to the beginning of this review, I know from experience that many, I would even say most, high school students simply will not put real attention or effort into a preparatory SAT course, nor will they take the initiative to open a book.

But they might, just might, be sufficiently fascinated by the computer to allow it to guide them into some helpful practice. After all, the multiple-choice question was itself essentially spawned by an electronic device that could read and tabulate marks on a sheet of paper, so maybe computer preparation for the SAT is perfectly appropriate. R

Address all author correspondence to Swain Pratt, c/o RUN *editorial, 80 Pine St., Peterborough, NH 03458.*

Other SAT Preparation Programs for the C-64

SAT Math (Intelligent Software, Inc., 9609 Cypress, Munster, IN 46321). SAT Math offers two modes: Practice mode and Test mode. The program covers eight major subject areas and aims to help students improve their overall mathematics skills, as well as prepare them for the SAT. Retail price is $69.95.

Lovejoy's Preparation for the SAT (Simon & Schuster Electronic Publishing Group, 1230 Avenue of the Americas, New York, NY 10020). This package provides tips on test-taking, 27 practice modules (covering both English and mathematics) and general tutorials. Two simulated SAT exams are included, as well as a copy of *Lovejoy's Concise College Guide Book*. The package retails for $69.95.

English SAT I and II; Math SAT I (MicroLab, Inc., 2699 Skokie Valley Road, Highland Park, IL 60035). English SAT I and II cover vocabulary, interpretive and reasoning skills. Math SAT I includes arithmetic, algebra, geometry and probabilities. This program allows the student to test himself according to subject matter. The three programs retail for $35 each.

Owlcat (Digital Research, Inc., PO Box 579, Pacific Grove, CA 93950). Owlcat has two separate versions. A 15-hour package contains English and mathematics reviews and tutorials. A second version (60 hours) also includes a practice SAT exam and additional documentation. The shorter version retails for $89.95; the expanded version, $249.95.

The Score Improvement System for the SAT (Hayden Software, 600 Suffolk St., Lowell, MA 01853). The Score Improvement System is made up of three modules that can be purchased individually. The verbal module includes reading comprehension and vocabulary reviews. The math program covers algebra, geometry and quantitative comparisons. The practice test module simulates the actual SAT exam. The programs retail for $39.95 each, or all three can be purchased for $99.95.

The Computer Study Program for the SAT (Barron's Educational Series, 113 Crossways Park Drive, Woodbury, NY 11797). The Computer Study Program includes reviews and practice exercises in both English and mathematics. A simulated test and a score analysis feature reveal the student's strengths and weaknesses. Retail price is $89.95.

College Board SAT Exam Preparation Series (Krell Software Corp., 1320 Stony Brook Road, Stony Brook, NY 11790). This series covers both the verbal and mathematics sections of the exam, diagnoses the student's strengths and weaknesses and simulates the SAT exam format and level of difficulty. Two versions are available: Gold Label (expanded version) guarantees an 80-point score increase and retails for $299.95; Red Label (condensed version) offers no guarantee and retails for $139.95.

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Computers in Education

The personal computer revolution of the 1980s has sparked a tremendous interest in the use of low-cost microcomputers in the classroom. Read on for a stimulating discussion of the issues surrounding computer-assisted instruction.

By BILL PARLE and DAN ADKISON

Currently, many schools and colleges are experimenting with microcomputers as educational tools. Typically, such experiments center around the use of a microcomputer instructional laboratory.

After being familiarized with the use of the equipment and the rules of the laboratory, students follow a schedule of assignments that takes them independently and at their own pace through the course material. Students who find the subject matter easy can proceed rapidly, while those who have difficulties may find themselves spending extra time in the lab.

In a variation on the laboratory idea, one university has required that each entering student purchase a microcomputer and a modem. Thus, the laboratory can go wherever the student goes. By using their personal computers to communicate with the university's mainframe computer, students can download (receive) assignments for study, upload (turn in) papers and other homework, and perhaps even take examinations and receive the instructor's evaluation, from wherever they have access to a telephone.

Microcomputer-assisted instruction may be used in conjunction with traditional classroom lectures and discussions, or students may meet individually with instructors as the need arises. When instructors deal with students in a computer-assisted learning environment, they are freed from the necessity of proceeding at the pace of the average student. They are able to respond to the needs of both the slow learner and the exceptional student.

When computer-assisted instruction is coupled with traditional classroom presentations, the instructor can devote more attention to abstract concepts and theory, knowing that the factual content of the course (sometimes the least interesting and challenging portion of the course) can be effectively presented through computer-assisted instruction.

At this stage of software development, computers are seen as being most useful and effective in teaching factual material, where the content is specific and well-defined.

For example, computer science terminology, steps in equation solving, foreign language vocabulary and grammatical rules are types of factual material that can easily be taught by computer software. Computers are endlessly patient when presentation, drill and practice are required.

Hardware and Software Developments

Despite the belief of many educators that the impact of the computer on all aspects of education is sure to be profound, the development of computer-aided instruction is still in its infancy. This is more true with respect to software than hardware.

Current hardware limitations have to do mostly with the lack of space available in microcomputer memory and on disk for storing the information to be presented in the lesson or course; however, this problem is being rapidly solved as the cost of memory expansion and storage capacity drops.

A very exciting development in the area of hardware is the coupling of personal computers with laser video disks. This will lead to some tremendous information storage and presentation capabilities. A single video disk can hold the text of a small library. In addition, video disks would permit the inclusion in educational programs of film sequences and elaborate computer-aided graphics. Using this technology, a course could be a multimedia spectacular.

The laser disk games introduced last year are an example of the application of such technology. At least one company is marketing an inexpensive interface that allows the coupling of a C-64 with a laser disk player. The principal barrier to the use of video disks is the current high cost of producing the disks themselves. But this cost, like that of personal computers, may fall rapidly as technology improves.

RUN It Right

C-64; C-128 (in C-64 mode); Plus/4; C-16

Continued on p. 92.


$X^2 - 3X - 28 = 0$
$(X - 7)(X + 4) = 0$
$X - 7 = 0$
$X + 4 = 0$
ANSWER: $X = 7$
$X = -4$



KATHERINE MAHONEY

UltraQuiz

With this program and a little imagination, you can create and print out quizzes, questionnaires and other such goodies.

By ROBERT POULIOT and RONALD POULIOT

You've seen the kinds of programs in which you enter questions and answers and then allow the program to quiz someone. The UltraQuiz program lets you enter 100 questions and answers, which you can save. You can print out the questions to give as a test, in single or multiple copies. You can also print out just the answers or both the questions and answers, for study away from your computer. UltraQuiz can even be used to print applications and questionnaires.

The Menu

UltraQuiz is menu-driven. Simply follow the prompts to create your quiz. The main menu gives you the following options.

The *Exit* option gets you out of the program; but be sure to save your quiz before using it.

Save asks for a filename and whether you're using tape or disk. Disk users should choose a different filename for each file, because using the same filename replaces the old file.

Load loads a quiz that's been saved. The computer will ask you for the device number and filename.

Edit sends you to another menu. Use the Exit option to return to the main menu. Use the *Enter* option to type in questions and answers. The *List* option lists the questions and answers (holding down the shift key stops the listing process). The *Modify* option lets you fix any mistakes made in the Enter phase.

Clear erases the current quiz from the computer's memory. *Print* takes you to another menu and inquires whether you want to print only the questions, only the answers, or both. You are then asked how many copies you want.

Incidentally, don't worry about printing on top of the perforations; UltraQuiz will automatically skip over them. Also, if the quiz ends part way down on a sheet while you're

RUN It Right

C-64; C-128 (in C-64 mode)
Tape or disk; printer optional

printing multiple copies, the paper will advance to the next sheet before printing the next copy.

Finally, the *Quiz* option asks you the questions that you entered. One drawback, however, is that your answer must be exactly the same as the answer in memory, so logically correct answers that are worded differently, or even misspelled, will be counted as incorrect.

As an example, to the question, "What country exports the most wheat?" your answer should be "The United States," not "U.S.A.," "the U.S." or "America." Let your guide be what you think is the most probable response when formulating answers to questions.

Long answers can be used if the quiz is to be printed, but both questions and answers must be kept to two screen lines. You can enter true-or-false questions by typing each question, followed by (T/F) and the correct letter to the answer for that question; [e.g., "The American Revolution began in 1776. (T/F)" "F"].

At the end of the quiz, the program tells you how many questions you answered correctly and incorrectly and gives you a number grade.

Other Applications

You can use UltraQuiz for more than quiz-making. For instance, you can type in a master grocery list as a series of questions and answers, then print out the answers, and you've got your master listing. Just cross off the items you don't need.

You can even make a list of the valuables in your house. For example, type in "Commodore 64/value $219" as the question, and "serial# 123456" as the answer. Then, using the Print option, you'll have a hard-copy of your valuables.

Use your imagination to come up with other applications for this program. If you'd rather not type in UltraQuiz yourself, send a blank tape or disk with a self-addressed stamped mailer and $3, and I'll mail a copy of the program to you. R

Address all author correspondence to Robert L. Pouliot, 34 Douglas Pike, Route 4, Harrisville, RI 02830.

Listing 1. *UltraQuiz program.*

```
5 BO=5328Ø:BA=53281                          :REM*139
1Ø DIMAA$(1Ø1),BB$(1Ø1),C$(1Ø1):GOTO37
                                             :REM*8Ø
2Ø FORI=1TO8Ø:PRINT"{CTRL 9} {CTRL Ø}";:NEX
   T:RETURN                                  :REM*1Ø4
3Ø POKE781,R:POKE782,C:POKE783,PEEK(783)AND
   254:SYS6552Ø:RETURN                       :REM*52
35 REM ***** MAIN MENU *****                 :REM*119
37 POKEBO,12:POKEBA,12:PRINT"{SHFT CLR}{CTR
   L 1}"                                     :REM*87
4Ø PRINT"{CTRL 1}":GOSUB2Ø:PRINT"{CTRL 9}{7
    SPACEs}1-EXIT{4 SPACEs}2-LOAD{4 SPACEs}
   3-SAVE{7 SPACEs}";                        :REM*242
45 GOSUB2Ø:PRINT"{CTRL 9}{4 SPACEs}4-EDIT{2
    SPACEs}5-CLEAR{2 SPACEs}6-PRINT{2 SPACE
   s}7-QUIZ{4 SPACEs}";:GOSUB2Ø              :REM*83
5Ø GETA$:IFA$=""THEN5Ø                       :REM*3Ø
55 A=ASC(A$)-48:IFA<1ORA>7THEN5Ø             :REM*241
6Ø ONAGOTO65,38Ø,33Ø,119,44Ø,458,625
                                             :REM*11Ø
65 R=1Ø:C=5:GOSUB3Ø:PRINT"{5 SPACEs}ARE YOU
    SURE ? (Y/N)"                            :REM*133
7Ø GETA$:IFA$=""THEN7Ø                       :REM*114
75 IFA$="Y"THENPRINT"{SHFT CLR}":END
                                             :REM*133
8Ø GOTO37                                    :REM*132
118 REM ### EDIT MENU ###                    :REM*54
119 POKEBO,1:POKEBA,1:PRINT"{SHFT CLR}{CTRL
     7}":GOSUB2Ø                             :REM*121
12Ø PRINT"{CTRL 9}{3 SPACEs}1-EXIT{2 SPACEs
   }2-ENTER{2 SPACEs}3-LIST{2 SPACEs}4-MOD
   IFY{4 SPACEs}";:GOSUB2Ø                   :REM*198
13Ø GETA$:IFA$=""THEN13Ø                     :REM*198
14Ø A=ASC(A$)-48:IFA<1ORA>4THEN13Ø           :REM*198
15Ø ONAGOTO37,155,23Ø,1ØØØ                   :REM*26
151 REM #### INPUT Q+A ####                  :REM*43
155 Z=X:POKEBO,1:POKEBA,1                    :REM*9
16Ø PRINT"{SHFT CLR}{CTRL 3}":GOSUB2Ø:PRINT
   "{CTRL 9}{2 SPACEs}1-EXIT{2 SPACEs}2-EN
   TER QUESTION AND ANSWER{3 SPACEs}";:GOS
   UB2Ø                                      :REM*252
17Ø R=9:C=Ø:GOSUB3Ø                          :REM*8
171 GETA$:IFA$=""THEN171                     :REM*113
172 IFA$="1"THEN119                          :REM*24Ø
173 IFA$="2"THEN175                          :REM*99
174 GOTO171                                  :REM*248
175 Z=Z+1:X=X+1:IFX>1Ø1THENX=1Ø1:Z=1Ø1:GOTO
   2ØØ                                       :REM*251
18Ø POKE19,64:PRINT"QUESTION #"Z:INPUTAA$(Z
   ):POKE19,Ø                                :REM*21Ø
185 IFAA$(Z)=""THENZ=Z-1:X=X-1:GOTO16Ø
                                             :REM*197
19Ø POKE19,64:PRINT:PRINT"ANSWER #"Z:INPUTB
   B$(Z):POKE19,Ø                            :REM*26
195 IFBB$(Z)=""THENZ=Z-1:X=X-1:GOTO16Ø
                                             :REM*231
199 GOTO16Ø                                  :REM*225
2ØØ PRINT"BUFFER FULL":FORI=1TO15ØØ:NEXT:GO
   TO119                                     :REM*11Ø
21Ø GOTO16Ø                                  :REM*236
215 REM ### LIST ###                         :REM*81
23Ø POKEBO,1:POKEBA,1:PRINT"{SHFT CLR}{CTRL
     1}":R=24:C=Ø:GOSUB3Ø                    :REM*1Ø
24Ø FORZ=1TOX                                :REM*112
245 PRINTZ;AA$(Z):WAIT653,1,1                :REM*93
25Ø PRINTZ;BB$(Z):WAIT653,1,1                :REM*194
252 FORI=1TO15Ø:NEXTI:NEXTZ                  :REM*156
26Ø PRINT"{CTRL 9}{CTRL 3}{1Ø SPACEs}HIT RE
   TURN TO EXIT{11 SPACEs}";                 :REM*5
27Ø IFPEEK(197)=1THENPOKE198,Ø:GOTO119
                                             :REM*2Ø1
275 GOTO27Ø                                  :REM*7Ø
328 REM ##### SAVE #####                     :REM*255
33Ø PRINT"{SHFT CLR}{COMD 4}"                :REM*119
335 GOSUB2Ø:PRINT"{CTRL 9}{6 SPACEs}1-EXIT{
   5 SPACEs}2-TAPE{5 SPACEs}3-DISK{6 SPACE
   s}";:GOSUB2Ø                              :REM*2Ø
337 PRINT"{CTRL 9}{18 SPACEs}SAVE{18 SPACEs
   }{CTRL Ø}";                               :REM*34
34Ø GETA$:IFA$=""THEN34Ø                     :REM*27
342 IFA$="1"THENGOTO37                       :REM*237
345 R=1Ø:C=Ø:GOSUB3Ø:POKE19,64:INPUT"FILE N
   AME ";N$:PRINT:POKE19,Ø                   :REM*228
35Ø IFA$="2"THENOPEN2,1,1,N$:GOTO36Ø
                                             :REM*173
355 OPEN2,8,2,"@Ø:Q"+N$+",S,W"               :REM*92
36Ø FORI=1TOX                                :REM*97
365 PRINT#2,AA$(I)                           :REM*12
37Ø PRINT#2,BB$(I)                           :REM*113
375 NEXT:PRINT#2,"QQ":CLOSE2:PRINT"{SHFT CL
   R}":GOTO4Ø                                :REM*8
377 REM ##### LOAD #####                     :REM*232
38Ø PRINT"{SHFT CLR}{CTRL 2}"                :REM*87
385 GOSUB2Ø:PRINT"{CTRL 9}{6 SPACEs}1-EXIT{
   5 SPACEs}2-TAPE{5 SPACEs}3-DISK{6 SPACE
   s}";:GOSUB2Ø                              :REM*7Ø
387 PRINT"{CTRL 9}{18 SPACEs}LOAD{18 SPACEs
   }{CTRL Ø}";                               :REM*176
39Ø GETA$:IFA$=""THEN39Ø                     :REM*141
```

Continued on p. 66.

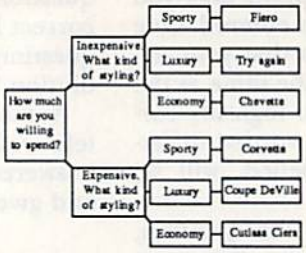
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POWER PLAN

Names	Wage per /hr	Mo	Tu
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Bosen	7.50 $	7.70	3.50
Carter	4.70 $	6.80	3.50
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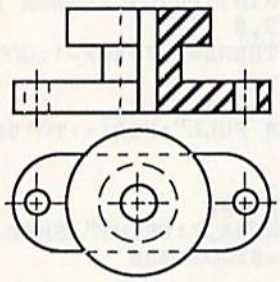
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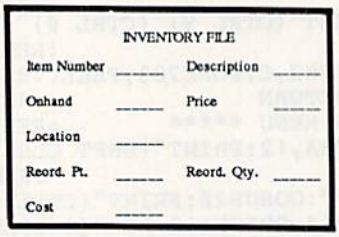
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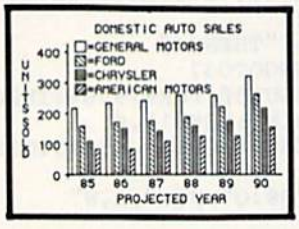
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RUN Magazine

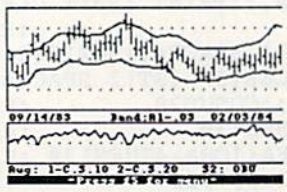
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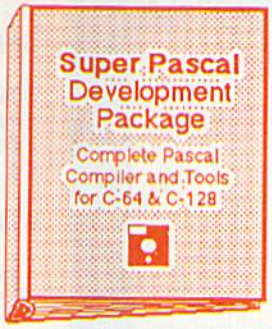


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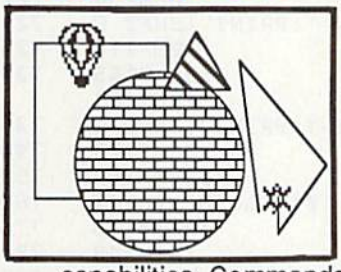
BASIC-64 full compiler



```
ADVANCED DEVELOPMENT PACKAGE
A = CODE-GENERATOR:      P-CODE
B = LOAD SYMBOL-TABLE:   OFF
C = SAVE SYMBOL-TABLE:   OFF
D = LINE-ADDRESS-TABLE:  OFF
E = MEMORY-TOP:          65536
F = CODE-START:          7557
G = RUNTIME-MODULE:      ON
H = EXTENSION:           SIMON'S BASIC
I = TOKEN-BYTES:         2
J = ELSE-CODE:           100 71
K = ERROR-LINE:          0
L = OVERLAY:             OFF
M = DISK-COMMAND:
```

The most advanced **BASIC** compiler available for the C-64. Our bestselling software product. Compiles to superfast 6510 machine code or very compact speedcode. You can even mix the two in one program. Compiles the complete BASIC language. Flexible memory management and overlay options make it perfect for all program development needs. **BASIC 64** increases the speed of your programs from 3 to 20 times. Free runtime package. Includes system diskette and user's handbook. **$39.95**

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The most advanced graphics development package available for the C-64. Adds dozens of powerful commands to standard BASIC so that you can use the hidden graphics and sound capabilities. Commands for hires, multicolor, sprite and turtle graphics, simple and complex music and sound, hardcopy to most printers, memory management, more. Used by professional programmers for commerical software development. Free runtime package. Includes system diskette and user's handbook. **$39.95**

FORTH Language

```
SCR # 20
 0 P ( RANDOM NUMBER TESTER ?RND )
 1 P FORTH DEFINITIONS DECIMAL
 2 P : ?RND
 3 P       ( INITIALIZE FIRST SCREEN)
 4 P       1024 1000 ASCII 0 FILL
 5 P       BEGIN
 6 P         1000 RND    ( RANDOM 0,999)
 7 P         40 /MOD     ( COLUMN, LINE)
 8 P         SWAP        ( EXCHANGE)
 9 P         2DUP 58     ( CHARACTER)
10 P         1+ -ROT     ( ADD 1)
11 P         SI          ( SAVE)
12 P       ?TERMINAL UNTIL
13 P ;
```

Our **FORTH** language is based on the Forth 79 standard, but also includes much of the 83 level to give you 3 times vocabulary of fig-Forth. Includes full-screen editor, complete Forth-style assembler, set of programming tools and numerous sample programs to get you deeply involved in the FORTH language. Our enhanced vocabulary supports both hires and lores graphics and the sound synthesizer. Includes system diskette with sample programs and user's handbook. **$39.95**

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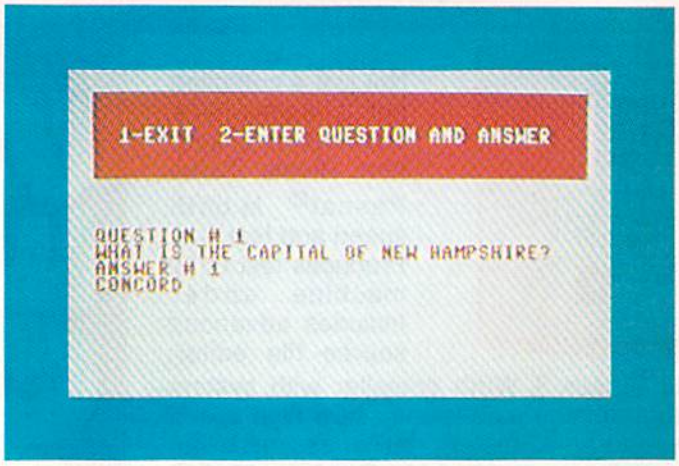
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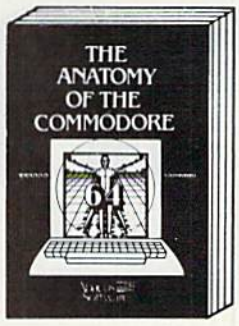
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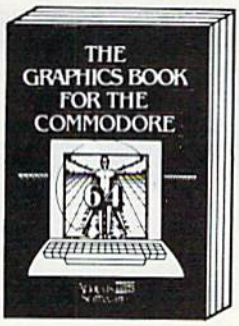
From p. 63.

```
392 IFA$="1"THENGOTO37                          :REM*31
395 R=1Ø:C=Ø:GOSUB3Ø:POKE19,64:INPUT"FILE N
    AME ";N$:POKE19,Ø:IFX<>ØTHENX=X+1
                                                :REM*3Ø
397 IFX=ØTHENX=1                                :REM*218
398 I=X                                         :REM*2Ø9
4ØØ IFA$="2"THENOPEN2,1,Ø,N$:GOTO415
                                                :REM*191
4Ø5 OPEN2,8,2,"Ø:Q"+N$+",S,R"                   :REM*138
415 INPUT#2,A$                                  :REM*56
417 IFA$="QQ"THENCLOSE2:X=X-1:PRINT"{SHFT C
    LR}":GOTO4Ø                                 :REM*114
418 AA$(I)=A$                                   :REM*165
42Ø INPUT#2,B$                                  :REM*93
422 IFB$="QQ"THENCLOSE2:X=X-1:PRINT"{SHFT C
    LR}":GOTO4Ø                                 :REM*127
423 BB$(I)=B$                                   :REM*184
425 I=I+1:X=I:IFX>1Ø1THENX=1Ø1:CLOSE2:PRINT
    "{SHFT CLR}":GOTO4Ø                         :REM*17Ø
43Ø GOTO415                                     :REM*49
435 REM ###### CLEAR ######                     :REM*2Ø2
44Ø R=1Ø:C=Ø:GOSUB3Ø:PRINT"ARE YOU SURE YOU
     WANT TO CLEAR? (Y/N)"                      :REM*213
445 GETA$:IFA$=""THEN445                        :REM*38
45Ø IFA$="N"THEN37                              :REM*59
455 CLR:GOTO1Ø                                  :REM*214
456 REM ###### PRINT ######                     :REM*65
458 POKEBO,3:POKEBA,3:PRINT"{SHFT CLR}{CTRL
     1}"                                        :REM*85
46Ø GOSUB2Ø:PRINT"{CTRL 9}{4 SPACEs}1-EXIT{
    3 SPACEs}2-QUESTIONS AND ANSWERS{4 SPAC
    Es}";                                       :REM*217
465 PRINT"{CTRL 9}{4Ø SPACEs}";                 :REM*126
47Ø PRINT"{CTRL 9}{3 SPACEs}3-QUESTIONS ONL
    Y{4 SPACEs}4-ANSWERS ONLY{3 SPACEs}";:G
    OSUB2Ø                                      :REM*197
475 GETA$:IFA$=""THEN475                        :REM*4
48Ø IFA$="1"THEN35                              :REM*185
485 R=1Ø:C=Ø:GOSUB3Ø:POKE19,64:PRINT"HOW MA
    NY COPYS? ";:INPUTB:OPEN4,4                 :REM*138
49Ø IFA$="3"THENFORT=1TOB:GOTO56Ø               :REM*1Ø9
495 IFA$="4"THENFORT=1TOB:GOTO59Ø               :REM*1Ø
5ØØ IFA$="2"THENFORT=1TOB:GOTO52Ø               :REM*215
51Ø GOTO475                                     :REM*225
52Ø L=2:FORI=1TOX                               :REM*17Ø
53Ø PRINT#4,"Q. ";AA$(I)                        :REM*84
535 PRINT#4                                     :REM*29
54Ø PRINT#4,"A. ";BB$(I)                        :REM*114
545 PRINT#4:L=L+4                               :REM*57
547 IFL>64THENFORR=1TO3:PRINT#4:NEXTR:L=2
                                                :REM*181
55Ø NEXTI:FORR=LTO67:PRINT#4:NEXTR:L=2:NEXT
    T:CLOSE4:GOTO458                            :REM*158
56Ø L=2:FORI=1TOX                               :REM*21Ø
57Ø PRINT#4,I". ";AA$(I)                        :REM*15Ø
575 PRINT#4:PRINT#4:L=L+3                       :REM*151
577 IFL>64THENFORR=1TO3:PRINT#4:NEXTR:L=2
                                                :REM*211
58Ø NEXTI:FORR=LTO67:PRINT#4:NEXTR:L=2:NEXT
    T:CLOSE4:GOTO458                            :REM*188
59Ø L=2:FORI=1TOX                               :REM*24Ø
6ØØ PRINT#4,I". ";BB$(I)                        :REM*2Ø4
6Ø5 PRINT#4:L=L+2                               :REM*113
6Ø7 IFL>64THENFORR=1TO3:PRINT#4:NEXTR:L=2
                                                :REM*241
61Ø NEXTI:FORR=LTO67:PRINT#4:NEXTR:L=2:NEXT
    T:CLOSE4:GOTO458                            :REM*218
62Ø REM ##### QUIZ #####                        :REM*19Ø
625 FORT=1TOX:C$(T)="1":NEXT:Z=1:L=Ø:W=Ø
                                                :REM*149
63Ø POKE5328Ø,1:POKE53281,1:PRINT"{SHFT CLR
    }{CTRL 6}"                                  :REM*2ØØ
64Ø GOSUB2Ø:PRINT"{CTRL 9}{14 SPACEs}ULTRAQ
    UIZ 64{14 SPACEs}";:GOSUB2Ø                 :REM*234
65Ø R=1Ø:C=Ø:GOSUB3Ø:IFZ>XTHEN73Ø               :REM*238
66Ø K=INT(RND(1)*X)+1                           :REM*234
67Ø IFC$(K)=""THEN66Ø                           :REM*136
68Ø C$(K)="":R=1Ø:C=Ø:GOSUB3Ø                   :REM*76
69Ø PRINTZ;AA$(K):Z=Z+1                         :REM*12Ø
7ØØ PRINT:POKE19,64:INPUTA$:POKE19,Ø
                                                :REM*116
71Ø IFA$=BB$(K)THENPRINT:PRINT"CORRECT":L=L
    +1:FORI=1TO5ØØ:NEXT:GOTO63Ø                 :REM*38
72Ø PRINT:PRINT"WRONG ANSWER, THE CORRECT A
    NSWER IS ":PRINTBB$(K):W=W+1                :REM*64
722 PRINT" HIT ANY KEY TO CONTINUE"              :REM*8Ø
723 GETL$:IFL$=""THEN723                        :REM*249
724 GOTO63Ø                                     :REM*232
73Ø PRINT"YOU GOT"L"RIGHT AND"W"WRONG."
                                                :REM*72
735 S=L/(L+W)*1ØØ                               :REM*247
74Ø PRINT:PRINT"YOUR SCORE IS"S                 :REM*17Ø
75Ø PRINT:PRINT"TRY AGAIN (Y/N)?"               :REM*12
76Ø GETA$:IFA$=""THEN76Ø                        :REM*192
77Ø IFA$="Y"THEN625                             :REM*57
78Ø GOTO37                                      :REM*67
999 REM **** MODIFY ****                        :REM*1Ø4
1ØØØ PRINT:PRINTTAB(13)"1":POKE19,64:REM*65
1Ø1Ø PRINT"{2 CRSR UPs}":INPUT"MODIFY FROM{
     2 SPACEs}";Z:POKE19,Ø:PRINT"{CTRL 6}":
     GOTO1Ø35                                   :REM*143
1Ø15 PRINT"{CTRL 6}"                            :REM*152
1Ø2Ø PRINT"{SHFT CLR}":GOSUB2Ø:PRINT"{CTRL
     9}{4 SPACEs}1-EXIT{2 SPACEs}2-MODIFY T
     EXT{2 SPACEs}3-SKIP{7 SPACEs}";:GOSUB2
     Ø                                          :REM*159
1Ø3Ø R=9:C=Ø:GOSUB3Ø:RETURN                     :REM*84
1Ø35 IFZ>XTHEN119                               :REM*93
1Ø4Ø GOSUB1Ø15:PRINT"{CTRL 1}QUESTION #"Z:P
     RINTAA$(Z)                                 :REM*186
1Ø5Ø GETA$:IFA$=""THEN1Ø5Ø                      :REM*84
1Ø6Ø IFA$="1"THEN119                            :REM*1Ø8
1Ø7Ø IFA$="2"THEN11ØØ                           :REM*11Ø
1Ø8Ø IFA$="3"THEN112Ø                           :REM*24
1Ø9Ø GOTO1Ø5Ø                                   :REM*172
11ØØ POKE19,64:R=9:C=19:GOSUB3Ø:PRINT"{CTRL
     9} ENTER NEW QUESTION ":INPUTA$:POKE1
     9,Ø                                        :REM*24
111Ø AA$(Z)=A$                                  :REM*16Ø
112Ø GOSUB1Ø15:PRINT"{CTRL 1}ANSWER #"Z:PRI
     NTBB$(Z)                                   :REM*222
113Ø GETA$:IFA$=""THEN113Ø                      :REM*228
114Ø IFA$="1"THEN119                            :REM*188
115Ø IFA$="2"THEN12ØØ                           :REM*198
116Ø IFA$="3"THENZ=Z+1:GOTO1Ø35                 :REM*24Ø
117Ø GOTO113Ø                                   :REM*2Ø4
12ØØ POKE19,64:R=9:C=19:GOSUB3Ø:PRINT"{CTRL
     9}{2 SPACEs}ENTER NEW ANSWER{2 SPACEs
     }":INPUTA$:POKE19,Ø                        :REM*142
121Ø BB$(Z)=A$:Z=Z+1:GOTO1Ø35                   :REM*216
```

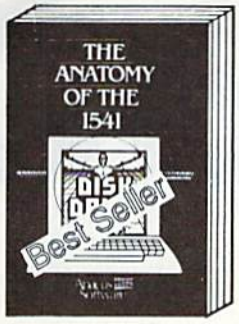
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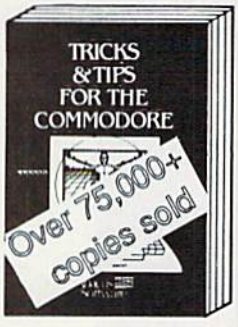
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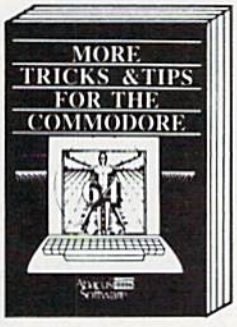
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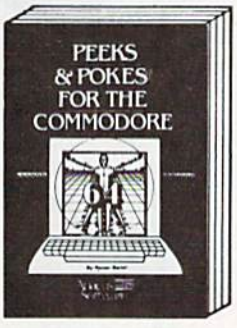
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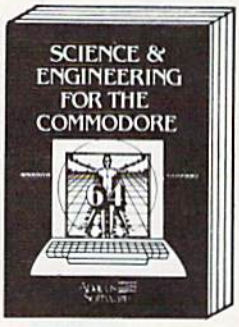
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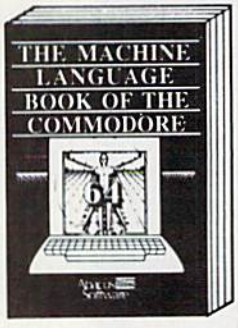
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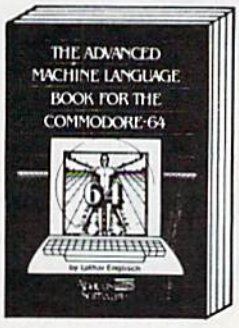
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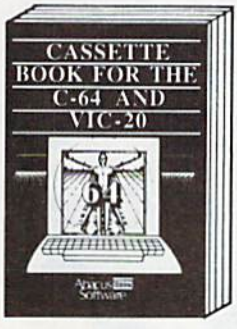
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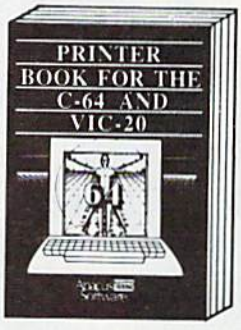
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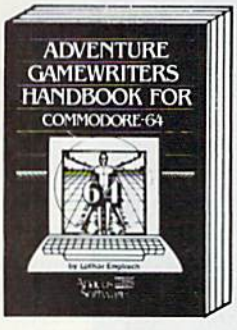
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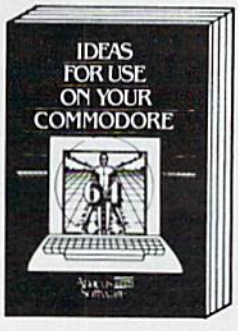
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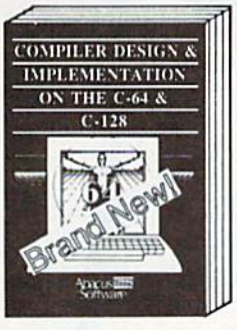
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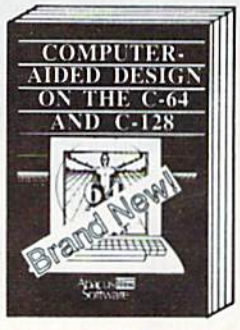
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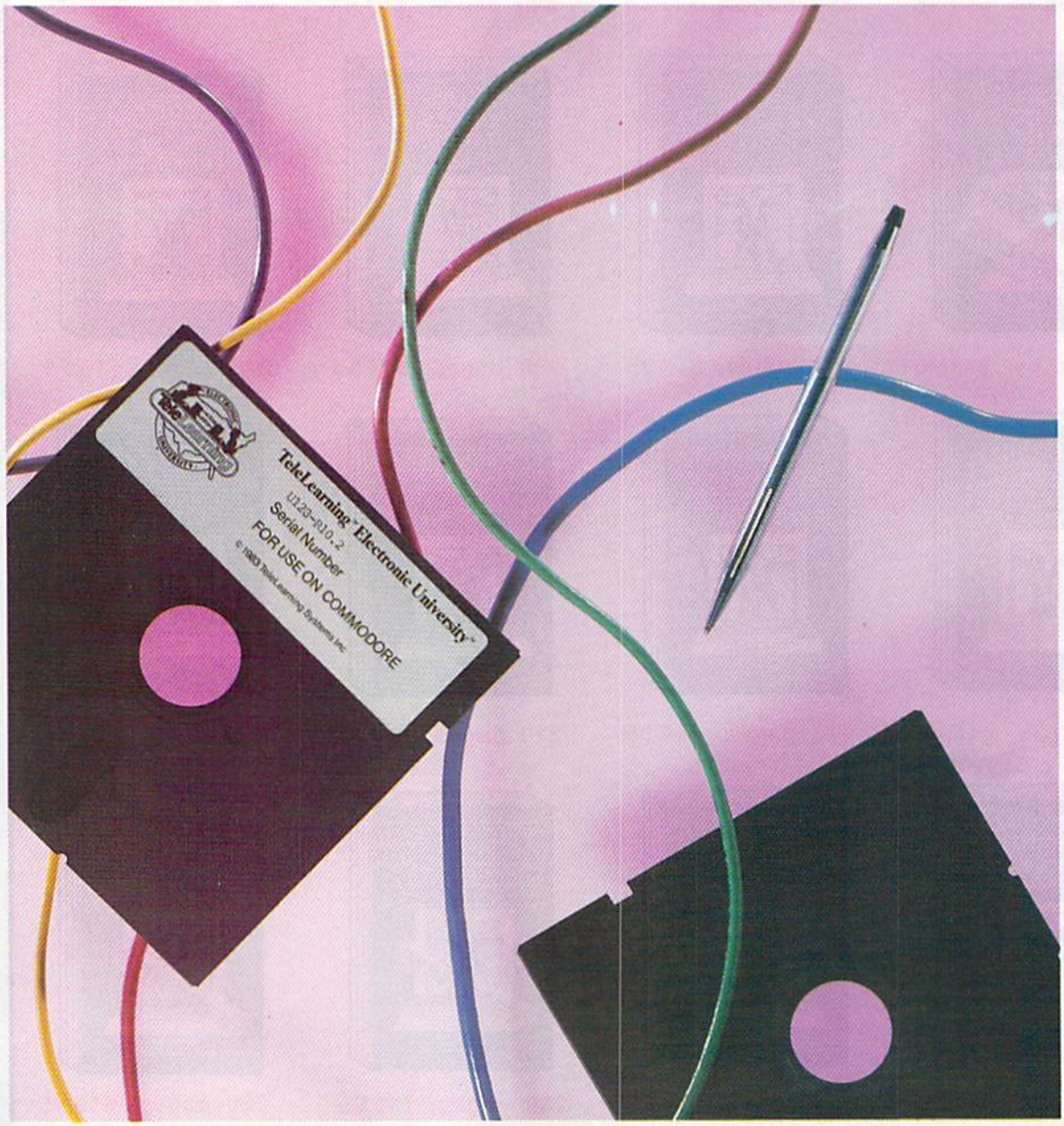
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Telecomm



This month features TeleLearning, an on-line education network through which all members of your family can take courses. You can even earn a college degree.

On-line with TeleLearning

By MARGARET MORABITO

Innovative methods of teaching and learning are beginning to appear at all levels of schooling, with the microcomputer as a key element in this changing atmosphere. The computer has the potential to dramatically reshape the way the teaching-learning process occurs; however, we've been slow to determine how the computer can effect a positive change.

An obvious use for the computer has been in the teaching of computer programming, but now many schools are starting to use it as a teacher's aid in subjects that are totally unrelated to computer science. Moreover, there is an even more valuable application for the computer that can benefit home users in particular.

The computer can be a central figure, not a supplemental tool, in the teacher-student relationship. Anyone who has a home computer can participate in computerized on-line instruction at home, while still having the benefit of communication with a live instructor.

An on-line service in San Francisco has been actively doing something to advance the use of computers in the home for computer-based instruction. TeleLearning Systems, Inc., is an on-line communication network that provides a conduit for course work by computer rather than by classroom instruction.

TeleLearning's Electronic University is the network through which students and teachers exchange information using their microcomputers. The courses are taught by instructors from all across the country, who prepare lessons and transmit correspondence to their students from the comfort of their own offices. TeleLearning classes feature direct interaction between students and instructors, something that cannot be done in any other kind of correspondence course.

The TeleLearning network offers over 140 courses to all ages, on many topics and for a variety of purposes. Through Electronic University, you can register for a course to aid you in your work or for personal advancement. Your children can register for tutoring programs. High school graduates can take CLEP (College Level Examination Program) preparation courses. Qualified students can register for college-level courses that will earn them legitimate college credit. You can even matriculate as a student at an undergraduate or graduate school.

Though this form of education lacks the physical connection, it is full of possibilities for personal interaction with instructors and other students. It also allows you to proceed at your own pace and receive evaluations of your progress along the way.

Types of Courses

The Electronic University offers non-credit courses, including tutoring programs for children, personal-improvement courses and courses to strengthen business and professional skills. The university also offers courses for credit and degree-granting programs. (For a sampling of TeleLearning's offerings, see Table 1.)

Course credits and degrees are issued only by accredited institutions; the Electronic University acts only as a network system through which courses and instruction are delivered. All courses for credit require that you take a proctored final exam at a library or a college in your area.

Degrees offered are Associate in Arts, Associate in Science in Management, Bachelor of Arts, Bachelor of Science in Business Administration, Master of Business Administration (general MBA), MBA in Individual Financial Planning and MBA in Technology/Engineering Management.

There are two methods of study: disk-based courses and on-line seminars. The disk-based courses have all of their lessons preprogrammed onto floppy disks. When you register for a course, you automatically purchase the course disks and the accompa-

nying textbooks from TeleLearning. (You may buy the books locally, if you wish.)

The disk-based courses are convenient, as you don't have to log on every time you want to do a lesson, and you may start whenever you wish. Each lesson usually involves reading, problem solving and other traditional forms of study. After completing a lesson, you send your answers to your instructor electronically. Only after you have finished a lesson will you be allowed to advance to the next one.

Your lessons are sent to your instructor's electronic mailbox, and responses are transmitted back to you in the same manner. You should check your electronic mail regularly in order to get the most recent feedback from your instructor before proceeding to the next lesson.

Also offered are on-line seminars, which are discussed in more detail below.

How to Access TeleLearning

TeleLearning provides a terminal program that holds its particular protocols and on-line registration procedures. You can buy a TeleLearning modem or use a Commodore 1650 Auto-Modem or VIC-Modem. The terminal package with modem is $149.95 and can be ordered by phone from TeleLearning, which periodically advertises lower sales prices.

In order to go on-line with TeleLearning, you'll need its system disk, one of the above-mentioned modems, the Electronic University course catalog, a disk drive, a telephone with a standard modular jack and your C-64 or C-128. You'll also need a major credit card for billing purposes.

After you have your equipment and system disk, you log onto the Electronic University using either Telenet or Tymnet. The system disk has a program that lets you enter all of your enrollment information into the computer and onto disk before you actually go on-line. This is a good money-saving feature for those who don't have toll-free telephone access to Telenet or Tymnet. You will be asked to type in your local-access phone numbers, which will be kept on disk. This makes all subsequent logging onto the system much easier, as it is completely automatic.

All procedures on the TeleLearning network are menu-driven and easy to follow; they make college enrollment and course registration very easy when compared to the actual physical process. Once you have sent your enrollment information to TeleLearning over the modem lines, your information is processed, and within 48 hours you receive on-line confirmation of your enrollment. Thereafter, you and any members of your family can access the Electronic University for any of its services.

The first thing you'll want to access from the University is its counseling service. This is an on-line communications option in which you answer several questions about your educational goals and background. You also have the opportunity to list your questions for the counselors to answer. However, you get a quicker response by calling TeleLearning and asking your questions over the phone. Counseling is optional, but if you intend to enroll in a degree-granting program, you must take a counseling session, for which there is a $15 fee.

Interaction with Your Instructor

Interaction with your instructor comes through the electronic mail that the Electronic University offers. The instructor for my Introductory Marketing course went over my lesson homework and tests and sent com-

Seminar Series

- Legal Rights
- ESP Applications
- Human Sexuality
- Management
- Artificial Intelligence
- Business Consulting

Non-Credit Courses

Tutoring Programs for Children

- Reading Readiness
- Basic Math Skills
- Vocabulary Building
- Language Arts
- Problem Solving
- Introduction to Computers
- Introduction to Basic Programming

Personal Improvement Courses

- Writing Skills
- Memory Training
- Vocabulary Development
- Computer Literacy
- Culinary Arts
- Economic News
- Human Anatomy

Business and Professional Skills

- Time Management
- Sales Techniques
- Negotiating
- Handling Stress
- Moneymaking with Microcomputers
- Starting and Managing Your Own Business
- Accounting
- Business Math

Courses for Credit

Humanities

- Written Expression
- Introduction to Theatre
- Freshman English
- American Literature
- Introduction to Journalism
- Western Civilization
- American History
- U.S. History
- Introduction to Philosophy

Natural Science/Mathematics

- Physical Science
- Geology
- Biology
- Introduction to Algebra
- Trigonometry
- Calculus

Social Sciences

- Human Growth and Development
- General Psychology
- Educational Psychology
- Child Psychology
- Introduction to Sociology
- American Government
- Economics I & II

Business

- Computers and Data Processing
- Programming in Basic
- Word Processing Fundamentals
- Spreadsheet Software
- Informational Systems for Management*
- Statistics
- Principles of Finance
- Money & Banking
- Managerial Finance*
- Investment Management*
- Financial Analysis*
- Introductory Accounting
- Tax Accounting
- Introductory Marketing
- Sales Management
- Business in Society
- Quantitative Managerial Decision Making
- Introduction to Business Law
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Table 1. *A Sampling of TeleLearning Offerings for 1985.*

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FLEET SYSTEM 2
Great Buy $48

Special of the Month
Paper Clip $49
Paper Clip/Speller $69
Home Pak $33

PROGRAMMING SERIES
Simon Basic $21
Logo $45

ACCOUNTING
Home Accountant $44
Typing Tutor III $29
General Ledger $35
A/R, A/P, Payroll $33
The Manager $35

DATA BASES
PFS: File $57
Super Base 64 ..... $48

Special of the Month
The Consultant
$57

SPREAD SHEET
Multiplan $59
Homepak $34

Hardware



In Stock
C-128 ..... $299
1571 Disk Drive ... $269

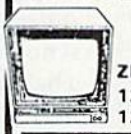
1541 Disk Drive
$189



1541 Alignment Kit $37
MPS 802 ..... $199
1530 Datasette $39
Magic Voice Speech $49.95
1011 RS 232 Interface $49

NEW.....FAST
1660 MODEM
$52

1541 FLASH .. $54.95



1702 Monitor
$189

ZENITH MONITORS
122 Amber $84
123 Green $79

Special of the Month
MSD DISK DRIVE
SD1 Disk Drive $224
SD2 Disk Drive $439

INDUS GT
DISK DRIVE
$229

COMPUSERVE STARTER
KIT $21

MPS 801 Printer
$119 Reg. $199

CARDCO 5 SLOT
EXPANDER
$49.95

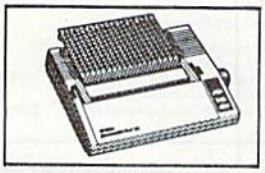
Printers

SG-10 $214
SG-10C $244
SG-15 ..... $369
SD-10 ..... $329
SD-15 ..... $444
SR-10 ..... $479
SR-15 ..... $579
Powertype ... $304



Letter Quality Powertype $304
Gemini 10x Ribbon $3
Gemini 15x Ribbon $3

Homewriter 10 .... $209
NEW LX-80 ..... $234
DX-10 Daisywheel ... $245
DX-20 Daisywheel ... $319
NEW LX-80 .... $224
RX-80 ..... $208
FX-80 ..... $323
FX-85 ..... $469



Epson 80 Ribbon ... $5
Epson 100 Ribbon . $8
Homewriter Interface $65

Okidata 182 ..... $214
Okidata 192 ..... $349
Okidata 193 ..... $499
Okidata 92 ..... $349
Okidata 93 ..... $559
Okidata 84 ..... $629
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Cardco + G Interface $48
Cardco B Interface $39
Grappler CD $84

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ments on my work via electronic mail. Whenever I had the time, I logged on to check for incoming messages.

This provides far more interaction than you would gain from a traditional correspondence course, one taken via television or VCR, or even a college course that has several hundred students with only one lecturer. Each Electronic University instructor has only ten students at one time. This contributes to the individualized instruction available.

At the beginning of the course, I was asked to fill out a personal information questionnaire for transmission to my instructor. I was also given a brief resume of the instructor. This personal identification between instructor and student is important and is not always found in a traditional educational setting. It is also possible to set up on-line sessions for chatting with your instructor.

My Introductory Marketing course had four textbooks and workbooks that were definitely college level and of excellent quality, written by faculty members from Texas A&M University. My instructor, Tom Copley, had a Ph.D. from Penn State and an MBA from the University of California at Berkeley. Instructors are often either graduate students or retired university professors.

The actual computer display was mostly composed of textual and numeric information. Other courses, when it's helpful, rely heavily on the C-64's graphics capabilities.

The Electronic University has an on-line library—always open—with over 60 databases offered through BRS (Bibliographic Retrieval Service). Anyone enrolled in Electronic University can access this tremendous on-line information system; you needn't be taking a course. You pay a fee, which varies depending upon which database you are accessing.

Through the library, you can gain access to 8,000,000 books, including abstracts from the *Harvard Business Review* and political news reports, as well as articles and indexes on any topic.

Also available through the library are databases covering world news and information, stock market reports, the Official Airline Guide and admission into the Electronic University's Seminar Series.

The Seminar Series gives students the opportunity to participate in interactive seminars on current topics and special-interest subjects without having to enroll for a full-length course. Seminars vary in length from several hours to several weeks and are given by renowned experts in their fields.

During a seminar, you may interact with the lecturer, panel members and other students. All communication among seminar participants is displayed on your computer's screen. You may print out the entire seminar or request a disk from the Electronic University.

Nine seminar topics are listed in the 1985 Electronic University Catalog, each costing from $12 to $15.

How to Get College Credit

There are four ways to earn college credit. Perhaps the most common is to use TeleLearning courses as preparation for college-level examinations, such as CLEP. You do all of your course work through the Electronic University, and then, when you are ready to take the exam, you go to one of the 1800 colleges and universities nationwide that offer these examinations.

If you earn the grade required by the college giving the exam, then that school awards credit for the course. The Electronic University simply prepares you to take those tests; it doesn't actually award credit itself.

Secondly, you can enroll in a university that has developed courses for use through the Electronic University. You use the college's materials and the college instructor, but you take the course on-line. The University of Nebraska and Ohio University are participating in course development and course offerings from their independent study departments through the Electronic University.

You can also enroll as a matriculated student at either Edison College, Trenton, NJ (609-984-1100) or City University, Bellevue, WA (206-643-2000). These universities offer degree-granting programs entirely via TeleLearning. You take all of your course work on-line, and then you take final examinations, prepared by their faculty members, at your local college or library under the supervision of a proctor. Edison College offers Associate and Bachelor's degrees and City University offers a Masters.

Another method of earning credits is to take a TeleLearning course and, after completing it, to apply at your chosen college for "life experience" credits. Many colleges and universities award credit for knowledge gained

through non-traditional means, such as work, personal experience or correspondence study. You should check with your local college on its credit-awarding policy before taking any courses for which you hope to gain credit through Electronic University.

The courses that were available in early June varied in price from $45 to $300. The fees reflect the variety of offerings and whether or not a course is college level.

Who Benefits from Electronic University?

The Electronic University offers individualized instruction and courses given by educators from all across the nation. You don't have to physically attend classes at specific times, and, often, the cost is less than that for full-time study.

As with any kind of self-paced correspondence program, you have to be self-disciplined in order to succeed. If you can't motivate yourself to do your lessons, stick to your own plan of study and set aside regular study times, you'll probably find yourself dropping out.

This on-line service is intended for people who, for whatever reasons, cannot or do not want to physically attend school or college to take a particular course.

Someone who works full-time and doesn't have the luxury of having a college nearby might want to look into the Electronic University. The physically handicapped or those living in remote locations would benefit greatly from TeleLearning. Children could also benefit from the wide range of class offerings given by teachers from many geographical locations.

I see the Electronic University as a good opportunity for supplementing your formal education, not as a complete replacement for a classroom-based education. It provides valid options for those who want to take extra courses (credit or non-credit) to complement their previous educational course work. For children, teenagers and adults, TeleLearning can offer the challenge that you face in traditional educational settings, but without many of the pressures.

Impressions

My experience with the Electronic University exceeded my expectations. Having been a college instructor myself, I was quite apprehensive about both the quality of course work being offered by an on-line network and the ability of a person to learn by this method. Frankly, I was impressed with the course-work materials and the curriculum, and with the fact that I could interact with my instructor when I wanted or needed to.

The Electronic University puts into action what many have just dreamed about. It is still young and has much room for development. However, it's a step in the right direction and already shows great promise as an ongoing source of educational training.

TeleLearning is the only on-line educational service available to C-64 or C-128 owners. The Plato Homelink service offers on-line courses, but doesn't link up with Commodore computers and doesn't offer credit toward college degrees.

How can you find out more information about TeleLearning? You can telephone 800-22LEARN, 800-44-LEARN (in California) or 415-928-2800. Or you can write to TeleLearning Systems, Inc., 505 Beach St., San Francisco, CA 94133. R

Address all author correspondence to Margaret Morabito, c/o RUN *editorial, 80 Pine St., Peterborough, NH 03458.*

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Paying your bills can be a painful procedure. Let your Commodore take the tedium out of this task by printing professional-looking checks, a record of each entry and a running balance of your transactions.

By WAYNE ARNETT

There are many time-honored methods for coping with monthly bills, but the most common is probably the pen-in-hand technique. The procedure is usually the same and begins with a search for the checkbook. Will it be in the glovebox this time or still in a bag with the groceries? After shaking out some loose dry cleaner's receipts, you prepare to wage war on personal debt with a calculator, scratch pad and ballpoint pen.

If this sounds familiar, welcome aboard. Many small businesses handle their finances the same way. But handwriting personal checks and posting them individually to a ledger or account register invites errors and wastes time. And consider this: Over the years, how many nearly identical checks will you handwrite for such things as your mortgage payment or electric bill? It seems as though some of these repetitive tasks could be automated.

Check Writer prints professional-looking checks and a record of each entry. It also maintains a running balance of your transactions. You don't have to enter anything except the amount of payment. Your check amount is automatically entered into the check register, so if you sometimes put one amount on a check and enter a different figure in the register or ledger, then this program should be of interest to you.

Most banks can provide tractor-feed checks in a variety of formats, imprinted with your name and account number. Many other suppliers of business forms, including Radio Shack, have a good selection of checks with detachable stubs, carbonless copies and other features, such as matching window envelopes.

I use all-purpose checks available from Moore Computer Supplies, PO Box 20, Wheeling, IL 60090 (catalog no. L17566). The spacing and tabs in the printout section of the listing are designed to fit the Moore checks, but Check Writer can be adapted to any other style.

Whatever type of check you decide to use, you might find it well worth the nominal service fee to maintain a separate account for computer-printed checks, used only for your monthly bills. It's easier to keep track of a budget, and you no longer carry your financial records in your pocket or purse.

Writing Checks

Run the program after putting blank checks in the printer. The display prompts you for beginning balance, deposits and bank service charges. These are optional, but you can't keep accurate records without them. You also provide the first check number and the date to appear on the checks.

The screen then clears and asks for the amount of each preformatted check. If for some reason one of your regular creditors isn't getting paid this month, just hit the return key and that check will be skipped.

When all the preformatted check amounts have been entered, the display asks for payee, amount and memo for any additional payments. The memo line is for an account number or any other information you would normally jot on a handwritten check.

After the last one is "written," just hit the return key without typing another payee's name. Entering a blank payee line or exceeding 50 total checks terminates the input portion of the program.

It's important to position the blanks carefully in the printer, so that the information will appear in its proper place. A row of asterisks should appear at the top of the first check. Before you begin printing your checks, make sure the asterisks are in the proper place. If they are, press f1 to proceed with printing; if they aren't, reposition the blanks and press f7 for another test row. It won't take long before you get it right the first time.

While the checks are printing, a subroutine converts the numeric dol-

RUN It Right

C64; C128 (in C64 mode); printer

lar amounts to English. For instance, 564.95 appears with a dollar sign and "five hundred sixty-four and 95/100" is printed on the appropriate line.

After the checks are completed, return the printer to normal operation by removing the blanks and installing regular paper. Press f1 to print the summary, which recaps the preceding activity and provides an ending balance. The summary gets its information from the same arrays as the checks, so there shouldn't be discrepancies.

On each check, the program prints a check number, which must match the imprinted numbers on your blanks. Make sure the first number you enter is the same as the one on your first check, and the rest will take care of themselves.

Fine-Tuning

It's easy to customize the printout section of the program if your checks are a different style. After you type in and save the program, run it with some dummy entries and print them on regular paper. Then compare the positioning of the various items with your checks. The value of SP determines the number of spaces, or line feeds, between entries, as well as the distance between individual checks (yours may be taller or shorter than mine).

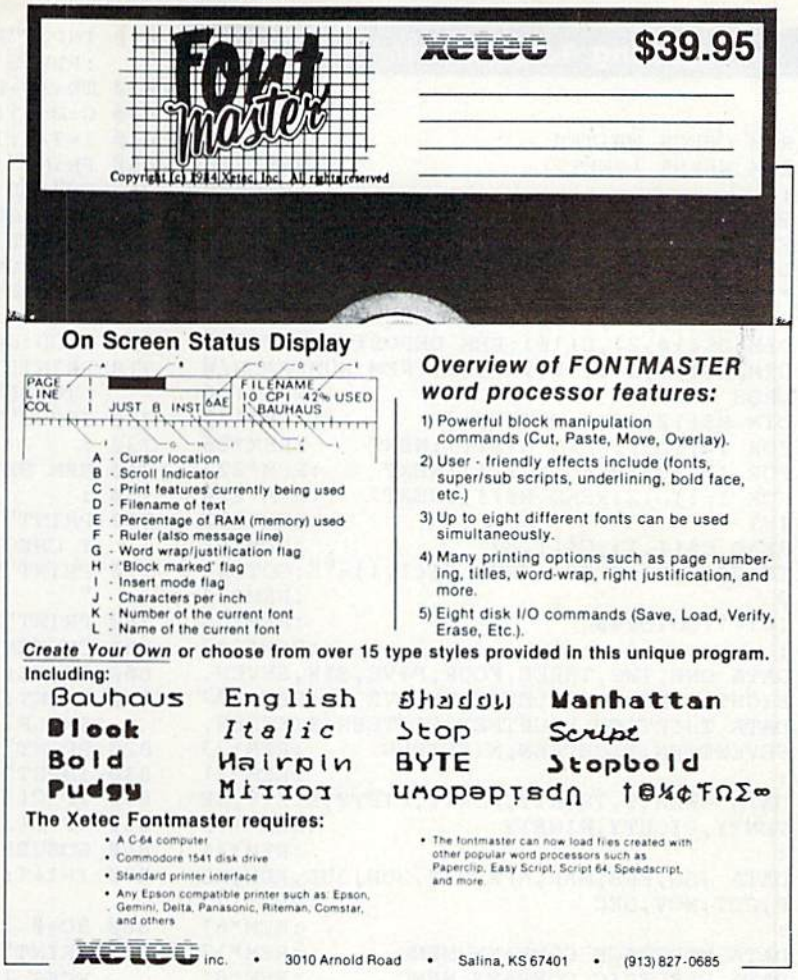
When typing in the program, substitute actual names and payment memos for the Data statements in lines 350–390. You can have more or less than the five preformatted checks shown in the listing, as long as the last one is identical to line 400. Any additions should be squeezed in between the existing five lines, so the rest of the program line numbers will be unchanged.

You may want additional information on your checks, such as mailing addresses or invoice numbers. The C$ array, which presently contains payee, amount and memo, can be expanded to include whatever you need. Experiment with SP and TAB until everything ends up in the right place.

This program completes a tedious and unpleasant task more quickly and accurately than was ever possible with the ballpoint-pen method. And isn't that what home computers are all about? R

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Listing 1. *Check Writer program.*

```
100 REM CHECK WRITER                          :REM*192
110 REM WAYNE ARNETT                          :REM*246
120 :                                         :REM*96
130 PRINT CHR$(142)                           :REM*32
140 F1$=CHR$(133):F7$=CHR$(136)               :REM*120
150 LI$=" ********************************
    *****":REM SPACE + 38 *                   :REM*150
160 DIM C$(50,3),C(50):REM CHECKS             :REM*166
170 DIM D$(10,2),D(10):REM DEPOSITS           :REM*240
180 DIM W$(5),N1$(19),N2$(9):REM NUMERALS/W
    ORDS                                      :REM*186
190 DIM M$(12):REM MONTHS                     :REM*130
200 FOR I=1TO19:READ N1$(I):NEXT              :REM*88
210 FOR I=2TO9:READ N2$(I):NEXT               :REM*222
220 FOR I=1TO12:READ M$(I):NEXT               :REM*220
230 I=1                                       :REM*182
240 READ C$(I,1),C$(I,3)                      :REM*92
250 IF C$(I,1)="END" THEN C$(I,1)="":GOTO44
    0                                         :REM*34
260 I=I+1:GOTO240                             :REM*85
270 :                                         :REM*247
280 DATA ONE,TWO,THREE,FOUR,FIVE,SIX,SEVEN,
    EIGHT,NINE,TEN,ELEVEN,TWELVE              :REM*207
290 DATA THIRTEEN,FOURTEEN,FIFTEEN,SIXTEEN,
    SEVENTEEN,EIGHTEEN,NINETEEN               :REM*23
300 :                                         :REM*21
310 DATA TWENTY,THIRTY,FORTY,FIFTY,SIXTY,SE
    VENTY,EIGHTY,NINETY                       :REM*115
320 :                                         :REM*41
330 DATA JAN,FEB,MAR,APR,MAY,JUN,JUL,AUG,SE
    P,CCT,NOV,DEC                             :REM*173
340 :                                         :REM*61
350 DATA MORTGAGE COMPANY,MEMO                :REM*13
360 DATA ELECTRIC COMPANY,MEMO                :REM*81
370 DATA WATER COMPANY,MEMO                   :REM*193
380 DATA GAS CREDIT CARD,MEMO                 :REM*31
390 DATA MASTERCARD,MEMO                      :REM*81
400 DATA END,END                              :REM*185
410 :                                         :REM*131
420 REM STARTUP INFORMATION                   :REM*45
430 :                                         :REM*151
440 PRINT"{SHFT CLR}{CRSR DN}ENTER DATE TO
    BE PRINTED ON CHECKS."                    :REM*45
450 INPUT"USE THE (MMDDYY) FORMAT - ";T$
                                              :REM*213
460 IF LEN(T$)<>6 THEN450                     :REM*231
470 M=VAL(LEFT$(T$,2)):IF M<1 OR M>12 THEN4
    50                                        :REM*11
480 DA$=MID$(T$,3,2):DA=VAL(DA$):IF DA<1 OR
     DA>31 THEN450                            :REM*253
490 YR$=RIGHT$(T$,2):YR=VAL(YR$):IF YR<85 T
    HEN450                                    :REM*221
500 DT$=M$(M)+" "+DA$+", 19"+YR$              :REM*247
510 PRINTLI$:PRINTTAB(13);DT$:PRINTLI$
                                              :REM*229
520 PRINT:PRINT"ENTER DEPOSITS BY DATE AND
    AMOUNT."                                  :REM*210
530 PRINT"(ENTER BLANK DATE TO END DEPOSITS
    )":PRINT:I=1                              :REM*36
540 IF I=5 THEN PRINT"{SHFT CLR}"             :REM*240
550 INPUT"DATE OF DEPOSIT (MMDD)";D$
                                              :REM*146
560 IF D$="" THEN650                          :REM*30
570 IF LEN(D$)<>4 THEN550                     :REM*92
580 LD=VAL(LEFT$(D$,2)):IF LD<1 OR LD>12 TH
    EN550                                     :REM*148
590 RD=VAL(RIGHT$(D$,2)):IF RD<1 OR RD>31 T
    HEN550                                    :REM*194
600 D$(I,1)=LEFT$(D$,2)+"/"+RIGHT$(D$,2):D$
    =""                                       :REM*140
610 INPUT"AMOUNT OF DEPOSIT{5 SPACEs}";D(I)
    :REM 5 SPCS                               :REM*184
620 TD=TD+D(I):PRINTLI$                       :REM*184
630 G=D(I):GOSUB2000:D$(I,2)=G$               :REM*112
640 I=I+1:IF I<11 THEN540                     :REM*168
650 PRINT"{SHFT CLR}":INPUT"BEGINNING BALAN
    CE";BB                                    :REM*126
660 G=BB:GOSUB2000:BB$=G$                     :REM*60
670 PRINTLI$:INPUT"BANK CHARGES";BC:REM*118
680 G=BC:GOSUB2000:BC$=G$                     :REM*176
690 PRINTLI$:INPUT"OTHER DEDUCTIONS";OD
                                              :REM*236
700 G=OD:GOSUB2000:OD$=G$                     :REM*152
710 PRINTLI$:PRINT"ENTER FIRST CHECK NUMBER
     TO BE"                                   :REM*90
720 INPUT"PRINTED";FCN                        :REM*58
730 :                                         :REM*196
740 REM SET UP CHECKS                         :REM*60
750 :                                         :REM*216
760 PRINT"{SHFT CLR}ENTER AMOUNTS OF MONTHL
    Y CHECKS."                                :REM*220
770 PRINT"TO SKIP ONE, HIT <RETURN> WITHOUT
    "                                         :REM*81
780 PRINT"ENTERING AN AMOUNT."                :REM*83
790 CN=FCN:RC=1:I=1                           :REM*65
800 IF C$(I,1)="" THEN880                     :REM*235
810 PRINT:PRINT"{CTRL 9} CHECK NO.";CN;"{CR
    SR LF} "                                  :REM*77
820 PRINT"PAYEE: ";C$(I,1)                    :REM*11
830 INPUT"AMOUNT ";C(I)                       :REM*33
840 IF C(I)<1 THEN870                         :REM*131
850 IF C(I)>=10000 THEN830                    :REM*101
860 GOSUB970:CN=CN+1                          :REM*13
870 I=I+1:IF I<51 THEN GOSUB1050:GOTO800
                                              :REM*3
880 RC=0                                      :REM*9
890 PRINT"{SHFT CLR}ENTER ANY ADDITIONAL CH
    ECKS.{2 SPACEs}AFTER"                     :REM*159
900 PRINT"ENTERING LAST CHECK, HIT <RETURN>
    "                                         :REM*85
910 PRINT"WITHOUT AN ENTRY FOR PAYEE."
                                              :REM*181
920 PRINT:PRINT"{CTRL 9} CHECK NO.";CN;"{CR
    SR LF} "                                  :REM*187
930 INPUT"PAYEE ";C$(I,1)                     :REM*115
940 IF C$(I,1)=""THEN1080                     :REM*25
950 INPUT"AMOUNT";C(I)                        :REM*149
960 IF C(I)<1 OR C(I)>=10000 THEN950:REM*35
970 TC=TC+C(I)                                :REM*25
980 G=C(I):GOSUB2000                          :REM*85
990 L=LEN(G$)-1:C$(I,2)=RIGHT$(G$,L) :REM*5
1000 IF RC THEN RETURN                        :REM*119
1010 INPUT"MEMO{2 SPACEs}";C$(I,3) :REM*243
1020 C$(I,3)=LEFT$(C$(I,3),30)                :REM*249
1030 I=I+1:CN=CN+1                            :REM*100
1040 IF I>50 THEN1080                         :REM*34
1050 IF I>4 THEN K=I-6:K=ABS(K):IF K/4=INT(
     K/4)THEN PRINT"{SHFT CLR}"               :REM*50
1060 IF RC THEN RETURN                        :REM*180
1070 GOTO920                                  :REM*76
1080 G=TC:GOSUB2000:TC$=G$:NC=I               :REM*20
1090 EB=BB+TD-BC-OD-TC                        :REM*102
1100 IF EB<0 THEN PB=ABS(EB):GOTO1120
                                              :REM*138
1110 G=EB:GOSUB2000:EB$=G$:GOTO1170 :REM*56
1120 G=PB:GOSUB2000:L=LEN(G$)-1               :REM*186
1130 PB$="("+RIGHT$(G$,L)+")"                 :REM*118
1140 :                                        :REM*96
1150 REM{2 SPACEs}** PRINT CHECKS             :REM*116
1160 :                                        :REM*116
1170 PRINT"{SHFT CLR}{CRSR DN} BE SURE THE
     ASTERISKS WERE PRINTED AT"               :REM*136
1180 PRINTTAB(10)"TOP OF FIRST CHECK."
                                              :REM*88
```

```
119Ø PRINTLI$:PRINT                    :REM*228
12ØØ PRINTTAB(13)"F1 TO PROCEED":PRINT
                                       :REM*6
121Ø PRINTTAB(12)"F7 TO TRY AGAIN"     :REM*196
122Ø CLOSE3:CN=FCN:OPEN3,4             :REM*6Ø
123Ø PRINT#3,"*****"                   :REM*172
124Ø GET R$:IF R$="" THEN124Ø          :REM*36
125Ø IF R$=F1$ THEN128Ø                :REM*188
126Ø IF R$=F7$ THEN123Ø                :REM*122
127Ø GOTO124Ø                          :REM*96
128Ø PRINT"{SHFT CLR}{3 CRSR DNs} PRINTING.
    .."                                :REM*2Ø9
129Ø SP=4:GOSUB2Ø5Ø                    :REM*2Ø5
13ØØ I=1                               :REM*233
131Ø IF C(I)<1 THEN156Ø                :REM*149
132Ø PRINT#3,TAB(72);CN                :REM*1Ø3
133Ø SP=2:GOSUB2Ø5Ø                    :REM*181
134Ø GOSUB2Ø8Ø:PRINT#3,TAB(6);W$       :REM*51
135Ø SP=1:GOSUB2Ø5Ø                    :REM*169
136Ø PRINT#3,TAB(48);DT$;              :REM*175
137Ø PRINT#3,TAB(1Ø);"$";(C$(I,2))     :REM*5
138Ø C$(I,1)=LEFT$(C$(I,1),44)         :REM*237
139Ø FOR J=1 TO 45-LEN(C$(I,1))        :REM*35
14ØØ C$(I,1)=C$(I,1)+" ":NEXTJ:REM 1 SPACE
                                       :REM*159
141Ø SP=1:GOSUB2Ø5Ø                    :REM*229
142Ø PRINT#3,TAB(6);C$(I,1)            :REM*115
143Ø SP=3:GOSUB2Ø5Ø                    :REM*57
144Ø PRINT#3,TAB(6);C$(I,3)             :REM*7
145Ø SP=5:GOSUB2Ø5Ø                    :REM*141
146Ø REM BOTTOM HALF (VOUCHER)         :REM*167
147Ø PRINT#3,TAB(72);CN                :REM*253
148Ø SP=1:GOSUB2Ø5Ø                     :REM*43
149Ø PRINT#3,TAB(66);DT$                :REM*73
15ØØ SP=7:GOSUB2Ø5Ø                    :REM*255
151Ø PRINT#3,TAB(5);C$(I,1)            :REM*141
152Ø PRINT#3,TAB(5);"$";C$(I,2)         :REM*25
153Ø PRINT#3,TAB(5);C$(I,3)             :REM*33
154Ø SP=12:GOSUB2Ø5Ø                    :REM*54
155Ø CN=CN+1                           :REM*68
156Ø I=I+1:IF I<=NC THEN131Ø           :REM*212
157Ø CLOSE3                            :REM*68
158Ø :                                 :REM*26
159Ø REM PRINT REGISTER                :REM*138
16ØØ :                                 :REM*46
161Ø PRINT"{SHFT CLR}{CRSR DN} TO PRINT A S
    UMMARY FOR YOUR RECORDS,"          :REM*12Ø
162Ø PRINT" INSTALL REGULAR PAPER IN PRINTE
    R.":PRINTLI$                       :REM*58
163Ø PRINT:PRINT TAB(13);"F1 TO PRINT"
                                       :REM*1Ø
164Ø PRINT:PRINT TAB(9);"F7 TO EXIT PROGRAM
    "                                  :REM*222
165Ø GET R$:IF R$=""THEN165Ø           :REM*66
166Ø IF R$=F1$ THEN169Ø                :REM*136
167Ø IF R$=F7$ THEN229Ø                :REM*122
168Ø GOTO165Ø                          :REM*92
169Ø PRINT"{SHFT CLR}{3 CRSR DNs} PRINTING.
    ..."                               :REM*112
17ØØ CLOSE3:OPEN3,4                    :REM*116
171Ø PRINT#3,CHR$(14);TAB(11);"CHECKING ACC
    OUNT"                              :REM*166
172Ø PRINT#3,TAB(13);DT$;CHR$(15)      :REM*26
173Ø PRINT#3:PRINT#3                   :REM*72
174Ø PRINT#3,"BEGINNING BALANCE";TAB(5Ø-LEN
    (BB$));BB$                         :REM*2Ø2
175Ø PRINT#3:I=1                       :REM*234
176Ø IF D(I)<1 THEN179Ø                :REM*16Ø
177Ø PRINT#3,"DEPOSIT ";D$(I,1);TAB(54-LEN(
    D$(I,2)));D$(I,2)                  :REM*232
178Ø I=I+1:IF I<11 THEN176Ø             :REM*6
179Ø PRINT#3                            :REM*Ø
18ØØ PRINT#3,"BANK CHARGES";TAB(35-LEN(BC$)
    );BC$                              :REM*149
181Ø IF OD=Ø THEN183Ø                  :REM*43
182Ø PRINT#3:PRINT#3,"OTHER DEDUCTIONS";TAB
    (31-LEN(OD$));OD$                  :REM*251
183Ø PRINT#3:CN=FCN:I=1                :REM*49
184Ø IF C(I)<1 THEN19ØØ                :REM*1Ø5
185Ø C$(I,1)=LEFT$(C$(I,1),3Ø)         :REM*53
186Ø IF CN>999 THEN K=8:GOTO188Ø       :REM*19
187Ø K=9                               :REM*173
188Ø PRINT#3,"CK#";CN;C$(I,1);TAB(K-LEN(C$(
    I,2)));C$(I,2)                     :REM*237
189Ø CN=CN+1                           :REM*153
19ØØ I=I+1:IF I<NC THEN184Ø             :REM*5
191Ø PRINT#3:PRINT#3,"*** TOTAL CHECKS ***"
    ;TAB(27-LEN(TC$));TC$              :REM*83
192Ø IF PB THEN E$=PB$:T=54:GOTO194Ø:REM*35
193Ø E$=EB$:T=53                       :REM*2Ø1
194Ø PRINT#3:PRINT#3,"ENDING BALANCE";TAB(T
    -LEN(E$));E$                       :REM*215
195Ø CLOSE3:GOTO233Ø                    :REM*81
196Ø :                                 :REM*151
197Ø REM SUBROUTINES                   :REM*191
198Ø :                                 :REM*171
199Ø REM----ALIGN DECIMAL POINTS       :REM*91
2ØØØ IF G=Ø THEN G$="Ø.ØØ":GOTO2Ø3Ø:REM*1Ø7
2Ø1Ø G=INT((G+.ØØ5)*1ØØ)/1ØØ           :REM*243
2Ø2Ø G$=STR$(INT(G))+"."+RIGHT$(STR$(G*1ØØ)
    ,2)                                :REM*21
2Ø3Ø RETURN                            :REM*47
2Ø4Ø REM----SET SPACING FOR PRINTOUT:REM*33
2Ø5Ø FOR N=1 TO SP:PRINT#3:NEXTN       :REM*24Ø
2Ø6Ø RETURN                            :REM*78
2Ø7Ø REM----CONVERT NUMERALS TO WORDS
                                       :REM*58
2Ø8Ø FOR J=1TO5:W$(J)="":NEXTJ         :REM*2Ø2
2Ø9Ø Q$=C$(I,2):L1=LEN(Q$):L2=L1-3 :REM*248
21ØØ CA$=MID$(Q$,1,L2):CE$=RIGHT$(Q$,2)
                                       :REM*144
211Ø M=1:ON L2 GOTO218Ø,217Ø,214Ø,212Ø
                                       :REM*92
212Ø T=VAL(MID$(CA$,M,1))              :REM*124
213Ø W$(1)=N1$(T)+" THOUSAND ":M=M+1:REM*8Ø
214Ø T=VAL(MID$(CA$,M,1)):IF T=Ø THEN216Ø
                                       :REM*1Ø4
215Ø W$(2)=N1$(T)+" HUNDRED "          :REM*226
216Ø M=M+1                             :REM*186
217Ø T1=VAL(MID$(CA$,M,1)):M=M+1       :REM*126
218Ø T2=VAL(MID$(CA$,M,1))             :REM*38
219Ø IF T1=Ø THEN222Ø                  :REM*144
22ØØ IF T1=1 THEN T3=1Ø+T2:W$(5)=N1$(T3):GO
    TO225Ø                             :REM*238
221Ø W$(3)=N2$(T1)                     :REM*24Ø
222Ø IF T2=Ø THEN W$(5)=W$(3):GOTO225Ø
                                       :REM*2Ø8
223Ø W$(4)=N1$(T2):IF T1=Ø THEN W$(5)=W$(4)
    :GOTO225Ø                          :REM*228
224Ø W$(5)=W$(3)+"-"+W$(4)             :REM*62
225Ø W$=W$(1)+W$(2)+W$(5)+" AND "+CE$+"/1ØØ
    "                                  :REM*11Ø
226Ø W$="*** "+W$+" ***"               :REM*25Ø
227Ø T=Ø:T1=Ø:T2=Ø                     :REM*234
228Ø RETURN                            :REM*42
229Ø PRINT"{SHFT CLR}{CRSR DN} END PROGRAM
    WITHOUT PRINTING SUMMARY."         :REM*24
23ØØ PRINT:PRINTTAB(9);"ARE YOU SURE (Y/N)"
    ;                                  :REM*216
231Ø INPUT R$:IF R$="Y" THEN233Ø       :REM*249
232Ø GOTO161Ø                          :REM*95
233Ø END                               :REM*37
```

64 Perfect Typist

By JAMES E. BORDEN

How many times have you typed in a long program listing only to find a Syntax error or Out-of-Data error come up on your screen after running the program? It's quite easy to make a simple little typographical error when typing in Basic program listings; finding that little error, however, is not at all easy. Sometimes, the line mentioned in the error message actually isn't the line that has been mistyped. This is particularly confusing for new computerists.

This is when a checksum utility program is invaluable. By loading and running the checksum before you begin to type in a program listing, you'll have the computer as an ally, not a foe. The computer itself evaluates each line that you type in. If you make any errors, you are notified at the end of each line, rather than at the end of the entire program.

RUN's checksum program, 64 Perfect Typist (Listing 1), will help ensure that all C-64 programs you type in from *RUN* will work the first time without errors. (This program will also work with the C-128 in C-64 mode, but *not* with VIC-20, Plus/4 or C-16 programs.)

You will notice that this month's C-64 listings all have a :REM*### at the rightmost margin of each line. *Do not type in these REM statements!* They are there only for comparison with your screen checksum number. If the checksum number shown on your screen matches the checksum number at the end of the line in the magazine, you will know that the line you have typed in is correct. If the two numbers do not match, then just check over your line and fix your typing error.

RUN's long-awaited checksum program is finally here! Now you can be sure that all the C-64 programs you type in from RUN *will work the first time without errors.*

How to Use 64 Perfect Typist

Type in 64 Perfect Typist and save it to either tape or disk before running it. If you make a mistake entering the Data statements, a message will be printed on your screen. Correct any errors and save the new version.

When you want to type in a C-64 program from *RUN*, first load and run 64 Perfect Typist. Two SYS numbers will be displayed on your screen. Jot these down and keep them handy. They are the SYS numbers for deactivating the checksum and reactivating it.

You might want to deactivate the checksum in the middle of your program entry for some reason. The only way to accomplish this, besides turning off the power, is to type SYS 40794 and press the return key. Simultaneously pressing the run/stop and restore keys won't disable 64 Perfect Typist.

After 64 Perfect Typist has been loaded and run, start typing in your program lines just as you are normally accustomed to doing. The only difference is that after you have pressed the return key to log in your line, a one-, two- or three-digit number will appear below the line on the left-hand margin. This number, the checksum, will be between 0 and 255.

If the number matches the checksum value given in the program listing, the line is correct, and you can type the next line right over the previous line's checksum value. If the checksum values are different, look through the line for typing or spelling errors. (See the section entitled "Correcting Lines," below.) Make any needed changes and hit the return key again. Continue until the program is finished.

When you have entered your program, disable 64 Perfect Typist (by typing the SYS disable number that

RUN It Right

C-64; C-128 (in C-64 mode)

is shown on the start-up screen), and then save the program as usual. If you run the program and get an Out-of-Memory error, turn the computer off and back on. This will clear 64 Perfect Typist out of memory.

You may save part of a program at any time and continue later. If you've already turned your computer off, you'll have to reload and rerun 64 Perfect Typist, then reload the program you were working on, list it and continue where you left off.

RUN's Program Listings

As mentioned previously, the C-64 program listings in *RUN* will contain a :REM*### at the end of each line. This is the checksum value for that line and must *not* be typed in. If you type in those values, the program will still run, but you'll never get the proper checksum value on the screen. For example, if the listing shows:

```
10 PRINT X:REM*50
```

you should type:

```
10 PRINT X{return}
```

The checksum will print:

```
*50
```

Here, the :REM* shows that the checksum follows and 50 is the correct checksum. After you hit the return key, a checksum for the line you just entered will be calculated and printed on the screen. In this example, if the checksum printed on the screen were *50, the line would be correct and you could continue by typing the next line over the *50 printed on the screen. The * will cause a Syntax error if you just hit the return key while the cursor is on the checksum. This will prevent you from accidentally deleting a line.

When entering programs, you may find it easier to use the Upper-/Lowercase mode. Hold down the shift key and press the Commodore key to get from graphics to lowercase. Then, when you type in shifted characters, they will appear on the screen as uppercase.

Use the shift key only where it is required, such as {SHFT L} or {PI}. If keyword abbreviations are used, they are much easier to read in this mode. For example, the abbreviation for PRINT# is P and a shifted R, *not* ?#. ?# isn't the same as PRINT# or pR. If you make this substitution, the checksum will not match the listing, and your program won't work properly. (See How to Type Listings from *RUN* elsewhere in this issue for further discussion of Print commands.)

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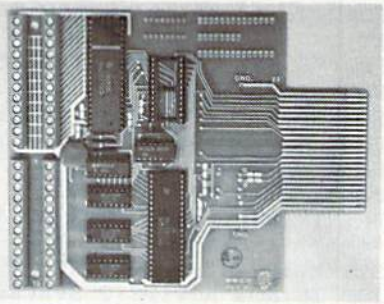
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What Does Perfect Typist Check?

The following features are included in *RUN*'s 64 Perfect Typist program.

- The line is checked only *after* it has been crunched by Basic. This allows PRINT and ? to give the same checksum value. If long lines require Basic keywords to be abbreviated, the checksum value will still be correct. A misspelled keyword (or an invalid abbreviation) will cause the checksum value to be wrong. Here are some examples:

```
10 ? X
*50
10 PRINT X
*50
10 PRINP X
*124
```

The first two lines give the same checksum value, since ? is the abbreviation for PRINT (see your user's manual). However, the last line gives a different checksum value because PRINT ("PRINP") is misspelled.

- Spaces matter only if they are *within* quotes. Because a space within quotes will affect the program, it will also affect the checksum value. Spaces outside quotes increase readability, so they can usually be eliminated if you like. Here are a few examples:

```
10 A$="X Z"
*102
10 A$="XZ"
*8
```

These two lines would give different checksum values since they would affect the running program differently. However, since the spaces in the following lines are not inside quotes, the spaces will not matter and the checksum value will be the same whether the spaces are used or not.

```
20 FORX=10TO20
*30
20 FOR X = 10 TO 20
*30
```

Also, do not include spaces in keywords (PR INT, for example), as this will cause the wrong checksum. If you are in doubt, enter the line exactly as listed.

- The order of the characters will affect the checksum value. Nonmatching checksums will prevent transposing letters or numbers (most important in Pokes). The following examples will show this:

```
10 POKE 57,13
*242
10 POKE 75,13
*226
```

Although the same letters are used in the example below, the checksum values are different because the printed text would be different.

```
20 PRINT "STOP"
*106
20 PRINT "POTS"
*94
```

In summation, Basic keywords can be abbreviated; text (meaning anything other than Basic keywords) should always match the listing; and the spacing *within* quotes *must* be copied exactly.

Correcting Lines

If the checksum shown on the screen does not match the one given in the listing, check for spelling errors first. This includes misspelled keywords and text. Carefully compare any text in quotes with the listing.

If spaces are used within quotes in the listing, they *must* be used when the line is entered. If you want to change the spacing, first type in the line to get the proper checksum value. This will ensure that any Basic commands on the line will be entered correctly. After you have a working program, you can add or delete spaces within quotes as you wish.

Also, check the line number to be sure it is correct. If it isn't, be sure to change it. Also, correct or delete any lines you accidentally entered with the wrong number. For example, if you were typing line number 1000 from the listing and you missed typing a zero (giving you line number 100), you would have to reenter the original line 100, then correct and reenter line 1000.

If you just can't get the correct checksum value by editing the line, try moving the cursor down a few lines and typing the entire line again. You may have a shifted space in it or something else that "looks" right, but isn't. If that fails, write down the line number and return to it later.

After using *RUN*'s 64 Perfect Typist, debugging should become a thing of the past. Get the correct checksum as you go, and your programs should run the first time. R

James E. Borden, 641 Adams Road, Carlisle, PA 17013, is the author of 64 Perfect Typist, RUN*'s checksum program.*

Listing 1. *64 Perfect Typist program.*

```
10 POKE56,PEEK(56)-1:POKE52,PEEK(56):CLR
20 PG=PEEK(56):ML=PG*256+600
30 FORX=ML TO ML+154:READD:T=T+D:POKEX,D:NE
   XT
40 IFT<>16252 THEN PRINT"ERROR IN DATA...":
   END
60 POKEML+4,PG:POKE ML+10,PG:POKE ML+16,PG
70 POKE ML+20,PG:POKE ML+32,PG:POKE ML+38,P
   G
80 POKE ML+141,PG
89 PRINT"{SHFT CLR}{CRSR RT}**************
   **********************"
90 SYS ML:PRINT "{CRSR RT}** 64 PERFECT TYP
   IST IS NOW ACTIVE{2 SPACEs}**"
100 PRINT "{CRSR RT}** SYS"ML"=ON{5 SPACEs}
    SYS"ML+30"=OFF **"
101 PRINT"{CRSR RT}**********************
    **************":NEW
110 DATA 173,005,003,201,003,208,001,096
120 DATA 141,105,003,173,004,003,141,104
130 DATA 003,162,103,160,003,142,004,003
140 DATA 140,005,003,096,234,234,173,104
150 DATA 003,141,004,003,173,105,003,141
160 DATA 005,003,096,032,124,165,132,011
170 DATA 162,000,142,240,003,142,241,003
180 DATA 189,000,002,240,051,201,032,208
190 DATA 004,164,212,240,040,201,034,208
200 DATA 008,072,165,212,073,001,133,212
210 DATA 104,072,238,241,003,173,241,003
220 DATA 041,007,168,104,024,072,024,104
230 DATA 016,001,056,042,136,016,246,109
240 DATA 240,003,141,240,003,232,208,200
250 DATA 173,240,003,024,101,020,024,101
260 DATA 021,141,240,003,169,042,032,210
270 DATA 255,169,000,174,240,003,032,205
280 DATA 189,162,004,189,211,003,032,210
290 DATA 255,202,016,247,164,011,096,145
300 DATA 013,032,032
```

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Easy Assembly IV

By WILLIAM B. SANDERS

In previous installments, I introduced you to machine language and described how to put together an assembler written in Basic. Now you're all set to start writing assembly language programs with an assembler.

If you're using the *RUN* assembler (the one we developed in my last two installments) you'll find a couple of small differences from standard assemblers. These differences will be discussed when the need arises. However, using any standard assembler, you should be able to copy the programs in this column and run them on your Commodore.

Now that you have an assembler, we'll show you how to use some of Commodore's built-in tools that simplify writing your own assembly language programs.

Built-In Machine Language Routines

First, crank up your assembler and go into the Edit mode. (Your *RUN* assembler does this automatically. Just enter the code and press the return key after each entry. After you enter RTS, enter Q to quit.) Enter the following code:

```
LABEL  OPCODE  OPERAND  COMMENT
-------------------------------
       JSR     $E544
       RTS
```

Note the four fields: label, opcode, operand and comment. Your *RUN* assembler only has the opcode and operand fields, so you don't have to worry about the label and comment fields. The label field can be used like a line number that you access with a Goto or Gosub statement, as in Basic. Your *RUN* assembler simply uses the addresses instead of labels. However, you won't be using the label field for a while.

The comment field is used like a REM in Basic. Code in the comment field is ignored when your program is compiled into machine language. Like the REM statements, it helps remind you what your code means in a program.

Now that you have some code with which to work, let's see what it does. The JSR opcode means jump to subroutine. In Basic, you have to write your own subroutines, but in assembly language, the most useful subroutines are built-in. The operand, $E544, represents the address of the subroutine you're accessing. Thus,

```
JSR $E544
```

means, "Go execute the subroutine at the address $E544." This is something like

```
GOSUB 58692
```

in Basic. The main difference is that you used the hexadecimal address $E544 instead of the equivalent decimal value 58692. (You could have used JSR 58692, but it's good practice to start using and thinking in terms of hexadecimal numbers for the built-in routines in your Commodore. It may be a little confusing at first, but in the long run it will make things a *lot* simpler.)

What does the subroutine at $E544 do? It clears the screen and returns the cursor to the home position. That may not look like a lot, but when you consider what it would take to clear every character and background color on the screen, it's really a good deal of work.

The Kernal

Not all of the subroutines are as simple to execute as $E544. However, using the built-in subroutines makes it a lot easier to program in assembly language. The most important collection of subroutines in your C-64 or VIC-20 is collectively called the Kernal.

Beginning on page 270 of the *Commodore 64 Programmer's Reference Guide* and page 182 of the *VIC-20 Programmer's Reference Guide* is a description of each machine's Kernal. As you advance in this column, you'll be learning how to use several of the Kernal subroutines. For those of you who want to jump ahead, take a look at your reference manuals. The most important of the Kernal subroutines deals with I/O (input/output).

For example, a subroutine called CHROUT, located at $FFD2 (65490), outputs a character to the screen, and GETIN, at $FFE4 (65508), gets a character from your keyboard.

Non-Kernal Subroutines

Besides the subroutines in your Kernal, there are subroutines scattered all over your machine's insides. Your reference manuals also have these subroutines listed. (See p. 310 of your C-64's reference guide and p. 170 of your VIC-20's guide.)

For example, last month the *RUN* assembler was tested with the subroutine at $D021 (53281), which

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changed the background color of your screen. Depending on the value you put in that address, your screen will turn different colors.

In this case, you do not use the JSR command to access the built-in routine, but, instead, you change its value. In still other cases, you will want to get the values *from* the routine. Sometimes, this is simply done with the JSR command; at other times, you must move the value into a register.

Let's GO!

You've spent enough time with theory; it's time you get into some real trouble with a program. You'll start with one of the most often-used opcodes, LDA.

There are different addressing modes for opcodes. You'll start with the Immediate mode. The accumulator, or A-Register, in the 6510 microprocessor (or the 6502 for VIC users) is the workhorse of your computer. Among other chores, it holds numbers and sends them around your computer. When you give the LDA instruction in the Immediate mode, whatever value is in the operand, up to $FF (255), will be loaded into the accumulator. Any number in the accumulator will be wiped out and replaced by the operand value. For example:

```
LDA     #1
LDA#    1 (RUN assembler)
```

That means you place the value 1 into your accumulator.

The question, of course, is what can you do with a single value in a single register? Well, to be honest, there isn't a lot you can do. However, using the value in the accumulator along with values in other registers, the built-in subroutines and the different instructions, there's a lot you can do.

In order to move a single value out of the accumulator, you need an instruction to it. The first one you'll consider is STA, which means store the accumulator. There are a lot of different STA modes, and you'll first be using the Absolute mode.

When you use STA, you use it with an address. That means, "Store the value in the accumulator in the address." For example,

```
STA     $C040
```

would store the accumulator value in the address $C040. Using the LDA and STA instructions together, you can get rolling.

Let's start off by writing and saving a program that you can use to set your foreground and background color. Choose your own background and foreground colors in lines 2 and 4 by changing the values 7 and 8 in the operand field. Note that the *RUN* Assembler uses different opcode/operand conventions in some cases; so to avoid confusion, I've included two source-code listings. (See Listing 1 and Listing 2.)

Enter only one of the name listings. Save the program under the name "COLOR," and you'll see how it can later be used from a Basic program. For those of you using a standard assembler, set the object code origin at 49152 or $C000, using ORG $C000, * = $C000 or whatever convention your assembler uses. The *RUN* assembler defaults to $C000 (49152).

Using the *RUN* Assembler or other assembler that saves files as PRG files, let's see how a machine language program can be incorporated into a Basic program that will set your screen colors for you.

(Be sure to check the machine language filename of your program. Some assemblers automatically add a ".O" to a filename to indicate it is object code. If your assembler does that, or uses some other "tail," be sure to use that name in your Basic

Listing 1. *Source code listing for standard assemblers. Allows you to set your screen's foreground and background colors.*

```
LN   LABEL   OPCODE   OPERAND   COMMENT
1            JSR      $E544     ;Clear screen
2            LDA      #7        ;Choose color value 0-15
3            STA      $D021     ;Store in background reg.
4            LDA      #8        ;Choose color value 0-15
5            STA      $D020     ;Store in border reg.
6            RTS
```

Listing 2. *Source code listing for* RUN *assembler. Allows you to set your screen's foreground and background colors.*

```
ADDRS    OPCODE   OPERAND
49152    JSR      $E544
49155    LDA#     7
49157    STA      $D021
49160    LDA#     8
49162    STA      $D020
49165    RTS
```

Listing 3. *Use with standard assembler to load a value into the accumulator and jump to a built-in subroutine that prints characters and letters to the screen.*

```
LN   LABEL   OPCODE   OPERAND   COMMENT
1            JSR      $E544     ;CLR/HOME
2            LDA      #82       ;1ST CHR
3            JSR      $E716     ;TO SCRN
4            LDA      #85       ;2ND CHR
5            JSR      $E716     ;AGAIN
6            LDA      #78       ;ETC.
7            JSR      $E716
8            RTS
```

Listing 4. *Use with the* RUN *assembler to perform the same functions as Listing 3.*

```
ADDRS    OPCODE   OPERAND
49152    JSR      $E544
49155    LDA#     82
49157    JSR      $E716
49160    LDA#     85
49162    JSR      $E716
49165    LDA#     78
49167    JSR      $E716
49170    RTS
```

program. Your *RUN* Assembler adds an "address tail," so you would put "COLOR 49152" as the filename.)

```
10 PRINT CHR$(147)
20 IF K = 0 THEN K = 1 : LOAD
   "COLOR",8,1 : REM CHECK YOUR
   FILE NAME
30 SYS 49152 : REM YOUR SCREEN
   COLOR CHANGE
40 PRINT "Your screen colors are under
   assembly language control!"
50 END
```

All right, now that you have seen how to use the LDA and STA instructions together to do something useful, let's learn how to use LDA with JSR. Enter Listing 3 (Listing 4 if you have the *RUN* assembler) to load a value into the accumulator and jump to a built-in subroutine that prints characters and letters to the screen.

Now, wasn't that a barrel of fun? If you didn't think so, try changing the program to write your name. (Having accomplished that, if you still want to have a really good time, use that routine to write a letter to somebody.

Questions and Answers

Q: After I spend a lot of time learning 6510 assembly language programming, will all of my knowledge be wasted when a new microprocessor is introduced? Isn't it better to learn a higher-level language, such as Basic, Forth or Pascal, which can be used on any machine, than to need separate instruction sets for different microprocessors?

A: Boy, that's a rough one. First of all, there are "families" of microprocessors that are developed with similar instruction sets. For example, the 6510 is related to the 8502 in the new Commodore 128. So, if you upgrade to a C-128, you may only have to learn a few additional opcodes (if any) and the new addresses of built-in subroutines.

Commodore has been very good about using the same Kernal addresses on various machines. Once you learn how to "think" in terms of assembly language, the added registers, addressing modes and instructions of the more advanced microprocessors give you added tools. You can still use your old skills, but you can develop new ones as well.

However, you are right in asserting that the higher level languages are more transportable. You have to consider the quality of what is transported.

Q: I use an Epson RX-80 printer, a Cardco interface and the Merlin Assembler. When I list or ASM to the printer, everything is in lowercase. Is there any way I can have the output all uppercase or upper-*and* lowercase?

A: Funny you should ask. Since I have a similar setup, I had the same problem. I talked with Tom Burns at Roger Wagner Publishing, the makers of Merlin, and they gave me a simple and effective fix. Load up the Basic program, Merlin. List line 60 and change the eleventh value from a 0 to 160. It should look like this when you're finished:

```
60 DATA 8,16,0,0,128,60,7,80,128,0,160,97,
   14,20,31
```

Then add line 65 as:

```
65 POKE 41191,97
```

Save the file as MERLIN.C, or some similar name, so you'll have it available when you want to print to your printer.

We don't have an Assembler of the Month in this installment, but we will have one again next month. R

Address all author correspondence to William B. Sanders, 8982 Stimson Court, San Diego, CA 92129.

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Keep Your Remarks To Yourself

While REM statements can be important, sometimes you need a little more space and room. This program removes all those non-essential, memory-consuming REMs.

By PETER A. MARIKLE

The Remark (REM) statement is the easiest keyword to learn, yet it is often neglected by beginners and always ignored by the microprocessor. However, it can be most indispensable because it can give you valuable information about what a program is doing.

Eventually, a worthwhile program will need to be modified for other or newer applications. If you've ever tried to alter a poorly documented program—even one you created—you know how irksome and time-consuming a task it can be. And the lesson probably changed your REM habits.

So, why am I offering a utility that wipes out thousands of valuable REM bytes in microseconds? To make more memory space available. I had some 28K+ programs in which 30%–40% of the program space was occupied by REM statements. That significantly cut down on random access memory (RAM) for arrays, bitmap screens, and so on.

Now I store on "archive" disks all the original programs, including their REM statements, and use the shorter, no-REM versions for actual operations. The space saved on working disks slightly improves program execution time and reduces string "garbage collection" needs.

Using the Program

Load and run REM Killer. First I'll discuss using the REM Killer program with the C-64; later, I'll address the minor differences in the Plus/4 version. Listing 1 is a Basic loader that puts the required machine language into the cassette buffer. It's fully relocatable by simply changing the value of N in line 200. If you use tape, put it in high RAM at 49152 or any other safe place.

Once the machine language is tucked away, load your own program. Enter FRE(0) if you'd like to compare before-and-after program sizes. Then erase the REMs by typing in

```
SYS828:CLR
```

Obviously, you must change the SYS if you've relocated the machine language elsewhere. Don't forget the CLR instruction, or important pointers and links won't reset properly. Now run your program.

I suggest you use a monitor program such as SuperMON to save the REM Killer machine language program to disk. Then you can load it anytime using the wedge % command without disturbing any Basic program that may be in memory.

How It Works

Every Basic line is held in memory with a "header" block, consisting of four bytes. The first two bytes tell the microprocessor where to get the next line; the next two bytes contain the Basic line number itself. The header is followed by the actual content and tokens, with the end of the line signified by a zero byte.

The REM Killer program contains two nested loops. The primary loop copies the original line links as tentative links for the new line and copies the line-number bytes. The secondary loop then copies each byte of the line to its new position in the new line. Whenever it encounters a zero byte for "end of line," it recomputes the "tentative links" and substitutes the recomputed bytes as the correct links. If no REM is encountered, it's as if every byte had been picked up and replaced in its original position.

When a REM byte (decimal 143) is found, one of two paths is taken. If the REM byte is in the middle of a line, it is replaced with a zero byte. Technically, the zero is placed one address lower than the REM, thus overwriting the colon that would ordinarily precede the REM. The remainder of that line is ignored, and the recomputed link points lower in memory than the original. Return to the primary loop to examine the next line of the original program.

If the REM byte immediately follows the line-number bytes, the program backs up to eliminate that line, thus avoiding a program peppered with "zero length" lines that not only take up unnecessary space but also might confuse the Basic interpreter.

A Few Tips

Be sure your source program's Gosubs and Gotos do not point at pure REM lines. If you have mid-line REMs, with spaces between the REM

RUN It Right

C-64; C-128 (in C-64 mode); C-16; Plus/4; VIC-20

and the preceding colon, you'll end up keeping the colon. This isn't disastrous, but the inelegant look is avoided if you exclude any unnecessary spaces.

The program uses zero-page storage at decimal addresses 247–252. While using REM Killer, be sure that you don't have an RS-232 device in use, nor any utility that can interfere with this normally "free" zero-page space.

The Plus/4 Version

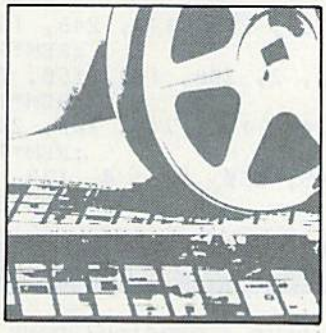
Listing 2 is the Basic loader for the Plus/4 version. It differs only in the addresses used. The Plus/4 cassette buffer begins at decimal 819, so REM Killer loads there, and SYS 819:CLR is used to activate it. If you use tape, you may want to locate it elsewhere. I'd suggest protecting some high RAM from Basic and either storing it there or at location 1630, which is the RAM area for speech, with 142 bytes available when speech isn't needed.

You can't use speech software while using REM Killer anyway, since I stole some zero-page "speech" space for my program. Locations 247–254 are not free in the Plus/4, but locations 208–215, reserved for speech software, are natural targets for machine language programmers who need to borrow some zero-page.

In every other respect, the Plus/4 program is identical to the C-64 version. You may want to use the internal monitor to save a pure machine language version. It can then be loaded through the monitor without disturbing Basic programs in memory. R

Address all author correspondence to Peter A. Marikle, 4506 Twisted Tree Cove, Austin, TX 78735.

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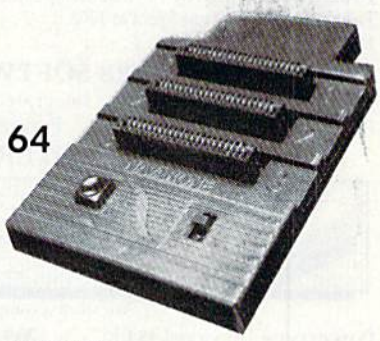
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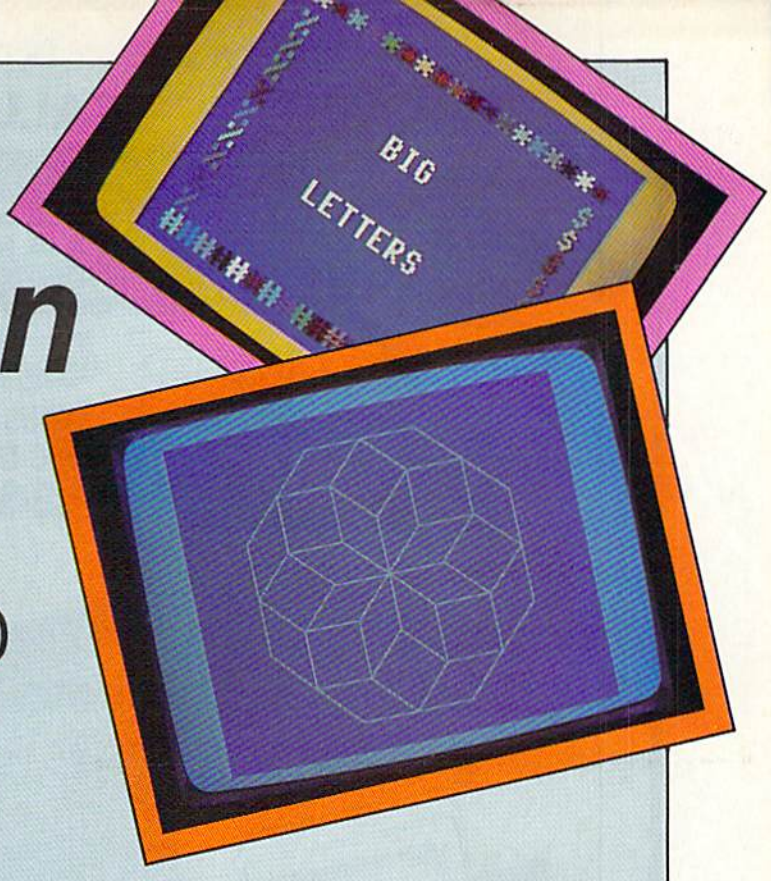
Listing 1. *REM Killer program for the C-64 and VIC-20.*

```
1ØØ REM REM KILLER/ C-64 VERSION/ PETE MARI
    KLE{2 SPACEs}1Ø/84                :REM*76
2ØØ N=828:REM FULLY RELOCATABLE-- CHANGE N
    AS DESIRED-- SYS N TO ACTIVATE :REM*244
3ØØ FOR I=NTON+128:READA:POKEI,A:CK=CK+A:NE
    XT:IFCK<>2Ø4Ø1THENPRINT"DATA ERROR"
                                      :REM*61
4ØØ END                               :REM*147
5ØØ DATA 165, 43, 133, 247, 133, 249, 165,
    44, 133, 248                      :REM*133
5Ø2 DATA 133, 25Ø, 16Ø, Ø, 177, 247, 133, 2
    51, 145, 249                      :REM*31
5Ø4 DATA 2ØØ, 177, 247, 133, 252, 145, 249,
     2ØØ, 177, 247                    :REM*117
5Ø6 DATA 145, 249, 2ØØ, 177, 247, 145, 249,
     2ØØ, 177, 247                    :REM*77
5Ø8 DATA 145, 249, 2Ø1, Ø, 24Ø, 11, 2Ø1, 14
    3, 24Ø, 2                         :REM*27
51Ø DATA 2Ø8, 241, 136, 169, Ø, 145, 249, 2
    ØØ, 24, 152                       :REM*7
512 DATA 17Ø, 16Ø, Ø, 1Ø1, 249, 145, 249, 7
    2, 2ØØ, 165                       :REM*22
514 DATA 25Ø, 1Ø5, Ø, 145, 249, 224, 4, 24Ø
    , 2, 133                          :REM*16
516 DATA 25Ø, 1Ø4, 224, 4, 24Ø, 2, 133, 249
    , 165, 251                        :REM*36
518 DATA 133, 247, 165, 252, 133, 248, 16Ø,
     1, 177, 247                      :REM*194
52Ø DATA 2Ø1, Ø, 24Ø, 2, 2Ø8, 162, 16Ø, Ø,
    169, Ø                            :REM*15Ø
522 DATA 145, 249, 2ØØ, 145, 249, 2ØØ, 24,
    152, 1Ø1, 249                     :REM*136
524 DATA 133, 45, 165, 25Ø, 1Ø5, Ø, 133, 46
    , 96                              :REM*226
```

Listing 2. *REM Killer program for the Plus/4 and C-16.*

```
1ØØ REM REM KILLER/ PLUS 4 VERSION/ PETE MA
    RIKLE 1Ø/84
2ØØ N=819:REM FULLY RELOCATEABLE-- CHANGE N
     AS DESIRED-- SYS N TO ACTIVATE
3ØØ FORI=NTON+128:READA:POKEI,A:CK=CK+A:NEX
    T:IFCK<>19153THENPRINT"DATA ERROR"
4ØØ END
5ØØ DATA 165, 43, 133, 2Ø8, 133, 21Ø, 165,
    44, 133, 2Ø9
5Ø2 DATA 133, 211, 16Ø, Ø, 177, 2Ø8, 133, 2
    12, 145, 21Ø
5Ø4 DATA 2ØØ, 177, 2Ø8, 133, 213, 145, 21Ø,
     2ØØ, 177, 2Ø8
5Ø6 DATA 145, 21Ø, 2ØØ, 177, 2Ø8, 145, 21Ø,
     2ØØ, 177, 2Ø8
5Ø8 DATA 145, 21Ø, 2Ø1, Ø, 24Ø, 11, 2Ø1, 14
    3, 24Ø, 2
51Ø DATA 2Ø8, 241, 136, 169, Ø, 145, 21Ø, 2
    ØØ, 24, 152
512 DATA 17Ø, 16Ø, Ø, 1Ø1, 21Ø, 145, 21Ø, 7
    2, 2ØØ, 165
514 DATA 211, 1Ø5, Ø, 145, 21Ø, 224, 4, 24Ø
    , 2, 133
516 DATA 211, 1Ø4, 224, 4, 24Ø, 2, 133, 21Ø
    , 165, 212
518 DATA 133, 2Ø8, 165, 213, 133, 2Ø9, 16Ø,
     1, 177, 2Ø8
52Ø DATA 2Ø1, Ø, 24Ø, 2, 2Ø8, 162, 16Ø, Ø,
    169, Ø
522 DATA 145, 21Ø, 2ØØ, 145, 21Ø, 2ØØ, 24,
    152, 1Ø1, 21Ø
524 DATA 133, 45, 165, 211, 1Ø5, Ø, 133, 46
    , 96
```

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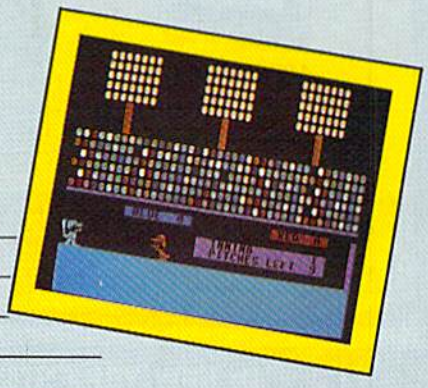
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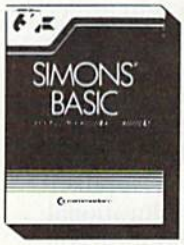
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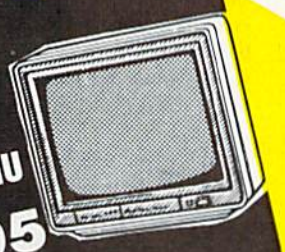


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From p. 60.

The real technological challenge to the use of computers in education may ultimately lie in the development of educational software. So far, despite the proliferation of home educational software packages on dealers' shelves and in some experimental school programs, this is an underdeveloped area.

Most programs available for homes or schools teach only a few concepts and a small number of facts in a very traditional way. Many of these programs are intended for young audiences and are designed as games in an attempt to increase the student's attention span and make learning fun. Those seeking more sophisticated and comprehensive educational programs at the high school or college level will have to wait a while longer.

Perhaps the major reason for the lack of more sophisticated software is that educators are just beginning to learn how to create it. Since most educators are not programmers, this is taking some time, but it is happening.

In some cases, educators and programmers are working together in teams to create programs to teach everything from mathematics to foreign languages.

In other instances, some adventurous educators are finding themselves becoming programmers in order to create the software necessary to take advantage of the computer's potential as an educational tool in their own fields.

In the latter case, many educators are taking advantage of special authoring software designed specifically to let non-programmers create educational programs without having to master traditional computer languages such as Fortran, Basic or Pascal.

These special programs are referred to as either educational languages or educational authoring programs. Educational languages are designed to simplify the creation of educational programs while giving the programmer maximum flexibility in terms of the type of educational program he or she is writing.

The most widely available educational language is Pilot, developed at Western Washington University. Versions of Pilot are available for most popular home computers, including the C-64, Atari and IBM. Programs written in the common subset of Pilot will run on other machines. Pilot contains many special commands that facilitate the creation of educational programs, but some programming ability is still required.

Educational authoring programs permit the creation of a specific type of educational software. They are easier for the new or non-programmer to use than an educational language like Pilot, but they lack Pilot's flexibility. Flash Card Author, presented below, is a simple educational authoring program.

Flash Card Author

This simple educational authoring program lets you create electronic flash cards, save them in sequential disk files and recall them, as desired, for drill purposes.

Flash cards can be very helpful in any learning situation requiring memorization or practice. For example, if you are learning a foreign language, you might wish to create flash-card files containing the new vocabulary introduced in each lesson. Once created, flash-card sets can be named, stored in sequential disk files and then loaded into the main program for a practice session. At the end of a session, the program will give you your score.

How to Use It

Type in the program and run it. Flash Card Author will present you with a menu of program options, including some useful disk commands. Option 1 allows you to create flash-card sets. Sets may contain from 2–100 flash cards. If you are learning new material, about 20 cards is optimal. The program will prompt you to enter first side 1 and then side 2 of each card. Cards will scroll up the screen as you create them. If you make an error, you can back up to correct it by typing the @ symbol. However, any cards you back over to reach your error will be erased, and you'll have to re-create them. When you are done entering flash cards, type an asterisk at the next side 1 prompt, and you'll be returned to the main menu.

Option 2 lets you load a previously saved flash-card file from disk. Enter the name of the file at the prompt, and the program will load the file, check the disk error channel and return you to the main menu. The error status will be reported on a separate line above the menu. In similar fashion, option 3 saves the current flash-card file to disk, checks for disk errors and returns you to the main menu.

Option 4 lets you drill on the flash-card set currently in memory. Cards are presented in random order. Either side of the card may be presented. You must respond by typing what is on the other side of the card and pressing the return key. If you make a mistake, the program will present you with the correct answer and then proceed with the drill.

The program also gives you the choice of drilling only on side 1 of your flash cards. This is useful if the material you are studying is in question-and-answer format (for example, math problems). If this is the case, when you create the card set, put the question on side 1 and the answer on side 2. To drill on side 1 only, select option 9 from the main menu.

To end a drill session, simply type an asterisk at any prompt. The program will return you to the menu and give your score, including the number right, the number wrong and the percentage of correct responses.

Option 5 allows you to add cards to a flash-card file that is currently in memory. The @ symbol and asterisk are used here the same way they were in creating the original file.

Options 6, 7 and 8 permit you to perform some useful disk functions from within the Flash Card Author program. Option 6 reads the disk directory for you. Option 7 allows you to scratch or erase a disk file. Option 8 lets you name and format a new disk to hold flash-card files.

Flash Card Author is presented here as an example of an educational authoring program. It is also, however, a useful applications program in its own right. Feel free to modify the program to meet any special needs you might encounter. For example, special characters could be added for foreign language flash cards.

If you would rather not type in the program yourself, send a blank disk, a self-addressed stamped envelope and $3 to cover costs, and we'll be glad to send you a copy.

Types of Educational Software

Educational programs fall into one of three categories: tutorials, simulations and practice programs. Tutorials are stand-alone programs that cover a discrete body of material. Typically, tutorials present the user with a series of information screens in which information is presented in text or graphic form, or both. These presentations are followed by practices and tests.

Properly designed, tutorials can (like a tutor) provide students with individualized instruction. For example, tests may be used in a program both to determine if a student has mastered the material and to diagnose learning problems.

Students who are having difficulty with a particular concept can be presented with supplementary and review materials and their comprehension tested again before material of a more complex nature is presented. Because students can differ in both their ability to learn and in the way in which they learn, the ability of well-designed software to individualize instruction is of great interest to educators.

Simulations are programs in which students learn by participation—that is, by playing an actual role in a given situation. The design principles are the same ones used in sophisticated computer games.

For example, one commercial program allows students to learn about genetics by breeding bees. A well-known mainframe simulation, The City Manager Game, helps students learn about public administration by having them assume the role of city manager. In this role, they are confronted with typical managerial decisions and their responses are evaluated. A poor performance may cost the manager his job. Other software lets students do experiments in a chemistry laboratory, mixing chemicals and reagents to analyze the composition of an unknown substance.

The possibilities seem endless and exciting. However, sophisticated simulations are the most difficult type of educational programs to create. This is because they require an extensive theoretical understanding of the phenomenon being simulated.

Drill and practice programs are the simplest type of educational software. They are also the most common. About 90 percent of the educational software available today is of this type. Despite their simplicity, these programs are very useful because they are applicable to a wide variety of subject matter. In almost every field, there are facts, definitions, terminology and skills that are best learned through memorization and practice.

The many commercial programs that provide math or spelling practice or teach such things as the states and their capitals are examples of this type of program. Because of their narrow focus, practice programs are usually used in conjunction with traditional classroom approaches, such as lecture and discussion.

While practice programs can be very useful, many educators feel that in order to realize its true potential as a classroom tool, the computer must move beyond this stage of electronic flash cards to the point where it can stimulate higher levels of thinking, such as analysis and synthesis. This will require an extensive, if not massive, commitment to the development of more sophisticated educational software.

Cultural Barriers to Computers

Improved hardware and more sophisticated software will not by themselves guarantee the computer's entry into the traditional classroom. In order for this to happen, computers must gain the acceptance of teachers, parents and students. This may be more difficult than it appears at first glance.

At a recent conference on "The School of the Future," held at Vanderbilt University, two viewpoints were expressed by educators. The more pessimistic suggests that schools are immensely good at resisting change. Proponents of this view argue that education is bound up in a rigid "school culture," in which teachers, parents and students play much the same role they have for generations.

Breaking down these cultural barriers may be very difficult, even for an innovation as profound as the computer. This point of view envisions only a limited and specialized role for the computer in education. The computer, they argue, is likely to remain in the laboratory.

A second, more optimistic, point of view envisions widespread educational use of the computer both in the classroom and at home. Proponents of this view argue that computers may be used to strengthen the traditional home-school tie. They feel that such a role for computers may lead to a computer on every desk, and, perhaps, in the not too distant future, to a national computer-assisted instructional curriculum for the elementary grades.

In summary, improved and inexpensive microcomputers have made the computerized classroom a technological possibility. How far and how rapidly computer-assisted instruction will penetrate the conventional educational setting depends in large measure on both the development of educational software and on the willingness of those involved in the traditional school culture—teachers, parents and students—to support such innovations. R

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Listing 1. *Flash Card Author program.*

```
5Ø PRINT"{CTRL 1}"                          :REM*248
1ØØ POKE53272,23                             :REM*42
11Ø POKE53281,14                            :REM*244
12Ø MX=1ØØ                                  :REM*23Ø
13Ø MN=2                                    :REM*156
14Ø DIM F$(MX),B$(MX),E(MX-1)               :REM*192
15Ø R=RND(-TI)                              :REM*232
16Ø PRINT CHR$(147)                         :REM*192
18Ø GOTO 2ØØØ                               :REM*13Ø
19Ø K=1                                     :REM*15Ø
191 W=Ø                                     :REM*183
192 C=Ø                                     :REM*1Ø4
193 PRINT                                    :REM*39
2ØØ PRINT"{SHFT E}NTER SIDE ONE OF CARD NUM
    BER";K"                                 :REM*138
2Ø5 INPUT F$(K)                             :REM*195
21Ø IF LEFT$(F$(K),4)="*" THEN 28Ø          :REM*36
22Ø IF LEFT$(F$(K),5)<>"@"THEN 23Ø          :REM*36
222 K=K-1                                   :REM*24
223 IF K<1 THEN K=1                         :REM*1Ø9
225 PRINT                                    :REM*71
226 PRINT"BACKING UP"                        :REM*1Ø
227 GOTO 2ØØ                                :REM*165
23Ø PRINT"{SHFT N}OW ENTER SIDE TWO"
                                            :REM*242
231 INPUT B$(K)                             :REM*189
```

Listing 1 continued.

```
24Ø IF LEFT$(B$(K),5)="@" THEN 225 :REM*244
25Ø PRINT                          :REM*96
26Ø K=K+1                          :REM*31
261 IF K<MX THEN 2ØØ               :REM*176
27Ø PRINT"{SHFT F}LASHCARD {SHFT S}ET {SHFT
    F}ULL."                        :REM*1
28Ø K=K-1:PRINT CHR$(147):GOTO2ØØØ :REM*139
29Ø C=Ø:W=Ø:PRINT CHR$(147)        :REM*7
291 W=Ø                            :REM*28
292 IF K>=MN THEN 31Ø              :REM*239
3ØØ PRINT"{SHFT T}HERE ARE";K;"CARDS. {SHFT
    T}HE MINIMUM IS";MN;"."        :REM*33
3Ø1 PRINT:PRINT"{SHFT P}RESS <{SHFT R}{SHFT
    E}{SHFT T}{SHFT U}{SHFT R}{SHFT N}> TO
    {SHFT C}ONTINUE."              :REM*248
3Ø2 INPUT U$: IF U$=" " THEN 2ØØØ  :REM*99
3Ø3 PRINT CHR$(147)                :REM*8Ø
3Ø5 GOTO 2ØØØ                      :REM*Ø
31Ø PRINT                          :REM*157
311 PRINT"{SHFT T}YPE WHAT IS ON THE OTHER
    SIDE"                          :REM*8
32Ø PRINT"OF EACH CARD AS AS IT IS DISPLAYE
    D"                             :REM*47
33Ø PRINT:PRINT                    :REM*29
34Ø R=INT(K*RND(1))+1              :REM*13
35Ø FOR J=Ø TO M-2                 :REM*2Ø1
36Ø IF E(J)=R THEN 34Ø             :REM*69
37Ø NEXT                           :REM*125
389 IF Q=7 THEN 422                :REM*234
39Ø J=RND(1)                       :REM*233
391 IF J>.5 THEN 42Ø               :REM*1ØØ
4ØØ PRINTF$(R)                     :REM*153
4Ø1 C$=B$(R)                       :REM*248
41Ø GOTO 43Ø                       :REM*157
42Ø PRINT B$(R):C$=F$(R)           :REM*185
421 GOTO 43Ø                       :REM*168
422 J=RND(1)                       :REM*9
424 PRINTF$(R)                     :REM*177
425 C$=B$(R)                       :REM*16
426 GOTO 43Ø                       :REM*173
428 C$=F$(R)                       :REM*147
43Ø PRINT:PRINT:PRINT:PRINT: INPUT R$:PRINT
    "{CRSR LF}"                    :REM*231
44Ø IF LEFT$(R$,4)="*" THEN 6ØØ    :REM*247
45Ø PRINT                          :REM*41
46Ø IF R$=C$ THEN 5ØØ              :REM*91
47Ø PRINT"{SHFT CLR}"              :REM*2Ø5
471 PRINT"{SHFT N}O, THE CORRECT ANSWER IS:
    "                              :REM*82
48Ø PRINT C$                       :REM*163
482 PRINT:PRINT:PRINT"{CTRL 9}{SHFT P}RESS
    SPACE FOR NEXT CARD{CTRL Ø}"   :REM*69
484 GET K$:IF K$<>" " THEN 484     :REM*37
486 PRINT CHR$(147)                :REM*7
49Ø W=W+1                          :REM*247
491 GOTO 52Ø                       :REM*23Ø
5ØØ PRINT"{SHFT CLR}"              :REM*235
5Ø1 PRINT"{SHFT C}ORRECT!"         :REM*156
5Ø3 PRINT:PRINT:PRINT"{CTRL 9}{SHFT P}RESS
    SPACE FOR NEXT CARD.{CTRL Ø}"  :REM*1Ø8
5Ø5 GET K$: IF K$<>" " THEN 5Ø5    :REM*18Ø
5Ø7 PRINT CHR$(147)                :REM*28
51Ø C=C+1                          :REM*121
52Ø FOR J=1 TO M-2                 :REM*148
53Ø P(J-1)=P(J)                    :REM*1Ø4
531 NEXT                           :REM*31
54Ø E(MN-2)=R                      :REM*242
55Ø PRINT                          :REM*142
56Ø GOTO 34Ø                       :REM*6Ø
6ØØ PRINT CHR$(147): GOSUB 15ØØ    :REM*2Ø
61Ø GOTO2ØØØ                       :REM*5Ø
7ØØ PRINT CHR$(147): IF K<1 THEN 18ØØ
                                   :REM*22
72Ø INPUT"{SHFT N}AME OF NEW FILE";R$
                                   :REM*18Ø
73Ø OPEN 2,8,2,"Ø:"+R$+",S,W"      :REM*1Ø4
74Ø FOR J=1 TO K                   :REM*96
75Ø PRINT#2,F$(J)                  :REM*4Ø
751 PRINT#2,B$(J)                  :REM*169
77Ø NEXT                           :REM*15
78Ø CLOSE 2                        :REM*35
782 GOSUB32ØØ                      :REM*23
79Ø PRINT                          :REM*127
8ØØ N$=R$                          :REM*255
81Ø GOTO 2ØØØ                      :REM*251
115Ø INPUT"{SHFT N}AME OF DISK FILE";N$
                                   :REM*92
116Ø PRINT CHR$(147)               :REM*172
119Ø GET R$                        :REM*4
1191 IF R$=" " THEN 119Ø           :REM*245
12ØØ OPEN2,8,2,N$                  :REM*12
121Ø K=1                           :REM*15Ø
1211 W=Ø                           :REM*183
1212 C=Ø                           :REM*1Ø4
122Ø INPUT#2,R$                    :REM*13Ø
124Ø INPUT#2,T$                    :REM*214
127Ø F$(K)=R$                      :REM*96
1271 B$(K)=T$                      :REM*83
128Ø K=K+1                         :REM*31
1285 IF ST=Ø THEN 122Ø             :REM*46
129Ø K=K-1                         :REM*73
1291 PRINT                         :REM*118
13ØØ CLOSE 2                       :REM*45
13Ø5 GOSUB 32ØØ                    :REM*36
131Ø PRINT                         :REM*137
1311 GOTO 2ØØØ                     :REM*242
15ØØ PRINT                         :REM*71
15Ø5 IF C+W=Ø THEN RETURN          :REM*76
15Ø8 PRINT"{CRSR RT}{CTRL 9}{SHFT S}{SHFT C
    }{SHFT O}{SHFT R}{SHFT E}{CTRL Ø}"
                                   :REM*143
15Ø9 PRINT                         :REM*8Ø
151Ø PRINT C;"{SHFT R}IGHT OUT OF";C+W
                                   :REM*73
1521 PRINT INT(C*1ØØ/(C+W));"{SHFT P}ERCENT
    "                              :REM*112
154Ø RETURN                        :REM*68
18ØØ PRINT                         :REM*117
18Ø1 PRINT"{SHFT T}HERE ARE {SHFT N}O FLASH
    CARDS YET."                    :REM*126
181Ø GOTO 2ØØØ                     :REM*231
2ØØØ PRINT: PRINT"{7 CRSR RTs}**** {SHFT F}
    {SHFT L}{SHFT A}{SHFT S}{SHFT H}{SHFT
    C}{SHFT A}{SHFT R}{SHFT D}{SHFT SPACE}
    {SHFT A}{SHFT U}{SHFT T}{SHFT H}{SHFT
    O}{SHFT R} ****"               :REM*131
2ØØ1 PRINT:PRINT"{14 CRSR RTs}---{SHFT M}{S
    HFT E}{SHFT N}{SHFT U}---"     :REM*72
2ØØ5 PRINT                         :REM*66
2Ø1Ø PRINT"{5 CRSR RTs}1--{SHFT C}REATE {SH
    FT N}EW {SHFT F}LASHCARD {SHFT S}ET
                                   :REM*41
2Ø2Ø PRINT"{5 CRSR RTs}2--{SHFT L}OAD A {SH
    FT F}LASHCARD {SHFT F}ILE      :REM*125
2Ø3Ø PRINT"{5 CRSR RTs}3--{SHFT S}AVE {SHFT
     C}URRENT {SHFT F}LASHCARDS    :REM*215
2Ø4Ø PRINT"{5 CRSR RTs}4--{SHFT D}RILL ON {
    SHFT C}URRENT {SHFT S}ET       :REM*91
2Ø6Ø PRINT"{5 CRSR RTs}5--{SHFT A}DD TO {SH
    FT C}URRENT {SHFT C}ARDS       :REM*88
2Ø61 PRINT"{5 CRSR RTs}6--{SHFT R}EAD {SHFT
     D}ISK {SHFT D}IRECTORY        :REM*225
2Ø62 PRINT"{5 CRSR RTs}7--{SHFT D}ELETE {SH
    FT D}ISK {SHFT F}ILE           :REM*7Ø
2Ø63 PRINT"{5 CRSR RTs}8--{SHFT F}ORMAT {SH
    FT N}EW {SHFT D}ISK            :REM*189
2Ø65 PRINT"{5 CRSR RTs}9--{SHFT D}RILL ON {
    SHFT S}IDE {SHFT O}NE {SHFT O}NLY
                                   :REM*111
```


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Listing 1 continued.

```
2066 PRINT"{4 CRSR RTs}1Ø--{SHFT E}ND {SHFT
     P}ROGRAM                          :REM*1ØØ
2067 PRINT                             :REM*129
2069 PRINT                             :REM*131
2075 PRINT                             :REM*137
2076 PRINT"{SHFT W}HAT DO YOU WANT TO DO";
                                       :REM*214
2077 INPUT R$                          :REM*15
2080 IF R$="1" THEN 190                :REM*164
2090 IF R$="2" THEN 1150               :REM*70
2100 IF R$="3" THEN 700                :REM*138
2110 IF R$="4" THEN 290                :REM*72
2120 IF R$="5" THEN 3405               :REM*84
2135 IF R$="6" THEN GOSUB 3000         :REM*179
2137 IF R$="7" THEN GOSUB 3135         :REM*231
2142 IF R$="8" THEN GOSUB 3105         :REM*12
2144 IF R$="9" THEN 3400               :REM*206
2146 IF R$="1Ø"THEN END                :REM*248
2150 PRINT CHR$(147):GOTO 2000         :REM*208
3000 PRINT"{SHFT CLR}":PRINT           :REM*19
3001 PRINT                             :REM*42
3005 PRINT"{13 CRSR RTs}{SHFT D}ISK {SHFT D
     }IRECTORY                         :REM*162
3006 PRINT                             :REM*47
3010 PRINT                             :REM*51
3015 PRINT"{SHFT L}ENGTH {SHFT N}AME{18 SPA
     CEs}{SHFT T}YPE"                  :REM*58
3016 PRINT                             :REM*57
3020 OPEN1,8,0,"$"                     :REM*223
3025 GET#1,A$,B$                       :REM*184
3030 GET#1,A$,B$                       :REM*189
3035 GET#1,A$,B$                       :REM*194
3040 C=0                               :REM*147
3041 IF A$<>""THEN C=ASC(A$)           :REM*110
3045 IF B$<>""THEN C=C+ASC(B$)*256     :REM*184
3050 PRINT MID$(STR$(C),2);TAB(7)      :REM*149
3055 GET #1,B$                         :REM*214
3056 IF ST<>0 THEN 3095                :REM*239
3060 IF B$<>CHR$(34) THEN 3055         :REM*171
3065 GET #1,B$                         :REM*224
3066 IF B$<>CHR$(34) THEN PRINT B$;:GOTO 30
     65                                :REM*205
3070 GET #1,B$                         :REM*229
3071 IF B$=CHR$(32) THEN 3070          :REM*130
3075 PRINTTAB(29);                     :REM*199
3076 C$=""                             :REM*56
3080 C$=C$+B$                          :REM*194
3081 GET#1,B$                          :REM*241
3082 IF B$<>"" THEN 3080               :REM*214
3085 PRINTLEFT$(C$,3)                  :REM*85
3090 IF ST=0 THEN 3030                 :REM*68
3095 PRINT "BLOCKS FREE"               :REM*149
3096 CLOSE 1                           :REM*48
3097 PRINT"{CRSR DN}{SHFT P}RESS <{SHFT R}{
     SHFT E}{SHFT T}{SHFT U}{SHFT R}{SHFT N
     }> FOR MAIN MENU."                :REM*133
3099 INPUTU$:IF U$=""THEN 3100         :REM*149
3100 PRINT CHR$(147)                   :REM*72
3102 GOTO 3200                         :REM*32
3104 REM FORMAT NEW DISK               :REM*118
3105 PRINT"{SHFT I}NSERT DISK TO BE FORMATE
     D."                               :REM*33
3106 PRINT                             :REM*148
3110 PRINT"{SHFT I}NPUT DISK NAME."    :REM*20
3111 INPUT DISK$                       :REM*77
3115 PRINT"{SHFT I}NPUT DISK NUMBER."
                                       :REM*43
3116 INPUT EXT$                        :REM*146
3120 MACRO$="N:"+DISK$+","+EXT$        :REM*208
3125 OPEN15,8,15,MACRO$                :REM*217
3130 CLOSE15                           :REM*166
3131 MACRO$="": GOTO 3200              :REM*13
3132 REM DELETE FILE                   :REM*176
3135 PRINT"{SHFT E}NTER NAME OF FILE TO DEL
     ETE";:INPUT DISK$:PRINT CHR$(13)
                                       :REM*243
3140 PRINT"{CTRL 9}{SHFT P}RESS RETURN TO D
     ELETE FILE.{CTRL 0}"              :REM*38
3141 GET K$: IF K$="" THEN 3141        :REM*223
3145 MACRO$="S:"+DISK$                 :REM*183
3150 OPEN 15,8,15,MACRO$               :REM*242
3155 CLOSE15                           :REM*191
3156 MACRO$=""                         :REM*130
3157 GOTO 3200                         :REM*87
3160 REM DISK ERROR CHECKING           :REM*128
3200 OPEN 1,8,15                       :REM*56
3205 INPUT#1,A$,B$,C,D                 :REM*213
3212 PRINT"{SHFT CLR}{CTRL 9}{SHFT E}RROR {
     SHFT S}TATUS:{CTRL 0}";           :REM*168
3215 PRINTB$                           :REM*85
3220 CLOSE1                            :REM*172
3221 GOTO 2000                         :REM*111
3400 Q=7                               :REM*165
3401 GOTO 290                          :REM*168
3405 PRINT CHR$(147):GOTO 260          :REM*16
```


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From p. 10.

$248 Encrypted filenames—You can make it difficult for others to load your secret programs by using unorthodox dummy characters to start their names. It doesn't matter which characters you use, and you don't even have to remember them, since your loading method will decrypt them automatically.

What's important is to use the same number of dummy characters each time—perhaps something in the range of 3–5. The best characters to use are those in the ranges CHR$(0) to CHR$(31) and CHR$(128) to CHR$(159). Also try CHR$(20), the delete character, which really confuses directory listings. A good example is:

```
SAVE CHR$(143)+CHR$(20)+"REAL NAME",8
```

The secret to loading such programs is to use the question mark wild-card character. If you use four dummies in naming the file, use four question marks in loading it. If you used three, use three, and so on. In our example, you would use:

```
LOAD "??REAL NAME",8
```

Cornelius Vanderbilt
New York, NY

$249 Fortune cookie—This generates some interesting messages, which *may* be useful in predicting the future. In tests against tea leaves and an out-of-round crystal ball, its output was consistently equivocal. Anyway, it's a highly amusing program. For nonstop entertainment, put a delay at the end, then skip a line and loop back to 730.

```
7ØØ REM FORTUNE COOKIE - MARCO BALAGUER
71Ø FORN=1TO1Ø:READA$(N),B$(N),C$(N),D$(N):
    NEXT:S$=CHR$(32)
72Ø DEFFNA(X)=INT(RND(Ø)*1Ø+1)
73Ø A=FNA(X):B=FNA(X):C=FNA(X):D=FNA(X)
74Ø PRINTS$A$(A)S$B$(B)S$C$(C)S$D$(D)
75Ø DATA THEY,WILL,FIND,HER,HE,WON'T,EXPOSE
    ,PLANS
76Ø DATA RIVAL,DID,IGNORE,CONSEQUENCES,STRA
    NGER,MIGHT,LOVE,YOU
77Ø DATA SHE,MIGHTN'T,ADMIRE,ANOTHER,YOU,DI
    DN'T,KNOW,THEM
78Ø DATA FAMILY,CAN'T,PROTECT,US,WE,CAN,DEN
    Y,IT
79Ø DATA CHILD,MAY,DESPISE,MONEY,SUPERIOR,C
    OULD,ACCEPT,HIM
```

Marco Balaguer
Brooklyn, NY

$24A Day of week routine—This routine has its origins in home computer antiquity, since a similar program appeared in *PET User Notes*, way back in 1978. It will print the day of the week for any date from March 1, 1900 through February 28, 2000. It does not destroy the date and may be used as a subroutine after the WD$ array is initialized. When you input the date, please use the numeric form of the month, day and year, using two digits for each and separating them with commas.

```
1Ø REM DAY OF WEEK ROUTINE
2Ø DATA SUN,MON,TUE,WED,THU,FRI,SAT
3Ø FORJ=ØTO6:READWD$(J):NEXT
4Ø INPUT"MONTH,DAY,YEAR";MN,DY,YR
5Ø CY=YR:M=MN-2:IFM<1THENM=M+12:CY=CY-1
6Ø Y=CY-INT(CY/1ØØ)*1ØØ
7Ø WD=Y+INT(Y/4)+1+DY+INT(2.6*M-.1999)
8Ø WD=WD-INT(WD/7)*7:PRINTWD$(WD)
```

R.E. Peat
Pittsburgh, PA

$24B Screen Poke Finder—When you're Poking characters to the C-64 screen, determining the Poke addresses is *not* part of the fun. That's why I created the Poke Finder program. Type it in and run it, and if your Data statements are perfect, you'll be asked to delete some lines. Delete them, then save the program.

When you run it from now on, it will seem to disappear. Then you're free to program or to cursor around the screen, leaving, if you're skillful, a trail of truth and beauty. To find the memory locations for any screen position, just move your cursor there and press the f1 key. Like magic, the numbers will materialize on screen! And since Poke Finder doesn't interfere with Basic, you can use its services while writing other programs. Simultaneously pressing the run/stop and restore keys kills Poke Finder, while SYS49152 resurrects it.

```
 1 REM SCREEN POKE FINDER - CHRIS CONLEE
 2 FORJ=1TO18Ø:READK:CS=CS+K:NEXT
 3 IFCS<>25844THENPRINT"DATA ERROR":STOP
 4 PRINT"DATA OK. DELETE LINES 2-4, THEN SAV
   E.":END
1Ø FORJ=49152TO49331:READK:POKEJ,K:NEXT:SYS
   49152:NEW
11 DATA 12Ø,169,Ø13,141,Ø2Ø,ØØ3,169,192
12 DATA 141,Ø21,ØØ3,Ø88,Ø96,Ø72,138,Ø72
13 DATA 152,Ø72,165,215,2Ø1,133,24Ø,ØØ3
14 DATA Ø76,172,192,Ø56,Ø32,24Ø,255,14Ø
15 DATA 18Ø,192,142,181,192,169,ØØØ,141
16 DATA 182,192,169,ØØ4,141,183,192,224
17 DATA ØØØ,24Ø,Ø2Ø,Ø24,169,Ø4Ø,1Ø9,182
18 DATA 192,141,182,192,169,ØØØ,1Ø9,183
19 DATA 192,141,183,192,2Ø2,2Ø8,236,Ø24
2Ø DATA 173,18Ø,192,1Ø9,182,192,141,182
21 DATA 192,169,ØØØ,1Ø9,183,192,141,183
22 DATA 192,Ø24,173,182,192,1Ø5,ØØØ,141
23 DATA 184,192,173,183,192,1Ø5,212,141
24 DATA 185,192,Ø24,162,ØØØ,16Ø,Ø24,Ø32
25 DATA 24Ø,255,169,Ø83,Ø32,21Ø,255,169
26 DATA Ø61,Ø32,21Ø,255,174,182,192,173
27 DATA 183,192,Ø32,2Ø5,189,169,Ø44,Ø32
28 DATA 21Ø,255,169,Ø32,Ø32,21Ø,255,169
29 DATA Ø67,Ø32,21Ø,255,169,Ø61,Ø32,21Ø
3Ø DATA 255,174,184,192,173,185,192,Ø32
31 DATA 2Ø5,189,Ø24,174,181,192,172,18Ø
32 DATA 192,Ø32,24Ø,255,1Ø4,168,1Ø4,17Ø
33 DATA 1Ø4,Ø76,Ø49,234
```

Chris Conlee
Moro, OR

$24C Equipment turn-on sequence—Much has been written about the proper order in which to turn

your computer and peripherals on and off. All sorts of disk hangups and printer problems are involved, and it's difficult to find the best turn-on sequence for every situation.

I struggled with these problems for years before discovering that if a reset button is connected to the serial bus, turn-on sequence doesn't matter. If you turn everything on, then press your reset button, the problems magically disappear. Apparently, the reset button causes the serial bus to normalize all the peripherals, regardless of when they have been turned on. This interesting experience represents one more reason to install a reset button on your computer.

Karl T. Thurber, Jr.
Millbrook, AL

$24D Video monitor tips—My monitor is a green monochrome without a speaker, which is little help when a program involves color and sound or both. But since the green monitor is plugged into the video connector on the back of my 64, the TV connector is vacant. I run a long cable from the TV connector to the switchbox on the back of my color TV. When a commercial comes on, I can do my color work without interrupting the family's viewing. The 64 can simultaneously drive both the monitor and the TV.

Of course, the cable connecting my green screen to the computer has a separate audio line. I patch it into my stereo receiver, so I can play the 64's sound. I frequently use this setup to record C-64 sound onto a cassette or reel-to-reel tape.

Stephen M. Zapytowski, Sr.
Beaverton, OR

$24E Power supply repairs—Trick $1F1 gave a hint on replacing the 3052P voltage regulator, which often fails in Commodore power supplies. Unfortunately, the suggested replacement isn't as husky as the original and may be subject to failure itself. Many electronics dealers handle the ECG line of replacement ICs, and ECG makes an exact, pin-for-pin replacement for the 3052P. The part number is ECG1934 and costs about $7. If your ECG dealer doesn't stock the part, he should be glad to order it for you.

Bob Wingerter
Raceland, KY

$24F Dummy modem—If you're trying to correct modem problems, learning to telecommunicate or debugging your own terminal software, there's an easy, low-cost way to go on-line. Get a friend to bring his computer and modem over, then connect your modems directly together, completely bypassing the telephone system. You can use any modular extension cord for this purpose, including the one that connects your own telephone to the wall.

You'll have to ensure originate/answer compatibility between the two modems, but that can be as simple as flipping a switch. Once you are in communication, this system completely eliminates phone-line problems. And having both terminals in the same room gives wonderful feedback to the operator, since keyboard entries on one can be viewed immediately as they are received and displayed on the second.

Chuck McGaffin
Ballston Lake, NY

$250 Recordkeeping hint—I keep track of all my machine language programs in a pocket-sized looseleaf notebook available at most department stores. The pages are 3¾″ × 6¾″, which is large enough to hold what I need, yet small enough to fit in a corner of my desk drawer. The program name goes on the top line of each sheet, followed by loading information, SYS calls and so forth. I use both sides of the lined sheets, so I never run out of room. I use masking-tape tabs to divide the book into meaningful sections, and the looseleaf system keeps everything safely together, while enabling me to move pages when necessary.

Since Basic programs can be listed on the screen, with numerous REMs to explain them, I seldom enter one in my book. But for all those unlistable machine language programs, with all their versions, SYS calls and options, I wouldn't be without my little book.

L.F.S.

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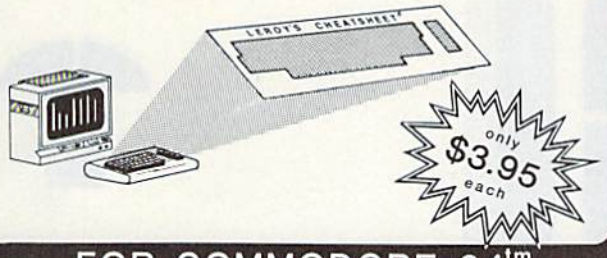
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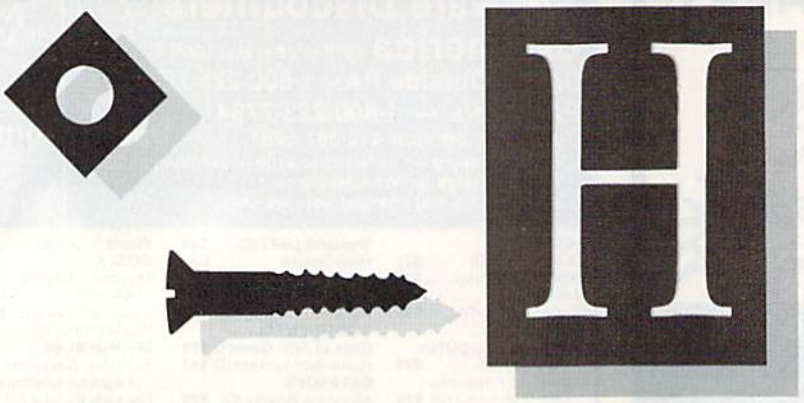
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Compiled by SUSAN TANONA

Computereyes

You Can Capture, Save And Print Out Images With this Video Digitizer

Computereyes provides the missing link between the Commodore 64 and your home video equipment. If you don't yet own a video camera, this device might provide you with strong incentive to go out and buy one.

The Computereyes package consists of a hardware module that plugs into the user port of your C-64 and a disk containing a set of machine-language routines that capture any video image, digitize it and then display it in black and white on your computer screen.

Amply documented, Computereyes is so easy to use that I hardly needed the manual. (Excellent help screens are also provided within the program.)

Using a standard stereo cable with RCA plugs at each end, you connect a video camera to the Computereyes module. Two knobs on the unit adjust the brightness setting and synchronize the computer to the camera. After that, it's simply a matter of aiming the camera, and within six seconds, Computereyes can scan and digitize its first picture.

Images can be captured in three modes: Normal (high contrast), Four-level gray scale or Eight-level gray scale. The eight-level image shows considerably more detail than the high-contrast scan and requires 50 seconds to complete a picture.

The program dices a video image into 64,000 pieces, each corresponding to a single pixel. Working from left to right, each slice of video is compared to the threshold (preset by the brightness control), and the computer decides whether or not the corresponding pixel is to be lit. As the scan continues, data from successive scans is compared to what is already in memory. The four- and eight-level scans simply repeat the process, changing the brightness threshold each time.

Digital Vision offers software that allows images to be stored in formats that can be called up directly by Koala, Doodle!, Flexidraw and Print Shop graphics programs. The Print Shop version also allows creation of graphics files that can be used to create cards, letterheads and banners. (This optional software to support specific programs is $15.)

While Computereyes will be greatly appreciated by those of us who use computer drawing and other graphics programs, there are dozens of other possible applications, such as pattern recognition, comparisons and security. The software is not copy-protected and Digital Vision supplies comprehensive information for programmers who wish to incorporate features of Computereyes in their Basic or assembly-language programs.

Since this program utilizes a standard video source (composite signal), it can digitize the output of almost any video device, including videotape recorders and videodisks. (The image must not be moving during the six to 50 seconds required to complete a picture.) I found that the system did best on either high contrast artwork or shots containing a limited range of brightness.

With a reasonable price and a one-year warranty, Computereyes is well within the reach of hobbyists and quite a bargain for artists and systems designers who need a digitizer, as they are now no longer restricted to high-priced computer systems. *(Digital Vision, Inc., 14 Oak St., Needham, MA 02192. C-64/$129.95.)*

John Premack
Lexington, MA

Quick Data Drive

Here's a New Data Storage System for Your VIC-20 or C-64

Loading files and programs with Commodore's Datassette can be a tedious chore at best. After a few weeks of loading and saving programs this way, many users begin to search for a faster method of storing data that's relatively inexpensive as well.

Entrepo, Inc., has come up with the Quick Data Drive, which claims to offer much greater flexibility in file handling than does the Datassette. The advertisement states that you can load a 24K program via the Quick Data Drive in approximately 20 seconds, a process that takes upwards of eight minutes on a Datassette and one minute on the 1541 disk drive.

Entrepo refers to the storage system as Microwafer technology. The storage medium is simply a mini cassette that operates at a higher rate of speed than a normal cassette tape. Before using the drive, an operating system called QOS (Quick Operating System) must be loaded into the computer. The software is supplied with the unit. This takes about 15 seconds.

Once loaded, the drive is ready for operation. Although I found file handling to be somewhat enhanced when compared to the Datassette, I also discovered several limitations.

The time required to format a wafer (mini cassette) depends upon the length of the tape itself. If it's 120 inches long, it takes at least as long, if not slightly longer, than formatting a disk with the 1541.

The operating system that came with my drive provided no way to scratch a file once it was on the cassette. To get rid of the undesired file, I had to reformat the entire cassette. (A new QOS may now be available that does allow you to scratch files.)

Although the manufacturer advertises that some programs load faster with the Quick Data Drive than with the 1541 disk drive, I found that *all* programs took a considerably longer time with this drive than with the 1541. I experienced a rate of speed that was 35–60% slower than the 1541.

Due to the memory positioning of the drive's operating system, I found that several programs would not operate when transferred and loaded by the wafer-drive system. These included word processors, many programs that I'd written myself and two machine-language monitors.

Although I searched for several days, I could find no commercial software that was formatted for the Quick Data Drive.

The unit is about the size of two packs of cigarettes stacked on top of each other. The sturdy metal case that encloses the mechanism is virtually indestructible. I was told to treat the unit abusively, which I did, and could find no apparent damage. The unit is nearly impervious to heat and I found it to be far less susceptible to load errors than is the Datassette.

You don't have to rewind the tapes with the Quick Data Drive. All operation is fully automatic, with the exception of loading the operating system (which is done simply by pushing the only button on the unit).

The storage medium itself seems relatively sturdy and is quite compact. You can purchase these wafers in packages of three or ten. The price varies depending upon the length of the tapes. Each cassette has a protective flap that covers the tape when you remove it from the unit.

The manual that accompanies the unit is well written and easy to understand.

Although the Quick Data Drive is somewhat of an improvement in speed and program accessibility over the Datassette, I found this new device's file handling to be both tedious and incomplete. Also, too many of the programs that I tried interfered with the drive's operating system.

If you're looking for increased speed and don't want to invest in a disk drive, I suggest you look into the several speed-up cartridges that are available on the market. If you're looking for increased speed *plus* extended file handling, then it might be a good idea to save for a disk drive.

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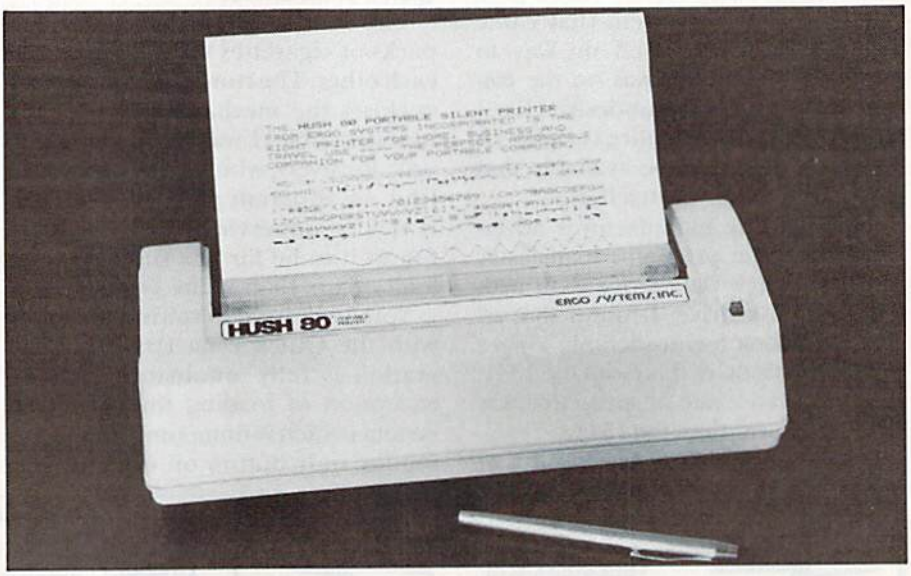
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Overall, I was disappointed with the performance of this unit and would not recommend it to be used for serious programming. *(Entrepo, Inc., 1294 Lawrence Station Road, Sunnyvale, CA 94089. VIC-20, C-64/$85.)*

Ann Sykes
Gainesville, FL



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The printer's dimensions are a scant 11.6 × 5.5 × 2.8 inches, and it weighs only 25 ounces—I thought the box was empty before I opened it. The print speed is a respectable 80 characters per second, with bidirectional printing in the Text mode and unidirectional printing in the Graphics mode.

The Hush 80 will print in three different character widths: 80 characters per line; 40 characters (expanded) per line; and 160 characters (condensed) per line. It is quite simple to switch to any of the other print modes, such as lowercase/uppercase, inverse print or dot-addressable graphics. You can easily access tabbing, graphics and all the printer features, and the manual does an excellent job of explaining each step.

The Graphics mode is a bit complicated to master, but the manual is very successful in explaining this feature. In fact, it is one of the clearest printer manuals I've ever worked with.

Although the printer is supposed to be Commodore-compatible right out of the box, it does not completely emulate the Commodore 1525 printer. Standard screen-dump programs will not work with the Hush 80, and while the manual very clearly explains how to make use of the Hush 80 graphics and other capabilities, only a fairly competent programmer could modify or create a working screen-dump program. (This is the result of the printer's factory settings.)

For generating short listings and performing some graphics printing, the Hush 80 is one of the best thermal printers available for the Commodore owner. If you're shopping for a thermal printer, I would definitely recommend the Hush 80. *(Ergo Systems, 26254 Eden Landing Road, Hayward, CA 94545. $139.99.)*

Guy Wright
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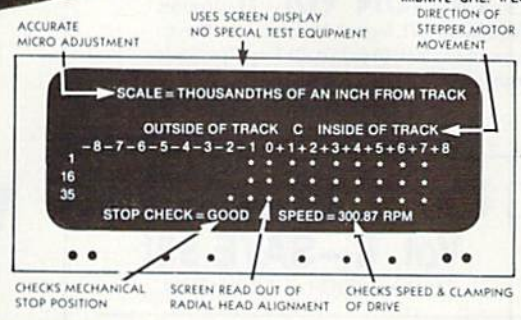
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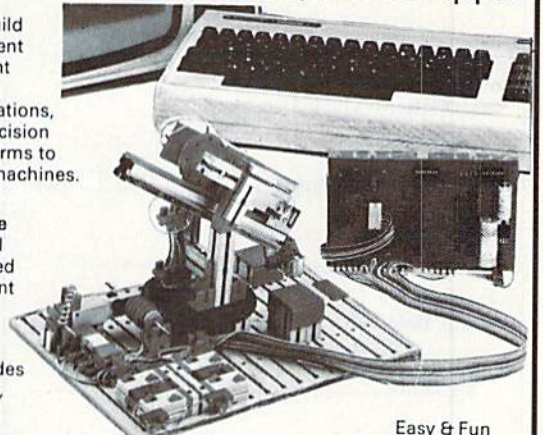
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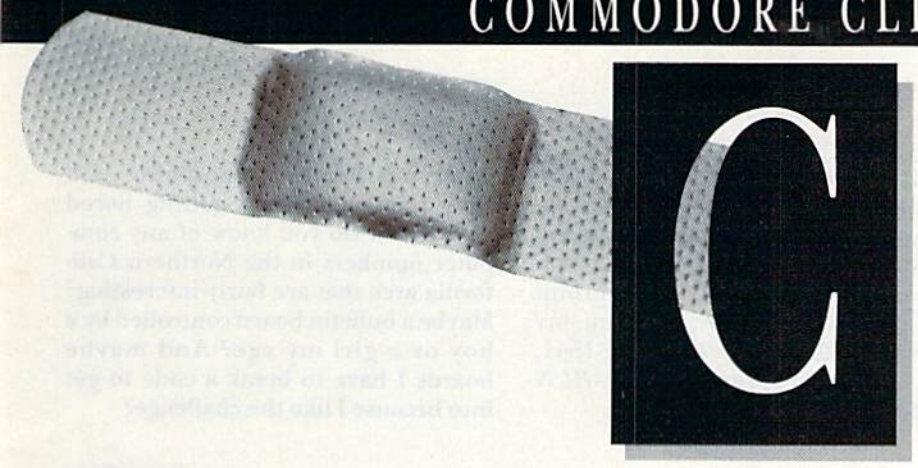


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HARDWARE

Q: When turning the new C-128 into a C-64, can you use the new, fast 360K disk drive to load 64 games, or do you need a separate disk drive?

Johnny
Sunnyside, NY

A: The new 1571 drive is supposed to be compatible with all programs for the C-64. One copy-protected game found my early prototype objectionable, but further improvements in the 1571 have since been made to correct that.

Q: I would like to expand the RAM memory on my 64. What would be the best way to do this?

David Jones
Jeffersonville, IN

A: It is possible to expand the memory of the 64 via bank-selected, add-on memory units that plug in like a cartridge. However, these only work with programs specifically designed for them. A more satisfactory solution for the long term would be to upgrade to Commodore's new C-128. It comes with 128K RAM and has at least 512K RAM total via promised add-on RAM cartridges. Several new Basic commands make using the added memory easy.

Q: Before I purchase the C-128, I need to know what hardware I will need to purchase. I have a Brother Correctronic 50 with a Cardprint A interface, an Epson printer, a 1541 disk drive and a 1702 monitor.

Ernest Briggs
Tahlequah, OK

A: All the equipment you mentioned should work properly with the new C-128. (I've tested the 128 with similar equipment and found no problems, not even in booting CP/M.) However, you may want to get Commodore's matching 1571 drive and 1902 monitor to take full advantage of Kaypro-format CP/M disks and the new 80-column color display.

Q: I have a Canon ¾-height, 40-track, double-sided disk drive. Is there any way to connect this to my C-64, and will Commodore's DOS support double sides? Is there anybody out there...

J.D. Bolling
Morris, MN

A: I receive many requests for information on connecting "alien" disk drives to Commodore computers. Unfortunately, this is almost impossible, because Commodore disk drives are smarter than almost all others on the market, and adding the needed chips to another type of drive would cost more than an equivalent Commodore disk drive. As for double-sided drives, Commodore makes three excellent products: the 8250, the SFD-1001 and the 1571.

Q: I am planning to buy a modem for my C-64, but I am a foreign exchange student and have to go back to Denmark soon. I have heard that we in Denmark have a different phone system and, therefore, can only use acoustic modems. If so, what kinds of acoustic modems are available?

Klaus Jacobsen
West Branch, MI

A: European countries use different modems than the U.S. Yours follow a standard known as CCITT and are incompatible with U.S. modems, acoustic or otherwise. You could, however, take home a U.S. modem and still use it to call up computers in the U.S. or Canada.

SOFTWARE

Q: I would like to know the best way to enable my Commodore 64 to run CP/M software. Where can I buy the proper equipment, and can I do

it without hurting any of my current capabilities?

Michael Rebaleati
Eureka, NV

A: Although Commodore's CP/M cartridge for the C-64 is still available in some stores and still a very inexpensive way to learn about CP/M, it's no longer the best way for 64 owners to use CP/M for serious business purposes. Commodore's new C-128 computer and 1570-series disk drives come with the latest version of CP/M and are also 100% compatible with the 64. Although the 128 and drive cost much more than a CP/M cartridge, they give you an unencumbered CP/M, with 80-column display, plenty of usable memory and a fast, CP/M-standard disk format.

Q: **I have both a 64 and an SX-64. Your program, Mail List 1541, will not run on the SX. It loads all right; when I type RUN, the disk drive starts and the screen clears, but then nothing happens. I would appreciate any help.**

Richard Bogardus
DeSoto, IA

A: You've discovered a common problem on the SX-64 that isn't really a problem at all. The Mail List works fine on the SX. The only problem is that, like many other programs for the 64, the Mail List changes the cursor color to white for added readability against the 64's blue background. Since the SX background is white, this leaves you hunting a white rabbit in a snowstorm.

The cure is to change the background color to blue before running such programs. POKE 53281,6 will do it and may be added to the first line of many such programs, including my Mail List.

Q: **How can I change Copy/All to work with only one disk drive? I know you must put in Print statements to tell when to switch disks, but I don't know where to put them.**

Tim Winn
Spring, TX

A: To copy programs with a single disk drive, you need Unicopy, not Copy/All. Both are for the 64, by the same author and work in much the same way. If your user's group doesn't have Unicopy, it is on my revised Test/Demo disk for the 1541, and I'll be glad to send it to any *RUN* reader for $15.

Q: **Do you know of any companies specializing in literature on artificial intelligence programming?**

Philip Jones
Slater, MD

A: Your letter arrived the same day as an announcement from TAB books of their new book, *Artificial Intelligence Projects for the Commodore 64*. It sounds like just what you want. TAB is located in Blue Ridge Summit, PA, and you can call them at 717-794-2191.

Q: **When I try to print out linked files using the PaperClip word processor, the printer prints the first file and loads the second file. The Print format commands are then lost or ignored. Consequently, page 2 begins printing on page 1. I would appreciate help on this.**

Alexander Pollatsek
Eugene, OR

A: The problem is most likely that you have duplicated your format commands at the start of each file. That isn't necessary, and can confuse not only PaperClip, but also several other popular word processors. When using linked files, put format commands for such things as page length only at the start of the first file. From then on, use format commands only when you need to make a change, and limit the command to the setting being altered.

PROGRAMMING

Q: **I am 12 years old and recently bought a modem. I know the computer number to CompuServe and Dow Jones, but I am getting bored with them. Do you know of any computer numbers in the Northern California area that are fairly interesting? Maybe a bulletin board controlled by a boy or a girl my age? And maybe boards I have to break a code to get into because I like the challenge?**

Scott Kirn
Cloverdale, CA

A: Let me head you off right now about one point you made. Regardless of the challenge involved, it is just as illegal to break into someone else's computer as it is to break into his home. It could easily lead you to a police record and a ruined future. If you're getting bored with CompuServe, perhaps it's time you got serious about learning to program your computer.

Start with Basic, Logo or Comal, then dig into machine language, Pascal, C and, perhaps, Forth. Next, put that knowledge to use helping people, perhaps as a volunteer programmer for a church, school or charity. I guarantee you won't be bored with your computer once you learn more about it and use that knowledge to benefit someone other than yourself. Volunteer work will also help you find friends now and a real job later.

As for finding bulletin boards you can call legally, an excellent new book, *The Complete Commodore Inner Space Anthology*, by Karl Hildon, includes a list of 39 boards in your area code that you'll never have to apologize for calling. The anthology is available from Transactor Publishing, 500 Steeles Ave., Milton, Ontario, L9T 3P7, Canada.

Q: **I have a short question concerning my C-64. Do you think it will harm my computer if I program it to repeat the same message and sound effect over and over for periods of up to ten hours?**

Richard Shackelford
Bucyrus, OH

A: As long as the computer is well vented, continuous operation isn't

likely to hurt it. Your message and sounds aren't likely to harm your TV or monitor either, as long as the picture on the screen is continuously varied. If you can't change the words, at least change colors regularly. Otherwise, your message will eventually be etched permanently into the luminescent coating of your display screen.

Q: When using RND( ) statements on my C-64, the computer generates the same initial numbers in the same order every time the power is turned off and on. What can be done to create a different first number each time the system is reset?

Brian Wickizer
Salem, OR

A: Random numbers don't come from thin air—they have to be initialized somehow, and no matter how involved the process, it is likely to give the same results each time on any one machine when it is first turned on. Therefore, Commodore allows you to further randomize the numbers by changing the seed value from which the random numbers are generated. Although other approaches also work, I add the following line to the start of my programs to alter the initial value from which other seeds generate random numbers:

```
140 X=RND(-TI):REM RANDOMIZE
```

After using this line, I simply use RND(1) to generate my random numbers, with entirely satisfactory results.

Q: I want to use the VIC's built-in clock to count down from 20 minutes to zero. Is there a way to make this work?

Sam Braid
Ontario, Canada

A: Yes. The trick is to use subtraction instead of addition. The following program will do what you ask.

```
10 TL=TI+20*3600:REM 20 MINUTES
20 T=TI
30 M%=(TL-T)/3600
40 S%=(TL-T)/60-60*M%
50 ? CHR$(147);M%;":";S%
60 IF TI<TL THEN 20
```

It uses integer variables to avoid fractional minutes and seconds and gets its time from the jiffy clock built into all Commodore computers sold in the U.S.

Q: Please give easy-to-follow instructions for a beginner to print from Direct mode on a Commodore Plus/4 to a 1526 printer.

Karen Baldwin
Zurich, KS

A: To print to any printer interfaced via the serial bus (like the 1526), you must first establish a channel of communication with it, just as you have to dial the phone and wait for it to be answered before beginning to converse. An often-used command that does this is:

```
OPEN 4,4
```

Next, you send the printer whatever it is you want it to print. This is handled as if the information were going to the screen, except that you add a #4 to your Print commands, as shown below.

```
PRINT#4,"THIS WILL APPEAR ONLY ON THE PRINTER"
```

Be sure to spell out the word Print (the abbreviation ?# is not correct) and don't omit the comma.

Finally, when you're done with the printer, tidy up with this command:

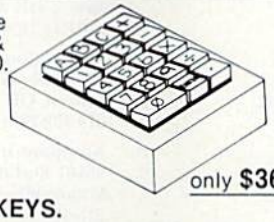
```
CLOSE 4
```

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Commodore's Service Network

Local service is now available to Commodore computer owners through the creation of a national network of service centers. This is the last of three sections of the service center list provided to RUN *by Commodore. For Alabama through New York, see the July and August issues of* RUN. *A call to the toll-free Commodore support hot line (800-247-9000) will give you the most up-to-date information about service and dealer locations.*

Attention, dealers: If we haven't included you, send in the name, address and telephone number of your store, along with a copy of Commodore's letter authorizing you as an official center, to RUN *editorial, 80 Pine St., Peterborough, NH 03458. We'll update the list in subsequent issues.*

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Charlotte, NC 28212
704-567-0900

Circuit City Service
3826 High Point Road
Greensboro, NC 27407
919-852-9111

Circuit City Service
7101 Glenwood Ave.
Raleigh, NC 27612
919-852-9111

Computer 2000
2432 Wycliff Road
Raleigh, NC 27607
919-781-2005

David Glaser
PO Box 252
Mineral Springs, NC 28108
704-843-2185

RCA Service Co.
5111 W. Market St.
Greensboro, NC 27409
919-292-9771

RCA Service Co.
3819 S. Tryon St.
Charlotte, NC 28210
704-525-5722

RCA Service Co.
6320-A Angus Drive
Raleigh, NC 27612
919-787-1963

Slayton Electronics
1318A Central Ave.
Charlotte, NC 28205
704-375-6600

Southern Photo Tech
2610 South Blvd.
Charlotte, NC 28209
704-523-0012

The PC Shop
1318A Central Ave.
Charlotte, NC 28205
704-375-6600

Triad Computers
3068 Trenwest Drive
Winston-Salem, NC 27103
919-765-0433

OHIO

Basic Computer
962 Great East Plaza
Niles, OH 44446
216-652-0056

Bexley Elec/TV
2733 E. Main St.
Columbus, OH 43209
614-235-0698

Big Bytes
1301 Boardman-Poland
Poland, OH 44514
216-758-0009

Burns Electronics
116 E. Market St.
Tiffin, OH 44883
419-447-8695

Cincinnati Computer
11711 Princeton Pike
Cincinnati, OH 45246
513-671-6440

Cinsoft
2235 Losantiville Ave.
Cincinnati, OH 45237
513-396-7638

Compucash Business Supplies
13369 Madison Ave.
Lakewood, OH 44107
216-226-3120

Computer Plus/Ohio
127 W. Wyandot Ave.
Upper Sandusky, OH 43351
419-294-5723

Computer Plus
1346 W. 4th St.
Mansfield, OH 44906
419-529-4222

Computer Services
2601 Sunset Blvd.
Steubenville, OH 43952
614-264-7541

Computer Site
14763 Pearl Road
Strongsville, OH 44136
216-572-3580

D&K Computer Sales/Service
Ohio Valley Mall, Rt. 610
St. Clairsville, OH 43950
614-264-7541

Dayprom Computer
3460 S. Dixie Highway
Dayton, OH 45439
513-299-8555

Digital Hardware Support
917 North Fountain Ave.
Springfield, OH 45504
513-322-8570

Earthrise Micro
1731 Brice Road
Reynoldsburg, OH 43068
614-868-1100

Earthrise Micro
562 W. Central
Delaware, OH 43015
614-363-1100

Ed-Com
120 W. Market St.
Celina, OH 45822
419-586-6523

Fairborn Computers
101 N. Broad St.
Fairborn, OH 45324
513-879-7402

Comtech
1750 Southgate Parkway
Cambridge, OH 43725
614-432-4259

George Saxtan Associates
1717 E. Perkins Ave.
Sandusky, OH 44870
419-625-8093

Grogg Business Machines
108 S. Market St.
Galion, OH 44833
419-468-7712

Home Elec Tech
16 Eagle St.
Madison, OH 44057
216-428-6161

Intra Corp.
2698 Billingsley Road
Worthington, OH 43085
614-764-8650

K&R Electronics
5920 South Ave.
Youngstown, OH 44512
216-758-6294

Lakes Consumer Electronics
3232 S. Main St.
Akron, OH 44319
216-644-3194

Marion Computer
1205 Delaware Ave.
Marion, OH 43302
614-382-2881

Nocoproe, Inc.
35101 Euclid Ave.
Willoughby, OH 44094
216-953-1535

Ohio Office Machines
124 Burkhart Ave.
Cincinnati, OH 45215
513-761-7121

Professional Microcare
1 E. Stewart St.
Dayton, OH 45409
513-223-6718

RCA Service Co.
1925 N. Ridge Road
Lorain, OH 44055
216-277-1231

RCA Service Co.
3896 Oakwood Ave.
Youngstown, OH 44515
216-792-1421

RCA Service Co.
4509 W. 16th St.
Cleveland, OH 44135
216-267-8800

RCA Service Co.
3979 Parkway Lane
Hilliard, OH 43026
614-771-0171

RCA Service Co.
1245 Munroe Falls Ave.
Cuyahoga Falls, OH 44221
216-923-4811

RCA Service Co.
50 Elmdale Road
Toledo, OH 43607
419-531-9951

RCA Service Co.
02107 Jergens Road
Dayton, OH 45404
513-233-5723

RCA Service Co.
20500 Miles Parkway
Warrensville Heights, OH 44128
216-587-5500

RCA Service Co.
6045 Winton Road
Cincinnati, OH 45232
513-542-5000

RCA Service Co.
2521 34th St. N.E., PO Box B
Canton, OH 44705
216-456-7316

RC Video
46739 Sidehill Road
East Liverpool, OH 43920
216-385-5672

Swallens, Inc.
3700 Red Bank Road
Cincinnati, OH 45227
513-527-6723

The Computer Store
116 7th South N.W.
North Canton, OH 44720
216-497-0299

Turner & Wilson, Inc.
214 W. National Drive
Newark, OH 43055
614-323-1213

Warner Electronics, Inc.
1240 Valley Belt Road
Cleveland, OH 44131
216-661-0304

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918-494-9701

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Tulsa, OK 74128
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1048 N. Douglas Blvd.
Midwest City, OK 73130
405-753-8064

Syntec Micro
1108 W. Stovall Road
Wilburton, OK 74578
918-465-5675

Wizards Electronics
2501 W. Memorial Road
Oklahoma City, OK 73134
405-751-0060

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3881 River Road N.
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503-393-5472

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86313 Franklin Blvd.
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503-726-8500

Computron Business Systems
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Electromatic, Inc.
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Portland, OR 97211
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Roseburg, OR 97470
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503-626-2221

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Eugene, OR 97402
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Portland, OR 97206
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503-773-8868

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Salem, OR 97303
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Basic Computer
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Basic Computers
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Downingtown, PA 19335
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Latrobe, PA 15650
412-539-2854

Edward Tech Group
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Pittsburgh, PA 15236
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Floppy Disk, Inc.
5224 Simpson Ferry Road
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717-697-6813

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1103 N. Front St.
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717-233-6200

Future Teck
W. Shore Plaza
Lemoyne, PA 17043
717-761-2439

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Harrisburg, PA 17111
717-564-1961

George L. Vogwill
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Allentown, PA 18103
215-432-6332

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Leslie Dresbold, Inc.
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412-421-2445

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Parkway Center Mall
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Century 3 Mall
West Mifflin, PA 15122
412-653-7878

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412-563-0330

Leslie Dresbold, Inc.
Monroeville Mall
Monroeville, PA 15146
412-371-6575

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412-681-0990

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604 Liberty Ave.
Pittsburgh, PA 15222
412-281-8320

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412-443-1871

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Greensburg, PA 15601
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717-347-6050

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RCA Service Co.
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215-672-6400

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Philadelphia, PA 19149
215-288-4700

Siskas Comp/Elec
1246 Horn Road
Windber, PA 15963
814-467-6827

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65th Infantry Ave.
Rio Piedras, PR 00929
809-760-0404

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168 Ave. F.D. Roosevelt
Hato Rey, PR 00918
809-754-7475

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BLC Sales/Service
881 Waterman Ave.
East Providence, RI 02914
401-434-3777

Elwin Appliance
55 Electronic Drive
Warwick, RI 02888
401-467-9300

Int. Computer Service
165 Dyerville Ave.
Johnston, RI 02919
401-273-1001

RCA Service Co.
6855 Waterman Ave.
East Providence, RI 02914
401-434-0872

Software Connection
101 W. Natick Road
Warwick, RI 02886
401-738-3430

Software Shack, Inc.
10 Cedar Swamp Road
Smithfield, RI 02917
401-231-3252

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Circuit City Service
6265 Rivers Ave.
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803-572-2461

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Mt. Pleasant, SC 29464
803-884-5828

Protronics TV
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Charleston, SC 29418
803-552-3960

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803-276-2713

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Charleston, SC 29418
803-797-6860

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DSB Computer Services, Inc.
Citizens Bldg., Suite 300
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605-225-6804

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Mitchell, SD 57301
605-996-5655

South Dakota Electronics
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Sioux Falls, SD 57103
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Watertown, SD 57201
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Circuit City Service
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Knoxville, TN 37919
615-694-0400

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Nashville, TN 37209
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Memphis, TN 38122
901-683-6079

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Nashville, TN 37203
615-244-0111

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Memphis, TN 38118
901-365-2495

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615-689-5647

RCA Service Co.
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Memphis, TN 38114
901-743-3262

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Dallas, TX 75236
214-337-4876

Consumer Computer Exchange
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Houston, TX 77024
713-932-6123

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Freeport, TX 77541
409-233-3153

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Waco, TX 76708
817-836-4670

Frank W. Heverly
2820-24 Walnut Lane
Dallas, TX 75229
214-350-4003

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506 S. Georgia
Amarillo, TX 79106
806-372-7300

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Dallas, TX 75229
214-241-7001

Nutcracker Electronics
1310 McDuffy #29
Houston, TX 77019
713-526-1577

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Forney, TX 75126
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RCA Service Co.
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RCA Service Co.
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409-744-7101

RCA Service Co.
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Beaumont, TX 77701
409-833-8639

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San Antonio, TX 78280
512-496-5701

RCA Service Co.
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Houston, TX 77099
713-933-9710

RCA Service Co.
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Ft. Worth, TX 76103
817-535-0861

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2755 Irving Blvd.
Dallas, TX 75107
214-631-8440

RCA Service Co.
510 Aldine Bender Road
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713-445-8588

RCA Service Co.
13620 Gamma Road
Dallas, TX 75240
214-233-3377

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San Antonio, TX 78217
512-654-1631

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127 Southbridge
San Antonio, TX 78216
512-340-2901

Total Electronics
600 N. Shepherd #102
Houston, TX 77007
713-497-7404

Vid Com
2370 6 N. Expressway
Brownsville, TX 78521
512-544-6441

Vidco Electronics
903 W. Cotton
Longview, TX 75601
214-757-4911

UTAH

Armadillo Brothers
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Ogden, UT 84403
801-621-3312

Armadillo Brothers
3330 S. State St.
Salt Lake City, UT 84115
801-484-2791

Computers Plus
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Midvale, UT 84047
801-566-3901

Computers Plus
5630 S. Redwood Road
Murray, UT 84123
801-968-3901

Electronic Professionals
7595 S. State
Midvale, UT 84047
801-562-2022

Micro Mania
4387 Harrison Blvd.
Ogden, UT 84403
801-479-0500

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Salt Lake City, UT 84119
801-972-1200

SW Educational
1552 W. 200 N.
Cedar City, UT 84720
801-586-9971

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1343 E. Carrie Drive
Fruit Heights, UT 84037
801-544-2098

Trisys
8121 S. Bueno Vista Drive
West Jordan, UT 84084
801-561-3278

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5740 Cooper City Drive
Salt Lake City, UT 84118
801-534-7507

Video Concepts
Crossroads Mall
Salt Lake City, UT 84114
801-363-1959

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Ray Supply Co.
150 Dorset St.
South Burlington, VT 05401
802-658-9375

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Action Electronics
5178 N. Main St.
Marion, VA 24354
703-783-6054

Appliance & Electronics
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Richmond, VA 23230
804-353-5508

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Hampton, VA 23666
804-838-3570

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Virginia Beach, VA 23462
804-499-0099

Circuit City Service
8401 Midlothian Turnpike
Richmond, VA 23235
804-320-8888

Circuit City Service
2040 Thalbro St.
Richmond, VA 23230
804-257-4321

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2840 Peters Creek Road
Roanoke, VA 24019
703-326-1891

L & Y Electronics
13670 Jefferson Davis Hwy.
Woodbridge, VA 22191
703-494-3444

Micro Marketing
5312 E. Virginia Beach Blvd.
Virginia Beach, VA 23462
804-490-8384

RCA Service Co.
3408 Azalea Garden Road
Norfolk, VA 23513
804-857-0626

RCA Service Co.
2205 Perl Road
Richmond, VA 23230
804-288-7241

RCA Service Co.
2813 Door Ave.
Fairfax, VA 22031
703-560-6000

Viewtronics Service
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Norfolk, VA 23518
804-588-5975

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Bits, Bytes & Nibbles
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Spokane, WA 99207
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Renton, WA 98055
206-226-3234

Butler's Mobile TV
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Federal Way, WA 98003
206-941-9096

Com-Soft
1831 W. Silver Lake Road
Everett, WA 98204
206-337-7715

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1730 Cont Place
Mt. Vernon, WA 98273
206-428-1840

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113 W. 3rd Ave.
Moses Lake, WA 98837
509-765-9751

Cosygn, Inc.
19219 W. Valley Highway
Kent, WA 98032
206-251-5070

D&D Service
15843 Pacific Highway S.
Seattle, WA 98168
206-242-9451

Erik's Place
14404 N.E. 31st K108
Bellevue, WA 98007
206-883-7404

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PO Box 217, 2614 Simpson Ave.
Hoquiam, WA 98550
206-532-3474

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Vancouver, WA 98662
206-892-8036

RCA Service Co.
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Tacoma, WA 98499
206-582-0733

RCA Service Co.
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Seattle, WA 98133
206-365-2100

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509-838-5270

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Camano, WA 98292
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Menomonee Falls, WI 53051
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Greendale, WI 53129
414-521-5597

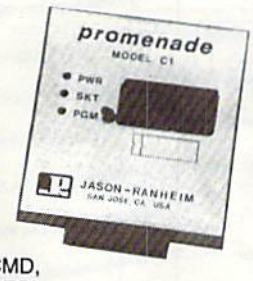
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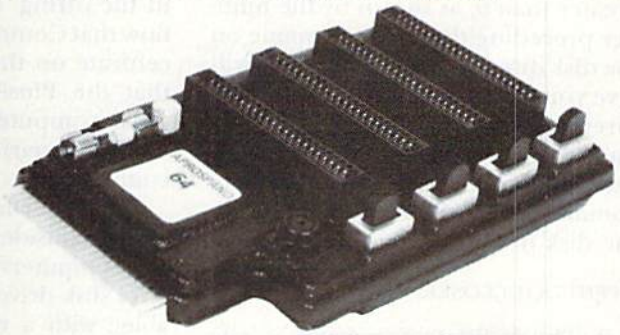
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About Bad Blocks...

I am responding to several comments that I have received from concerned readers about my article "Bad Blocks" in *RUN*'s June 1985 issue. Some readers were confused about two statements I made on page 67; the first involves scratching bad files, and the second is my warning against using the Validate command. Let me clarify things a bit.

1. It's usually safe to scratch a bad file on a disk (as indicated by a *PRG on a directory listing), *unless* the length of the bad file on disk is greater than 0, as shown by the number preceding the program name on the disk directory. Most bad saves will give you a file length of 0 on the disk directory (the BAM was not updated). Bad files indicated by *SEQ or *REL are best fixed by either the Validate command or the direct command to the disk drive:

```
OPEN15,8,15:CLOSE15
```

2. The Validate command is safe to use at all times except on disks containing random-access files and when you suspect that your disk drive may be in the process of going out of alignment and the disk you're validating contains only a few files or programs. "Safe & Fast Disk Checker," the program accompanying "Bad Blocks," can be used (with the write-protect notch covered) on your test/demo disk from Commodore to check for disk alignment. (See "Keep Your Disk Drive in Line," in the July issue of *RUN*, for the procedure to follow when realigning your drive.) your drive.)

Joe Shaughnessy
Jacksonville, FL

Plus/4 Perplexities

I would like to thank you for Margaret Morabito's excellent articles on the Plus/4 computer (December 1984, February and April 1985). I am very pleased with my Plus/4, but, when I purchased it, I thought it would receive wider acceptance. Nonetheless, I appreciate the acceptance it has received from *RUN*.

Do you know if Commodore plans to release a disk drive specifically for the Plus/4? Frankly, I have delayed purchasing a disk drive in hopes that something superior to the 1541 was in the offing. However, I really fear now that Commodore is going to concentrate on the C-128 and C-64 and that the Plus/4 is heading for the great computer burial ground with the TI, Aquarius and Timex/Sinclair computers.

Thus, perhaps we Plus/4 owners should consider the possible demise of our computers and purchase the new 1571 disk drive (if the price is reasonable), with a view toward eventually having to dump our essentially unsupported Plus/4 in favor of the C-128.

Thank you for the benefit of any information you can give me.

Matthew F. Dyer
Augusta, ME

There is no special disk drive for the Plus/4. If you intend to keep your Plus/4, you might want to get a double disk drive, like the MSD II. This would give you plenty of storage. Unless you seriously intend to dump your Plus/4 and buy a C-128 (and there's no need to do so), there's no sense in buying the 1571, as you can only use it in the 1541 mode.

The Plus/4 is a good computer with plenty of memory for running serious applications. You can get software that is mostly for small-business and home-accounting use from Commodore and Tri-Micro, and we will continue to cover the Plus/4 in RUN.

Editors

An Answer to Retirement

Who says you can't teach an old dog new tricks?

Several years ago, I retired from a post as an active newspaper editor. Four months ago, at age 73, I came home with a C-64 and Datassette. I connected the Datassette and an old Heathkit color television to the C-64. From that moment, I was hooked!

Since I had never laid a finger on a computer, I did not know a cursor from a sprite or a pixel from a byte. From keyboard lesson to error messages, I pored over the *User's Guide* and then through Commodore's *Introduction to Basic, Part I*, and the *Commodore 64 Programmer's Reference Guide*. I spent hours at the computer, Peeking and Poking, looping the loops, working mathematical problems, drawing sprites, punching in data and editing *without* a pencil. Everything began slowly to take on meaning.

Mistakes? Oh, yes! But I gradually began to catch on to programming. I found all kinds of surprises and unheard-of tips and shortcuts—like line-crunching, abbreviated commands and advice on sounds and colors. I experimented happily with *RUN*'s Magic tricks. I programmed all over the place, taking my ideas of games, drawings and utilities and building them up with Basic rules. What a thrill!

Bringing home a personal computer starts the buildup of fabulous

new information in the user's memory, just the opposite to typing to the screen NEW, which erases the computer's current memory.

Of all the positive reasons a senior citizen might buy a computer, the greatest is mental enrichment—unless it's having fun!

W. Stuart Sewell
Asheville, NC

Datafile Delight

I use Mike Konshak's Datafile programs quite frequently (*RUN*, November and December 1984, July 1985). They are far superior to type-in database programs I've seen in other magazines. I buy or subscribe to almost all periodicals pertaining to the C-64. I use the C-64 daily for business applications and can attest to its durability, performance and economy. Programs like Datafile only enhance the overall value of this machine.

I own Data Manager 2 by Timeworks, and I find that Datafile is much easier and more flexible than Data Manager 2. I don't have extensive knowledge of database usage, but most people don't—until they begin using a database.

I showed Datafile to some people who operate a computer store and handle several computers, and they were most impressed with it. They couldn't believe it was available as a type-in program from a magazine.

Carl A. Wickett
Decatur, MI

Chatterbox

I would like to congratulate you on your article, "Chatterbox" (July 1984). I recently built the voice synthesizer with allophone chip, and now my C-64 is chatting happily away. I am rather proud of this, as I am only 13 years old. Keep up the good work!

Roy Duncan
Queensland, Australia

Getting Behind Commodore

As an avid Commodore enthusiast, I, along with many of my peers, read with interest your publisher's commentary in the June RUNning Ruminations (p. 6). As we get more and more enthusiastic and supportive of our machines, we are glad to see *one* Commodore-specific magazine offering some hope for the future of the end user. I have been using Commodore microcomputers since early 1978. I have also worked with several other "higher" brands, not unlike the IBM PC, Apple III or the Mac, along with Wang word processors.

Each time I have encountered a professional programmer who works with the above machines, I find they have denigrated the Commodore line of microcomputers. In addition to this verbal attack, we constantly find the media poking fun at the line, simply because it's cheaper than the competition.

Of course, cheaper does not necessarily mean it is less of a machine. The Commodore 64 is a case in point. We have all envied the ability of this computer to produce the best computer-generated sound in the industry, unmatched even by the giant, IBM. Sure there are faults to be found, but, on the whole, my C-64 offers more features and overall value than my neighbor's IBM PC, which costs more.

We all hope the post-Tramiel Commodore, which includes the exciting, upcoming Amiga (previously known as Lorraine) and the upwardly mobile 128, will be stronger than ever. Simply, in my opinion, even Jack Tramiel cannot match the upcoming aggressiveness of Commodore.

All that we users and enthusiasts need is some supportive backing, like that provided in the June 1985 issue of *RUN*. We thank you for your positive support of Commodore microcomputers and hope for an even better picture of the future.

Mark Valera
Rego Park, NY

Another Alignment Program

In your recent review of the 1541 Physical Exam program (June 1985), the opening paragraph states, "Until now, there was no sure way for you to detect disk-drive misalignment in its early stages, let alone correct it when it occurred. You had to wait for disaster to strike and then take your drive to a service center..."

Clearly, the claim is made that this is the first program that allows you to detect alignment problems, and the *only* one. This statement will come as a great surprise to CSM's thousands and thousands of satisfied customers worldwide, since we produce such a program—The 1541 Disk Drive Alignment Program. With regular use of our program, you can clearly detect any change in the quality of a drive's alignment. Not only do we produce this program currently, we have been producing it for over a year!

Our program not only detects drive misalignment, it also includes comprehensive instructions for correcting it. Procedures are provided for adjusting rotational speed, radial alignment and end-stop position. Diagrams illustrate the adjustment points on different drive models. A special section is given on troubleshooting unusual situations, including problems with the drive belt and pressure pad. Directions are included for a permanent FIX that can eliminate future alignment problems. We also staff a technical support line for personal help in case of difficulty. Thank you for this opportunity to correct the misleading statements made in your review.

Thomas N. Simstad
President
CSM Software, Inc.

A Price Reduction

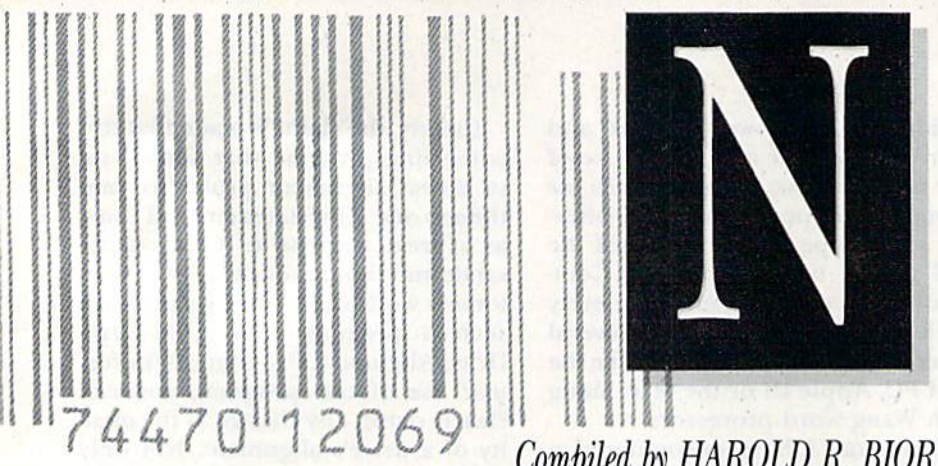
In your July 1985 issue, you published a review article, "Database Management Programs for the C-64," by independent reviewer Bob Guerra. It appeared on pp. 68–75.

On p. 74, you included a few paragraphs of review information on our popular Database Manager program.

We would like to point out that the suggested list price of the Database Manager program was recently lowered from $99.95 to $49.95.

Thank you for your continuing help in the process of publicizing quality programs for the Commodore computers.

Michael R. Reinhold
Director of Marketing
Mirage Concepts, Inc.



Compiled by HAROLD R. BJORNSEN

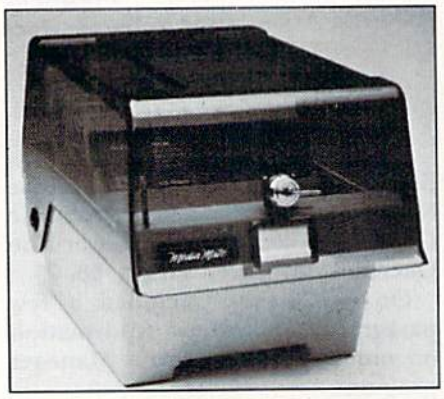
QUick-thINKing

Quink is a thinking game for the C-64 whose object is to eliminate, before your time is up, those entries among eight that do not share a common association.

Quink comprises six major categories: Fame, Pop Culture, Imagination, Science and Nature, General Knowledge and Mixed Bag, with over 150 subjects and 4700 entries. For one or two players or teams.

Available on disk for $34.95. CBS Software, One Fawcett Place, Greenwich, CT 06836.

Check Reader Service number 400.



Media Mate 5 Plus

Amaray International Corporation (14935 N.E. 95th St., Redmond, WA 98052) introduces Media Mate 5 Plus, a lockable filing and storage system that holds up to 50 5¼-inch disks.

The 5 Plus can be stacked for storage and transported without scattering disks. Available for $20.95.

Check Reader Service number 401.

Wally's Word Works

Wally's Word Works is a software package that helps students identify the parts of speech by showing that the function of a word changes as its role in a sentence changes.

Wally's Word Works is available for the C-64 for the elementary, junior high and senior high levels.

The $65 price includes a teacher's disk with backup, a teacher's guide and one student disk. Sunburst Communications, Inc., 39 Washington Ave., Pleasantville, NY 10570.

Check Reader Service number 402.

Calling All Hams

Winner's Edge Software (2003 Sarazen Place, Reston, VA 22091) has released The Contester, a software package for the amateur radio contest operator.

The Contester manages all the paperwork involved in amateur radio contests and logs and keeps track of up to 3000 contacts.

Available on disk for the C-64 at $39.95.

Check Reader Service number 403.

Tailor-made BBS

Telemessage (Tailored Solutions, PO Box 183, Washington, DC 20044) is a bulletin-board system software package for the C-64 that is compatible with most auto-answer modems.

The package is an automatic message entry/retrieval system consisting of five support programs and an online system. You can tailor the package to meet your own needs. Available on disk for $79.50.

Check Reader Service number 404.

Reading Is Fun

Scholastic Software (730 Broadway, New York, NY 10003) has released Success with Reading, an educational software and book series for grades 3–6, to help students and teachers reinforce reading, spelling and syntactic concepts.

Available for the C-64, the core package (which includes a program disk and teacher's handbook) plus one grade-specific package is $79.95. Additional grade-specific packages are $49.95 each, and the complete program, containing material for all four grades, is $179.

Check Reader Service number 405.

Countdown to Shutdown

In Countdown to Shutdown, a software game, you must wend your way through a huge 2000-room power plant to repair the power core.

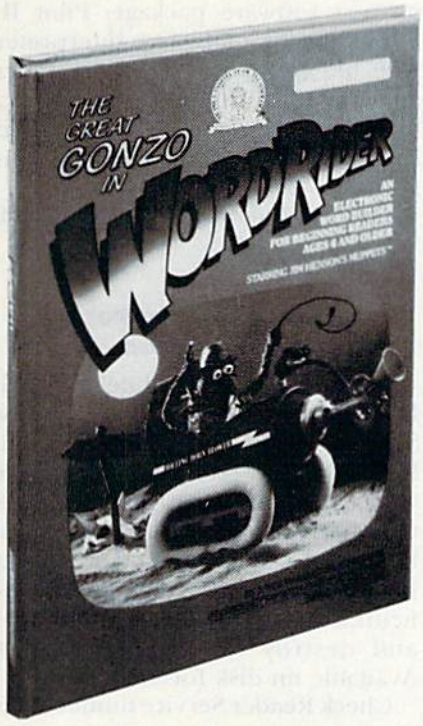
The strategy game is available on disk for the C-64 and retails for $29.95. Activision, Inc., 2350 Bayshore Frontage Road, Mountain View, CA 94043.

Check Reader Service number 406.

Help Gonzo Rescue Camilla

The Great Gonzo in WordRider is a strategy-adventure game for children ages six and up that helps develop their reading, vocabulary and word-usage skills.

The object of the program is to create vehicles by combining adjec-



tives and nouns to help Gonzo rescue his beloved bird, Camilla the Chicken.

Based on characters from the Muppet Show television series, The Great Gonzo in WordRider is available on disk for the C-64 and retails for $29.95. Simon & Schuster Electronic Publishing Group, 1230 Avenue of the Americas, New York, NY 10020.

Check Reader Service number 407.

For Math Afficionados

The Practical Applications Mathematics system (P.A.M.), a program for the C-64, determines the dimensions of a variety of geometric shapes on a high-resolution screen.

P.A.M. also computes statistical functions, including linear regression and interpolation.

Graphics and calculation results can be printed out. Available on tape or disk for $24.89. MicroEnergy Systems, PO Box 5291, High Point, NC 27262.

Check Reader Service number 408.

Reset Switch

Master Software (6 Hillery Court, Randallstown, MD 21133) has released Reset Master, a system reset switch for the C-64 and VIC-20.

Reset Master resets your computer without your having to turn off the power and restores control of the computer in case of a lock-up. It also can operate two printers concurrently. Retail price is $24.95.

Check Reader Service number 409.

Medical Center

DMC Software Co. (Rt. 1, Box 364, Clinton, LA 70722) has released EMed, an electronic medical database for the C-64.

EMed contains data on over 460 diseases and 325 symptoms, and it features a diagnostics program that lists diseases from symptoms you select. Available on disk for $29.95.

Check Reader Service number 410.

An Education in Finance

Lifeplan is a utility program for middle-income families to help them manage their personal and family finances. The program analyzes results and monitors progress while instructing the user in controlling his own money.

Lifeplan is available on disk for the C-64 for $99.95 from Lifeware, 2318 Second Ave., Seattle, WA 98121.

Check Reader Service number 411.

Strike Up the Band

MasterSoft (PO Box 1027, Bend, OR 97709) has released two more programs in its Mastery in Music series for the C-64. Trumpet Master and Clarinet Master offer an alternative to drills, with random music personalized by your choice of key signature, time signature, note type and note range. You can change tempos and play along with access to music facts and fingerings.

Each program is available on disk for $49.95.

Check Reader Service number 412.

Turn on Your Mind

Mentor Learning Systems (1601 Civic Center Drive, Santa Clara, CA 95050) has released Conceptor, an educational software package for the C-64.

Conceptor utilizes focus recognition to expand your capacity to perceive and classify information. Available on disk for $49.95.

Check Reader Service number 413.

Typing Arcade

Typing, a new program released by Gamco Industries, Inc., for the C-64, employs an arcade-style reward game to motivate students to practice their typing lessons.

Available on disk for $39.95 from Gamco Industries, Inc., Box 1911, Big Spring, TX 79721.

Check Reader Service number 414.



Static Buster

Static Buster (Lamb's Information Systems, Inc., 301 N. Main St., Pueblo, CO 81003) consists of two foam pads that connect to the CRT face and the keyboard to control static. Available for $49.95.

Check Reader Service number 415.



Digi-Cam

Cardco (300 S. Topeka, Wichita, KS 67202) announces Digi-Cam, a digitizer that converts still video images to digital configurations and produces a 320- by 200-dot screen image in five gray scales. Available for the C-64 at the suggested retail price of $250.

Check Reader Service number 416.

Kidbits

Available together on one disk for the C-64 are Kidbit Software's ed-

ucation programs entitled Same/Not Same Game and Alpha-Bee Sequence.

In Same/Not Same Game, your child takes a spaceship to the stars by choosing which shape, color, direction or letter in a group is different from the rest.

In Alpha-Bee Sequence, your child helps a bee with the letters of the alphabet by singing the Alphabet Song along with him.

For children ages 3–7, the package retails for $26.95. Kidbit Software, 7001 Sunkist Drive, Oakland, CA 94605.

Check Reader Service number 417.

For *RUN*'s Runners

Maximizer: Personal Running Coach, made up of a set of three programs for serious runners, compares your training progress to specific inputted goals.

Each program (Base Training, Maintenance/Race Preparation and Race Peaking) helps prescribe your workout guidelines based on your personal physiological information.

Available on three disks for the C-64 at $79.95 per set from MII Fitness Software, RD 1, Box 241, Madison, NY 13402.

Check Reader Service number 418.

For Kids Only

KIDware (PO Box 9762, Moscow, ID 83843) has released 60 new educational software packages for children ages 1–16. Each program is available on cassette ($9.95) and disk ($11.95) for the C-64.

Check Reader Service number 419.

Print Shop II

Broderbund Software (17 Paul Drive, San Rafael, CA 94903) releases The Print Shop Graphics Library, Disk Two, adding 120 new graphics images to its Print Shop series. Categories include jobs, hobbies, people, places, travel and health.

The Print Shop lets you write, design and print your own greeting cards, letterheads, banners and signs with no knowledge of computer graphics or graphics design.

The suggested retail price is $24.95 for the C-64 version.

Check Reader Service number 421.



Supershipper64

Progressive Peripherals and Software (2186 South Holly, Denver, CO 80222) has released Supershipper64, an invoice and billing program for the C-64. Supershipper64 can store and print out customer account lists, product and price lists, and print invoices, labels and C.O.D. tags. Available on disk for $99.95.

Check Reader Service number 422.

Weather Sensor/ Environment Controller

Sensatrol, a sensor/controller interface for environmental sensing and energy control, allows you to measure weather conditions, control thermostats and monitor environmental conditions. A special serial-output feature makes it possible to connect over 200 Sensatrols with a common four-wire connection on one computer port.

Available on disk for the C-64 with an RS-232C serial interface for $385 from Data World Products, Box 33, Francestown, NH 03043.

Check Reader Service number 423.

Pilot II

EasyWare (PO Box 32, Hamilton, MT 59840) has released, for the C-64, its first software package, Pilot II. Pilot II is a Pilot-language interpreter with high-resolution turtle graphics and full sprite support, including a built-in sprite editor. A registered copy with full telephone support is available on disk for $40.

Check Reader Service number 424.

Commander Stryker vs The Dragon

Beach Head II, the sequel to Beach Head, has been released by Access Software (925 East 900 South, Salt Lake City, UT 84105). It is compatible with the C-64. Beach Head II picks up where the original Beach Head left off. Now, Commander Stryker must liberate the Allied prisoners, neutralize The Dragon and his forces and destroy their fortifications. Available on disk for $39.95.

Check Reader Service number 425.



Squeaky Clean

The Texwipe Co. (PO Box 575, Upper Saddle River, NJ 07458) has released the Read/Write Microcomputer Cleaning Kit, which includes a floppy disk head cleaner and metered spray, Static Stopper, Static Stopper cloth, 30 Datawipes, 24 CRT terminal cleaning pads and ten office equipment cleaning pads. The suggested retail price is $34.95.

Check Reader Service number 426.

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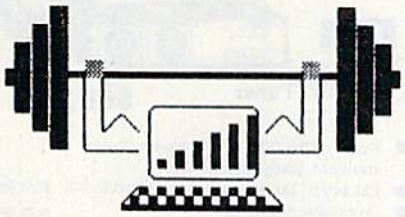
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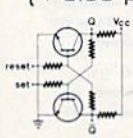
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How to type listings from *RUN*

For directions on how to use RUN*'s new checksum program, see the article by the program's author, James Borden, on p. 78 of this issue. The directions will be incorporated in these typing instructions in future issues.*

Typing in listings can be difficult enough without having to worry about strange graphics characters, charts or tables. That's why we decided to make it easy to enter listings from *RUN* by translating everything we thought might be confusing in any program.

When you see something between the curly brackets, all you have to do is press the keys indicated. For example:

{SHIFT L}—means hold down the shift key and press the L key at the same time.
{COMD J}—means hold down the Commodore key (it is on the lower left side of the keyboard) and press the J key at the same time.
{SHIFT CLR}—hold down the shift key and press the CLR/HOME key.
{HOME}—press the CLR/HOME key without shifting.
{CTRL 6}—hold down the control key and press the 6 key.
{FUNCT 2}—function 2 (in this case, you hold down the shift key and press the function 1 key).
{CRSR UP}{CRSR DN}{CRSR LF}{CRSR RT}—these are the four cursor directions.
{UP ARROW}—means the arrow key (the one with the pi sign under it).
{LB.}—the British pound sign (£).
{PI}—the pi sign key (π); (shift and press the up arrow key).

Our translating program does not designate single spaces between characters. Within quotations, these spaces are often critical to the screen display. Be sure to read the listings closely and include these single spaces as you type in your program.

In some instances, when a large number of characters or spaces are repeated in a listing, we will represent them this way: {22 spaces} or {17 CRSR LFs}.

Print vs Print#

RUN readers should be aware of difficulties that may arise when entering listings that contain the PRINT and PRINT# commands.

These two commands may look very similar, but they are different. If, for example, you use a question mark (?) to abbreviate PRINT in a line such as 10 PRINT#4,A$, then you're telling the Commodore computer that you're trying to print the variable #4, which is not a legal variable name.

The command PRINT#4 actually means "print to file number 4." You can abbreviate PRINT# by hitting the P key and the shift and R keys at the same time and then entering the file number. But *do not* abbreviate PRINT# with a question mark.

If you think of PRINT as one command and PRINT# as an entirely different command, then you should have no problems.

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October

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Screen Dump Plus—With one program, you'll be able to print out both high- and low-resolution graphics displays.

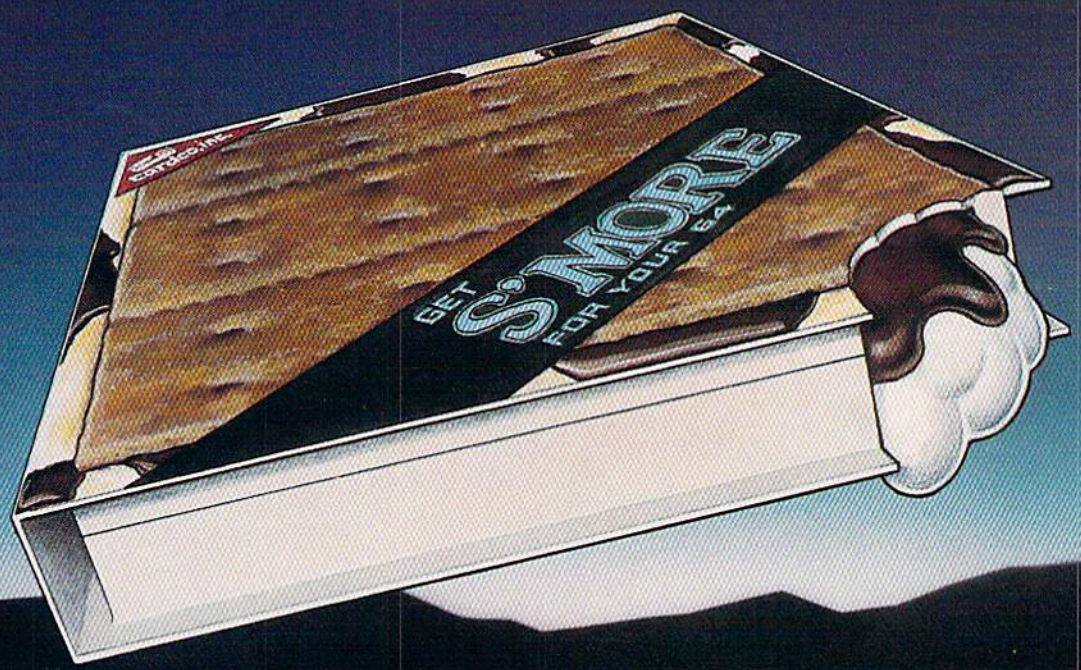
Video Monitors for Your C-128—Thinking of buying a C-128? Well, you needn't incur the expense of a new monitor. You can still use your 1702, and our technical manager, Margaret Morabito, explains how and why.

CP/M and the C-128—Find out what CP/M is all about and how the C-128 opens up a whole new world of CP/M software for Commodore users.

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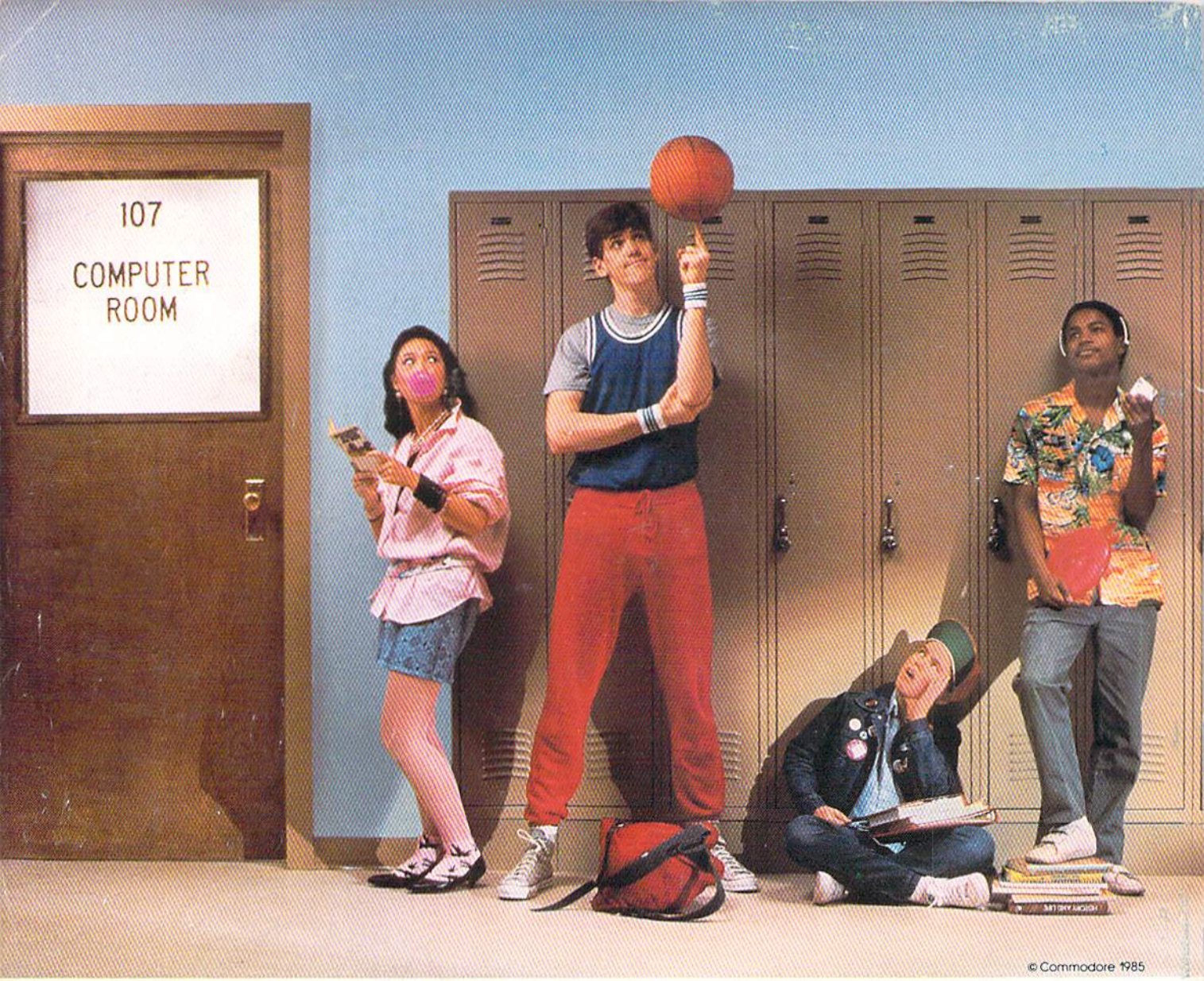
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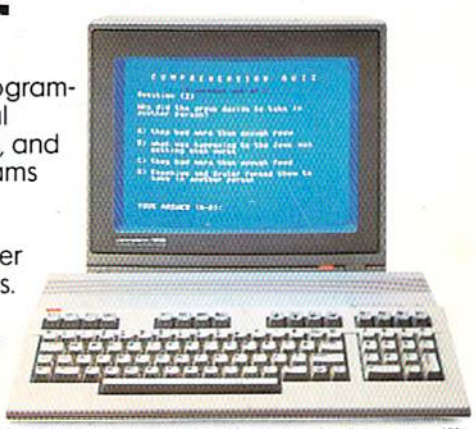
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