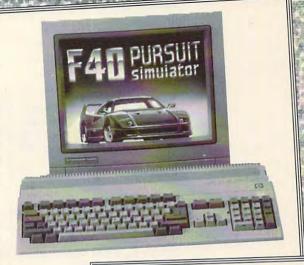
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#### Cursor SYS for 128

SYS 52591 will turn on a cursor on the 128 in 80-column mode. But what is the SYS number to release the cursor? ROBERT NELLIST BROCKPORT, NY

A SYS to address 52591 (\$CD6F) will turn the cursor on in either 40- or 80-column display mode. To disable the cursor in either mode, enter SYS 52639 (\$CD9F).

If you do any programming in 64 mode, you might be interested in reading Randy Thompson's "Programmer's Page" this month. His column contains a handy reference table for 64 programmers that lists dozens of interesting and unusual SYS calls, POKEs, and WAIT commands.

Most of these items were submitted by our readers. We encourage—and pay for—programming tips used on the "Programmer's Page."

Sports Card Update

I have just started collecting trading cards, so Kevin Davis's Sports Card Collector (November 1991) is a blessing. One thing that I felt was missing was an indication of when you had last updated the prices. So I added the following to the program, and it works great.

195 PRINT"{12 SPACES}UPDATE: ";DA\$ 390 INPUT#8, YT: INPUT#8, DA\$: INPUT#8.GC 615 INPUT" (8) ENTER DATE: MO. DA. YR.{wht}";DA\$ 1240 PRINT#8, YT: PRINT#8, DA\$: PRINT#8.GC

DOUGLAS JEFFERY TELKWA, BC CANADA

**Writing Games** 

I am writing a game on my 64 in BASIC. It's getting a little complicated, and I'm beginning to think that maybe I

should be writing it in machine language. How can I have a sound track running, sprites moving, and the computer awaiting input all at the same time?

BRYAN PEASE LIVERPOOL, NY

Computer games may seem to do many things at once, but they're actually doing only one thing at a time. Computers follow instructions sequentially. A system that does several different things at once is possible, but you would need more than one computer or microprocessor (each operating sequentially). To give your program the appearance of simultaneous action. you need to plan. Separate the actions into subroutines. IF-THEN can decide whether or not you want to gosub to the appropriate routine. It might help to write, in plain English, the game conditions and their consequences.

For example, if the fire button is pressed, then launch missile and set missile flag. If the joystick moves, then move ship sprite. If one second has passed, then play another note of the song. If the missile flag is set, then move missile sprite again. Repeat the above loop.

First, you check for the joystick button. If it's pressed, then gosub to the appropriate routine. If it's not, forget about launching the missile until the next time through the loop. Once you've launched the missile, you want it to continue moving, which is the reason for the missile flag. Whether or not the button was down, you next peek the joystick to see if the player wants to move and update the ship's position. Third, you check the jiffy clock by reading variable TI or TI\$ to see how much time has gone by. If a second (or whatever time period you've chosen) has passed, play the next note of the song.

Next, move the missile sprite if the flag is set, and go back. The program loops around, checking the joystick twice, checking the time, checking a variable, and taking any necessary action.

The computer works quickly, so individual actions seem to happen simultaneously.

To convert the above outline into a playable game, you'd need a few more subroutines. One would check the collision register in case the missile has hit something. Another would erase the sprite and reset the flag as soon as the missile has reached the top of the screen. And, of course, you'd have to translate the outline into BASIC code.

There's another technique that's even closer to simultaneous action, but it requires from an intermediate to an advanced knowledge of machine language. Sixty times a second the computer stops what it's doing and takes some time to redraw the image on the screen. The main program is being constantly interrupted. Using a wedge, you can divert the interrupt to your own machine language program, which could play music, move sprites, or whatever you choose. Such interruptdriven routines are sometimes difficult to implement, but they can be very effective.

Do you have a question or problem? Have you discovered something that could help other 64/128 users? Do you have a comment about something you've read in Gazette? We want to hear from you. Send your questions and comments to Gazette Feedback, 324 West Wendover Avenue, Suite 200, Greensboro. North Carolina 27408.

An update to a sports card collection program and tips about writing your own game programs



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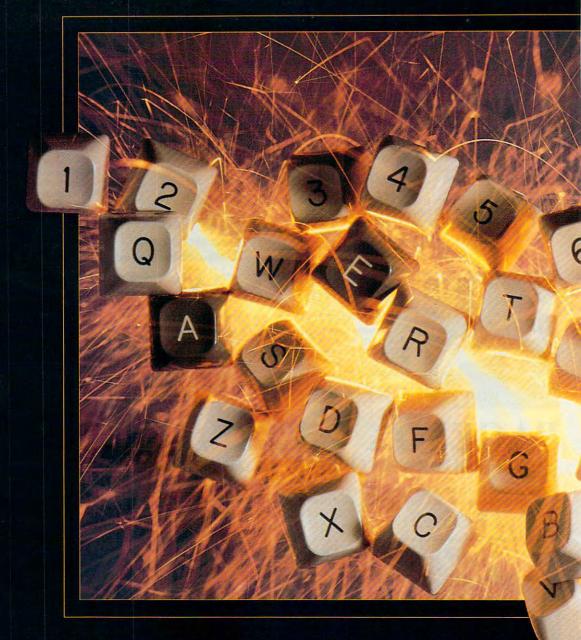
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## RELATIVELY SIMPLE

PROGRAMMERS
OFTEN SHY AWAY FROM
RELATIVE FILES, BUT
MAYBE IT'S TIME TO TAKE
ANOTHER LOOK
AT THIS ALTERNATE METHOD
OF DATA STORAGE.

BY JAYSON JOHNSON

Relative files are the black sheep of the data storage family. Programmers may try them once, have a few problems, and then give up on them. Then they spread the word to their friends to stay away from relative files. The reputation spreads. Unlike sequential files, relative files get no respect, but maybe it's time for a change.

Relative files do have good points and advantages. For one thing, they offer far more speed and efficiency than other methods of data storage. Since they can access data without reading through every file that precedes the desired information, relative files offer almost random access. If you have a large sequential file, you must first load the entire file into the computer's memory for processing. Then to retrieve data, you may have to read every file before you find the information you want. With sequential files, if you want a



piece of information that's stored in record number 100, you'll have to plow through records 1–99 first.

Suppose you have a CD collection of 500 titles and you want to catalogue it on index cards. If you put the titles in alphabetical order and read them as a sequential file reads data, you'd have to flip through the whole stack before you came to anything by ZZ Top or Pia Zadora.

With relative files, you can go directly to the data you want and read only that data. Just as with index cards, you can home in on the information you want without starting from the beginning and flipping sequentially through every file.

Since a relative file program uses only enough memory to read desired data, very little computer memory is actually used at one time. A small program can access 163K of information that could be stored on a single-sided disk.

#### Follow the Rules

Creating and using relative files is fairly easy, providing you follow a few simple rules. First, let's get some terminology straight. With relative files, information is stored in records, and each record contains various fields. In the following example, we'll create a mailing list. This whole list is our file. Each person on our list will be a record, and the various pieces of data about each person will be our fields.

For example, each record on our list will contain a person's first and last names, street address or post office box number, city, state, ZIP or postal code, and telephone number. These are the fields we'll set up for each record. We'll begin by calculating the total size of each record. This is done by adding the number of characters in each field. With our mailing list, we'll estimate how many characters each field should contain.

Field#	Field name	Number of Characters
1	Last name	15
2	First name	15
3	Address1	20
4	Address2	20
5	Address3	20
6	State	10
7	Zip Code	09
8	Phone #	12
Total		121

The record size for this file would be 121. Since the PRINT# statement used with relative files adds a carriage return to the end of each string, you should add one extra character to each field. So make it 129. If you try to write 15 characters plus a CHR\$(13) (carriage return) to a record set up for 15, you'd get an ERROR 51, OVER-FLOW IN RECORD.

DOS uses a single ASCII character to represent the record length. This means that the largest single record could be 254 characters. This is very important to remember. If you want more information stored in each record, you'll have to split them in two. For example, a 500-character record could be split into two 250-character records. You could use odd and even numbers to identify each data pair.

The largest number of records you can have is 65,535, but you'll never use this many because of space limitations on a floppy disk. A freshly formatted disk should show 644 blocks free. Blocks, or sectors, are the areas on a disk that can hold up to 256 characters of information. DOS uses 2 of these characters, so that leaves 254 bytes available for data.

Relative files use side sectors as an index to keep track of which sectors contain data. Each side sector has room for 120 two-block pointers that let DOS quickly locate the various blocks assigned to the file.

As many as six side sectors can be assigned to a file since each can deal with 120 disk sectors (not records) for a total of 720, more than the number of blocks on a disk. Filling a 664-block disk would use 6 blocks for side sectors, leaving 658 blocks for data. Each block can hold 254 characters, giving you 167,132 characters in the largest possible relative file. You can split this up any way that is convenient for your data. You could have 1671 records of 100 characters each or 658 records of 254 characters each.

#### Create a File

We have to create a file before records can be stored or read. This is done by opening a data channel with the desired filename and record length. You should note that DOS won't let you create relative files with record lengths of 42, 58, or 63. These numbers represent ASCII values that have special meaning to DOS. The format for creating a relative file is as follows.

#### OPEN file#, device#, channel#, "filename,L," + CHR\$(record length)

Let's start writing a program and call our file MAILLIST. We previously counted the number of characters we'd need in each record and decided on 129. Type in the following OPEN command, but don't run the program until we complete it.

#### 1000 REM OPEN MAILLIST FILE 1005 OPEN 1,8,2,"MAILLIST,L,"+CHR\$(129)

Remember not to run it yet. It's now possible for us to put information into the file. In DOS, there's no command to check the number of records in a relative file; however, it's possible to store this number manually within the first record. Let's do this by positioning the record pointer to the first record and storing the number 1. To do this, we must open the command channel.

#### 1010 OPEN 15,8,15

The POSITION command for record 1, position 1 is

### 1015 PRINT#15,"P"+ CHR\$(2) + CHR\$(1) + CHR\$(0) + CHR\$(1)

The P is our pointer, and it tells the drive to look for a certain record. In CHR\$(2) above, 2 is the channel we opened when we created the file in line 1005 (OPEN1,8,2,). Next, put the number 1 into the record, because all we have now is one record in our file.

#### 1020 PRINT#1,1

Print to the file number we assigned when we opened the file. (Remember OPEN 1,8,2.) Then, close the file and the command channel, and the file is ready to use.

#### 1030 CLOSE1:CLOSE15

Run the program now, and a file called "MAILLIST" will be created and placed in the disk's directory.

#### Writing and Reading

To read from or write to any record in our file, we open two channels, the DOS command channel and a file channel. Now we can position the record pointer to any record and field in the

file with the DOS POSITION command.

PRINT#15,"P" + CHR\$(channel number) + CHR\$(rec# lo) + CHR\$(rec# hi) + CHR\$(position within record)

Notice that in the above line there are two characters that represent the record number (rec# lo and rec# hi). The formula for calculating these two numbers is as follows.

#### RECORD # = REC HI \* 256 + REC LO

The record number can also be determined in other ways.

REC HI = INT(RECORD #/256)
REC LO = RECORD # - REC HI\*256

Translated, the command sequence would be as follows. (You don't have to

### TIPS ON USING RELATIVE FILES

Relative files are good ways to store data for quick and easy access, but many programmers avoid using them. Here are a few things to remember to avoid problems.

- Always initialize the disk drive at the beginning of your program to reset all drive channels.
- Always set the file pointer to the first byte in a record. The last parameter in the P command should be CHR\$(1).
- Never write an empty string to the disk. This will cause the disk drive to lock in a continuous loop.
- Never leave a file open after entering or editing data. Be sure to open, read/ write, and close the file in the same command sequence.

If you attempt to create a file that's too large for the space remaining on your disk, you'll get ERROR 52, FILE TOO LARGE. If you plan to store a lot of data, it's a good idea to devote a whole disk to a relative file.

Here's a short BASIC program to determine the maximum number of records you can have on a disk. To use the program, you must know how many free blocks remain on your disk and the total number of characters allotted for each record.

- 10 INPUT"NUMBER OF FREE BLOCKS ON DISK";FB
- 20 INPUT"TOTAL CHARACTERS IN RECORD";RL: IF RL<1 OR RL>254 THEN 20
- 30 IF RL=42 OR RL=58 OR RL=63 THEN PRINT"DO NOT USE";RL; "CHARACTERS": GOTO 20
- 40 SS%=((FB/120)+.99): BA=FB-SS% 50 RP=(INT(BA\*254/RL): IF RP465536 THEN
- 50 RP=(INT(BA\*254/RL): IF RP465536 THEN RP=65535
- 60 PRINT"THERE'S SPACE FOR"; RP; "RECORDS"

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enter NEW before typing this next section. It and the remainder of the code are meant to be added to the previous program lines.)

10 OPEN15,8,15

15 OPEN1,8,2,"MAILLIST": REM WE ARE OPENING, NOT CREATING THE FILE

40 R = 1: P = 1: REM RECORD NUMBER 1
POSITION 1

45 GOSUB 500

90 CLOSE1: CLOSE15: END

500 REM POSITION RECORD POINTER

510 RC = R + 1: REM ADD 1 TO RECORD (REC1 IS ALREADY USED TO HOLD FILE LENGTH)

520 RH% = RC/256: RL = RC-RH% \* 256: REM TWO-BYTE ADDRESS; RH% IS AN INTEGER

530 PRINT#15,"P" + CHR\$(2) + CHR\$(RL) + CHR\$(RH%) + CHR\$(P)

540 RETURN

999 END

Don't run the program yet.

#### **Record Contents**

Each record is actually a string of information in itself. To read each field separately, we must calculate where it begins within the record. Here are the record sizes we established earlier. We can use these figures to determine

where to look for each field.

Last name	1-15	
	1-15	
First name	16-30	
Address1	31-50	
Address2	51-70	
Address3	71-90	
State	91-100	
Zip Code	101-109	
Phone #	110-121	

Now let's make a list of pointers for each field.

5000 DATA 1, LNAME, 16, FNAME, 31, AD1, 51, AD2, 71, AD3, 91, STATE, 101, ZIP, 110, PHNO

As you can see, this translates into Last name at position 1, First name at position 16, Address1 at position 31, and so on.

#### **Writing Data**

Let's enter some information into a sample record. As we do, we'll write over line 45 in the earlier subroutine.

35 REM STORE RECORD

45 F\$(1)="JOHN": F\$(2)="DOE"

50 F\$(3)="15 HOLLYWOOD AVENUE"

55 F\$(4)="(SPACE)"

60 F\$(5)="HOLLYWOOD"

65 F\$(6)="CALIF."

70 F\$(7)="90135"

75 F\$(8)="555-964-6652"

80 RESTORE: REM RESET DATA POINTER 85 FORLP=1T08: READP,X\$: GOSUB500:

PRINT#1, F\$(LP): NEXTLP

When you have this final block of code entered, you may run the program typed in so far. You may also want to save it to disk.

#### Reading Data

Reading information is just the opposite. You set the pointer and use IN-PUT# to read the information instead of PRINT#, which is used to write it.

20 GOTO100

100 REM READ RECORD

110 R=1: REM RECORD 1

115 RESTORE: RESET BASIC DATA POINTER

120 FORLP=1TO8: READP,X\$: GOSUB500:

INPUT#1,F\$(LP): NEXTLP 125 CLOSE1: CLOSE15

130 PRINT"LAST NAME: ";F\$(1)

135 PRINT"FIRST NAME: ";F\$(2)

140 PRINT"ADDRESS: "

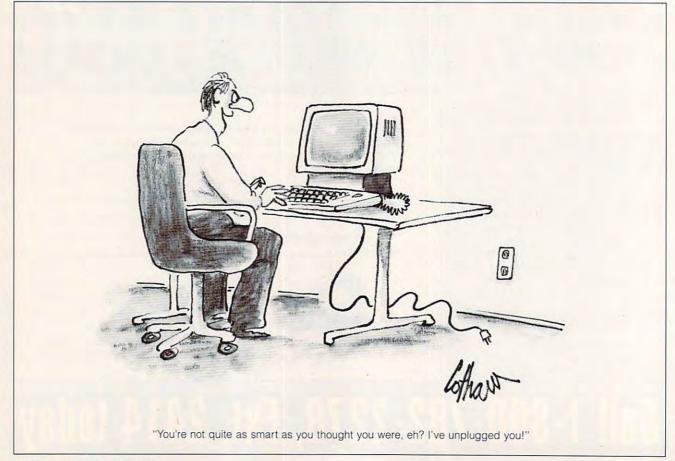
145 PRINTF\$(3)

150 PRINTF\$(4)

155 PRINTF\$(5);", ";F\$(6),F\$(7)

160 PRINT"PHONE#: ";F\$(8)

175 FNI



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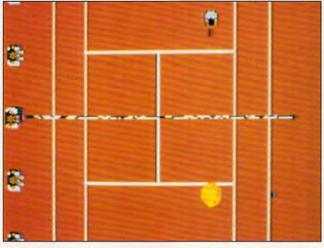
Perhaps you don't feel ready for world tournament play just yet. If you just want to compete against a few of your friends, select tournament play. Once again, each player is assigned racket weight and tension. You also select the surface type and color that you want to play on. Court types vary in difficulty since the ball may move faster or bounce differently on certain surfaces. For example, the ball will move faster on an asphalt or a PVC court than it will on clay.

Let's say that you haven't played for a while and are a little rusty. If you feel like practicing either before entering a world tournament or playing against your best friend who happens to be a tennis pro, then select training. Here, you can practice with a variety of computer players of varying skill levels.

If your friend wants to practice as well, you both can

play against each other or play doubles with two computer players. (To play against a friend, one person must use the joystick, and the other must use the 64's arrow keys and space bar to control the onscreen players.) This training mode also will let you experiment with dif-

Tie Break is easy to learn. In no time, you'll have a racket in your hand, be ready to compete in a world tournament, or be ready to play against the computer in the training mode. The level of difficulty depends on such factors as the number of players you must beat in a tourna-



This player on a clay court has just hit a high lob to his singles opponent in Tie Break, DigiTek's new tennis game.

ferent rackets and surfaces. Being able to practice with other players is a nice feature of this game, since some of the other computerized tennis games let you practice only by hitting balls tossed by a ball machine.

No matter what mode you select, you don't have to worry about moving your player to the appropriate court position to hit the ball. Tie Break automatically positions the player for return shots. You simply decide how you're going to complete your return shot. Some of the options are volley, lob, slice, topspin, and smash. The computer will decide if your shot will be forehand or backhand. You control your shot's speed, direction, type, and length. It's also possible to pause during the action or slow the game down. ment, the tension and weight of your racket, the opponent you select, and the court surface. This game's challenging to play, but it would be even more challenging if there were an option to position your player yourself for return shots as opposed to having the computer do it for you.

The manual provides you with enough information to get you started quickly. All types of shots are explained in enough detail so that you'll soon learn how to perform each one. There are even diagrams to show you in more detail exactly how to hit certain shots. The manual also includes useful information on how to use trick shots to defeat an opponent.

Tie Break's graphics and sound effects are great on the 64. You watch the

games as though you were looking down from above. You see the ball, players, court, and net in a three-dimensional view. You can hear the sound each time someone hits the ball or the ball bounces off the court. Tie Break lets you know visually when the ball hits the net or is out of bounds. You can see just what type of shots the players are taking, and the scores appear on the screen after each point is scored.

Overall, Tie Break is fun and challenging, and it'll give you hours of entertainment. So if tennis is your racket, I think you'll love playing this game, especially if the weather is too nasty to go outside on the courts. Bring the true-to-life action and excitement of tennis to your 64 and give this game your best shot. See you at Wimbledon! CHRIS SAUCIER

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#### CALC II

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I'll have to admit that, at first glance, I wasn't impressed. I mean—a spreadsheet is a spreadsheet. They're made up of letters along the left side of the screen that identify rows and numbers run-

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ning across the top that identify columns. The intersection where a row and column meet is called a cell, and Calc II has plenty of those. In fact, it has 240 rows and 240 columns. A 64 doesn't have enough memory to use that many cells, but it does have room for about 20K of data. The actual number of free bytes remaining is displayed at the top of the Calc II screen

I'm going to assume that everyone knows what a spreadsheet is and jump right into Calc II's strong points and improvements over its earlier version. One feature that's almost worth the price alone is Calc II's ability to split the screen into two, three, or four windows. This lets you see one part of the sheet while working in another section.

Many times I've been entering data in a budget with dates running across the top of the page and with income and expense categories running down the left. Things are fine as long as all the information is on one screen. By the time you've entered enough data to scroll across and down the page, however, you can no longer see the dates and the categories. After a while, you have to scroll back to the beginning to make sure you're entering data in the correct cells.

With Calc II you don't have this problem. You can open a couple of windows, lock the categories and dates in place, and then move anywhere on the sheet and still be sure you're not entering November's electric bill in the cell reserved for December's rent payment. You can divide the screen into any size windows you like.

Printing can also be a problem if your spreadsheet is larger than your printer can I

G-14

handle. Calc II automatically splits at the end of a page, printing the rightmost sections on later pages. Other spreadsheets may wrap and print on the next line, destroying the row and column order. You can print just a portion of the sheet if you don't need all of it. You can also embedded printer codes in Calc II to utilize your printer's compressed print modes.

Once you have data entered, you can manipulate it with Calc II's sorting routine. You can sort in ascending or descending order by row or column. This is the only area where I experienced any difficulty. I entered a group of names running down the page in a column. When I defined this block of data and asked the program to sort the column in ascending order, nothing happened. After several unsuccessful attempts, I asked it to sort the row, and then it worked. The same held true with data across the page. I call that a row, but the sort routine apparently considers that a column. Numbers sort with no problem, but text sorts according to word length unless cells are left-justified.

Data in cells can be justified left, right, or center, depending on your preference. Columns can be adjusted globally or individually to fit data of any width, from 3 to 38 characters. Other options include number of decimal places, auto or manual calculate, tape or disk, device number for printing, and screen and text colors. You can make these changes manually after a spreadsheet loads, but Calc II provides a separate program that lets you customize the program to fit your preferences. Then, anytime you run Calc II, it'll default to your customized choices.

Another program that comes with Calc II is a merger program. Use it to combine different spreadsheet templates onto one larger spreadsheet. The resulting file can be a merger of any number of previously saved templates. Text and formulas must use different cells, however, or the second spreadsheet will overwrite those cells already in memory.

Speaking of templates, Calc II provides about 40 of them that are ready to load and run. Some of them help you calculate break-even points, business budgets, depreciation, loans, mortgages, standard deviations, and future worth of investments. Others will help balance vour checkbook, keep a grade book, write sales slips, and figure factorials. One will even take room measurements and calculate how much wallpaper. paint, or carpeting you'll need for the job.

Several of the templates have borders and lines to set off data. In the past, I had to be content with a series of equal signs or dashes to create such effects. With Calc II, however, it's possible to use many of the Commodore keyboard graphics to create design elements that make your spreadsheet easier to read and more appealing to

Calc II treats mathematical calculations in the same fashion as Commodore BA-SIC, so you shouldn't have any problems entering your own formulas. It even accepts the Boolean operators And, Or, and Not.

Calc II also has a number of powerful built-in functions that can make your calculating chores easier. In addition to the usual Sums, Square

rithms-functions found in most spreadsheets—Calc II offers Rnd for random numbers. Peek to return a value of a memory byte, and Exp for exponents. Additional functions include Average. Minimum and Maximum values, and Number of Items in a block of data. Lookup and Index are functions used to find data in tables. Fix truncates remainders in calculations, and Round rounds the value up or down. An If function lets you make a choice between two options. How to use these and other functions is carefully explained in the manual.

A spreadsheet is a very powerful yet flexible tool that lets vou perform a wide range of mathematical calculations. It's a productivity package you'll use again and again. If you don't have a spreadsheet, I recommend that you get one. Once you decide to get one. I heartily recommend Calc II. TOM NETSEL

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#### **BAD BLOOD**

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### REVIEWS

blood here. Your goal is to bring peace to the Plains and prevent war between the mutant races and the humans who want to control and enslave them.

You start Bad Blood in the mutant town of Mardok. After watching an introduction, you choose a character for the game. The choices are Varigg, Jakka, and Dekker. Varigg is a green male, full mutant. Jakka is a female mutant, almost human except for her eye blasts. Dekker is a male human. All the characters have qualities that make them attractive alter egos. Their weaknesses make the game a different challenge with each character.

Bad Blood takes place on the Plains, a land laid to waste long ago by a nuclear bomb. The inhabitants managed to survive, but not without mutations.

to survive, but not without mutations. The humans tried to ignore the mutants and enslaved them. As time wore on, the mutants rebelled and formed their own communities. In addition to mountains and open spaces, the Plains con-

sists of mutant towns Mardok, Okkarn, Nivvik, and Kitrum; human cities Xantin-

ium and Yvrium; and a dangerous shell of a city called Zero City.

Bad Blood's game screen features an overhead view of your character's surroundings in a mock television cabinet. Below this window on the left is a list of five commands; a jar of brown fluid on the right marks the character's life level. The commands are Inventory, Examine, Use, Talk, and Options (Pause game, Save game, Load game, and Music on/off). To play Bad Blood, move the character around in the top window with joystick or keyboard and select commands with the joystick button or space bar. The first three commands bring up an inventory window for further choices.

It's necessary to carry on a lot of conversations with people you meet in Bad Blood. They'll provide clues and other necessary information. Selecting the Use command brings up another menu with options to chat, ask a character about a specific topic from another list, or say goodbye.

Finally, in combat, you use a weapon or bare hands to attack by pressing the joystick button or space bar. That's all there is to Bad Blood. You'll be playing the game in no time.

Bad Blood possesses the right difficulty for beginners, and seasoned adventurers will enjoy the atmosphere of the game and the strange characters. The well-written manual details the history of the Plains and also explains the slang of the region, such as *tuff* (warrior or soldier), *hume* (human), and *mute*  (mutant). It's a fresh perspective to see the entire game on one scale, as is not the case in a lot of other role-playing games. You only see the interiors of buildings when you enter the doors. Bad Blood takes advantage of its game world and contains a lot of interesting mutants, not all of whom are friendly. Just remember to watch out for the reptilian Kejek creatures; they capture other mutants as slaves for the humans in exchange for big rewards.

The graphics in Bad Blood are topnotch. The overhead view is particularly impressive because of the detail it provides. Scrolling is smooth and fast. The only time the game halts and accesses the disk is when you enter a building or move into a new area of the Plains. Fortunately, this access time is short. Bad Blood's graphics bring the mutants to life and offer a rich environment for exploration. The catchy music is constant throughout the game and adds a lot to the enjoyment. Sound effects are not as prevalent.

Bad Blood is a fine example of how much more enjoyable a game can be with a simple control system. Bad Blood's interesting land and inhabitants make this game an ideal choice for adventure fans.

RUSS CECCOLA

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## **BEGINNER BASIC**

Larry Cotton

#### **ALPHABET SPRITES**

Let's transfer data from the 64's built-in character set to an interesting sprite format.

Lines 10–110 contain familiar sprite code, except for constant definitions in lines 50 and 60, which we'll look at in a moment. Line 120 begins a FOR-NEXT loop to copy three groups of character data.

Lines 130 and 170 access

RJ 10 PRINTCHR\$(147):POK E646,7{10 SPACES}

JD 20 PRINTTAB(10) "PLEAS E WAIT 3 SEC.

RC 30 V=53248:REM 1ST SP R CTRL REGISTER

HD 40 POKEV+21,0:REM TUR N SPR 1 OFF

HG 50 X\$="ABCDEFGHIJKLMN OPQRSTUVWXYZ":REM {SPACE}SEE LINE 33

RA 60 S=6656:E=8:REM SEE LINE 140

BD 70 POKE2040,192:REM P OINT TO DATA

PC 80 REM POKEV+23,1:POK EV+29,1:REM ENLARG

EP 90 POKEV+39,7:REM YEL LOW SPRITE

PX 100 X=160:Y=130:POKEV ,X:POKEV+1,Y:REM {SPACE}LOCATE

HM 110 FORB=12288T012350 :POKEB,0:NEXT:B=1 2288:REM CLEAR SP RITE DATA AREA

FG 120 FORG=1TO3:GOSUB32

SM 130 POKE56334,0:POKE1 ,51:REM KBD OFF

DR 140 FORI=0TO21STEP3:Z =(T+S)\*E:POKEB+I, PEEK(Z+A):REM COP

Y CHARACTER DATA
XK 150 A=A+1:NEXT:A=0:B=
B+1

GA 160 NEXT:B=B+21:GOTO1

SB 170 POKE1,55:POKE5633

4,1:REM KBD ON
AM 180 PRINTCHR\$(147)

FB 190 POKE214,9:PRINT:P OKE211,17:PRINT" {3 SPACES}SS":REM 3 SPACES BEFORE

{SPACE}SS
MQ 200 POKE214,10:PRINT:
POKE211,17:PRINT"
{3 SPACES}SOR":RE
M 3 SPACES BEFORE
SOR

XB 210 POKE 214, 11: PRINT:

POKE211,17:PRINT"
KEYS"
XB 220 POKEV+21,1:REM SP

RITE ON

AA 230 KB=197:SH=653:NK= 64:MX=255

CG 240 K=PEEK(KB)+PEEK(S H):IFK=NKTHEN240

MB 250 IFK=7THENY=Y+1 SE 260 IFK=8THENY=Y-1

SC 270 IFK=8THENY=Y-1
SC 270 IFK=2THENX=X+1

CB 280 IFK=3THENX=X-1 EQ 290 X1=INT(X/MX):X2=X

-X1\*MX QF 300 POKEV, X2: POKEV+16

,X1:POKEV+1,Y:REM MOVE SPRITE

KG 310 GOTO240

JE 320 READA\$:IFA\$="\*"TH EN170

HP 330 FORT=1T026:IFA\$=M ID\$(X\$,T,1)THENRE TURN

FG 340 NEXT

HD 350 DATA P,R,E,C,U,R,

the character ROM located from 53256 through 53463. POKE 56334,0 turns off the keyboard, while POKE 1,51 switches the character ROM in. When the copying is complete, the two memory registers must be restored to normal with POKE 1,55 and POKE 56334,1. The order of poking in line 170 must be reversed from that of line 130.

Between lines 130 and 170. the ROM-to-sprite data copying occurs. We set up the sprite's shape data in memory registers 12288 through 12350; B is 12288. Recall that each sprite shape is defined by 63 bytes (three columns of 21 bytes). The first letter whose 8 bytes of data we'll transfer will appear in the upper left corner of the sprite, controlled by addresses 12288, 12291, 12294, and so on.

A FOR-NEXT loop from 0 to 21 in line 140 begins copying the eight bytes of character data. STEP 3 ensures that the data bytes fall under each other in the sprite so the character will be readable. Z is the ROM location of the character data. Its value is calculated by adding constant S and variable T and then multiplying by con-

stant E. (S and E are defined in line 60.) T comes from a subroutine in lines 320–350, which is called from line 120. Let's look at that subroutine.

A\$ is a letter of the alphabet. X\$ (the alphabet, defined in line 50) is scanned for a match. T indicates A\$'s place in the alphabet. Thus, if A\$ is the letter C, T will equal 3. The subroutine returns control to line 130. T is then added to S in line 140, which determines Z's value—the place to begin peeking for character data.

In line 140, the first time through the loop, B is poked with whatever's in Z. However, line 150 increments A (which starts as 0) by 1, so the next time through the loop, B+3 is poked with whatever's in Z+1. Thus, as the sprite data registers are increased by three, the character data registers are increased by one.

After the loop is finished in line 150, A is reset to 0, and B is increased by 1. The next two characters will be placed to the right of the first one in the sprite; the FOR-NEXT loop is finished in line 160. Finally, B is increased by 21, and another loop begins in line 120. This places three more characters under the first three.

Lines 180-310 print a message and illustrate a spritemoving technique via the cursor keys. Line 230 looks at memory locations 197 and 653, which track keyboard presses. The sum of their peeked values equals 7, 8, 2, or 3, corresponding to down. up, right, and left cursor movements. Line 290 converts the sprite's horizontal position to pokable values for the two horizontal-position memory registers 53248 and 53264. Line 300 does the actual poking.

will be readable. Z is the ROM location of the character data. Its value is calculated by adding constant S and variable T and then multiplying by con-

Here's an interesting
way to turn
keyboard characters
into sprites,
and move them about
with cursor keys.

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## MACHINE LANGUAGE

Jim Butterfield

## ROTATING

You may recall an earlier expedition into hexadecimal number printing. In this column, we'll expand on that subject.

Here's what this program will do. The user names a program file. Our program examines that file and reports two things: the load address and whether or not the last three bytes of the file are 0. The load address of a program gives you a hint as to whether this is a normal program (generated with a SAVE command) or an unusual one that will need to be brought in with a LOAD "filename", 8,1 command. Normal load addresses vary from computer to computer, but these addresses almost always end with hexadecimal digits 01.

If the load address ends with digits 01, our program will read the rest of the file to catch the last three bytes. If each of the three are 0, the program will print ALL BASIC.

For example, a program with a load address of \$0801 that ends with three binary 0s is more than likely a BASIC language program that was probably saved on a 64. That means it can be loaded with the normal ,8 extension.

The program must read all the bytes of the file in order to catch the last three, but it doesn't need to save all those bytes that it encounters first. A buffer large enough to hold three bytes is all that's required. As the data bytes come from the file, they'll be stored in one of these three addresses. A pointer will move across the three locations, looping around as needed. In other words, we have a rotary buffer. When we finally see the END OF FILE signal, the contents of those three locations will be the pieces of information that we want to know.

The BASIC program first pokes the machine language code in place. Then it asks for a filename and opens logical file 1. The machine language program is called in to do the main job. When control returns to BASIC, the file is closed, and the program is finished.

Note that the file is opened and closed from BASIC. Although we could do the same job from machine language, we'd save little time or memory. It's nice to have BASIC on hand for such jobs. On other computers, BASIC wouldn't be there, and you'd lose this easy and flexible option. Since it's built into the Commodores, why not use it?

The machine language program is situated at addresses \$2000 to \$2081. When called, it connects to logical file 1 and reads the first two bytes into addresses \$2200 and \$2201. Those bytes are converted to hexadecimal and printed.

At address \$2021 we check to see that the last two digits of the load address are 01. To do this, simply examine the contents of \$2200. If you don't find value 1 there, skip to the end of the program.

Our rotary pointer is held in X; the value is temporarily stored in location \$2202 when we read in a new byte from the file. The data byte is stored in one of three locations in the range \$2203 to \$2205.

2027	8E	02	22	STX	\$2202
202A	20	E4	FF	JSR	\$FFE4
202D	AE	02	22	LDX	\$2202
2030	9D	03	22	STA	\$2203.X
2033	E8			INX	
2034	EO	03		CPX	#\$03
2036	DO	02		BNE	\$203A
2038	A2	00		LDX	#\$00
203A	A5	90		LDA	\$90
203C	FO	E9		BEQ	\$2027
					100000000000000000000000000000000000000

Note that ST, the status byte. is at \$90 for Commodore computers from the VIC-20 on. | 360 CLOSE 1

For early PET/CBM machines, substitute address \$96.

Once the file is completely read, it's easy to examine the three bytes of the buffer to see if they're all 0.

If the file does end with three 0 bytes, the program prints its ALL BASIC message. The loop to do this is at locations \$204B to \$2057.

The machine language program disconnects from the file by calling Kernal subroutine \$FFCC, prints a Return, and then passes control back to BASIC.

Full coding isn't given here, but you can disassemble it to see the details. Note the changes for older PETs on lines 110 and 270.

10 DATA 162,1,32,198,255,32, 20 DATA 228,255,141,0,34,32 30 DATA 228,255,141,1,34,169 40 DATA 36,32,210,255,162,1 50 DATA 189,0,34,32,96,32 60 DATA 202,16,247,174,0,34 70 DATA 202,208,49,142,2,34, 80 DATA 32,228,255,174,2,34 90 DATA 157,3,34,232,224,3 100 DATA 208,2,162,0,165 110 DATA 144:REM 150 FOR PET 120 DATA 240,233,169,0,162,2 130 DATA 29,3,34,202,16,250 140 DATA 170,208,13,162,0 150 DATA 189,119,32,32,210 160 DATA 255,232,224,11,208 170 DATA 245,32,204,255 180 DATA 169,13,76,210,255 190 DATA 72,74,74,74,74,32 200 DATA 107,32,104,41,15 210 DATA 120,248,24,105,144 220 DATA 105,64,216,88,76,210 230 DATA 255.32.65.76.76.32 240 DATA 66,65,83,73,67,13 250 FOR J=8192 TO 8321:READ X

270 IF T<>14512 THEN STOP: REM 14518 FOR PET 300 INPUT "NAME OF PRO-GRAM FILE";F\$ 310 OPEN 15,8,15:OPEN 1,8,3,F\$ 330 INPUT#15.E.E\$,E1.E2 340 IF E<>0 THEN PRINT E;E\$;E1;E2:END

260 POKE J, X:T=T+X:NEXT J

350 SYS 8192

Here's a method to determine a program's starting address and whether it's a BASIC or a machine language program.

## **WORLD VIEW**

Emil Heyrovsky

## VIEW FROM CZECHOSLOVAKIA

Don't worry if you hear us talking favorably about Commies in Czechoslovakia these days. The Communist party hasn't ruled in our country since November 1989. When we talk about Commies now, we're talking about our Commodore computers.

Czechoslovakia is a free country in the heart of Europe; its population slightly exceeds 15 million. It's a mountainous country with a colorful history.

Now back to the Commies. Thanks to the Communist regime, the value of the Czechoslovak crown has fallen drastically in comparison to its pre-World War II value. The present exchange rate is about 30 crowns to the U.S. dollar.

Now hold your breath. The average monthly salary of a Czechoslovak citizen today is 2,700 crowns. That's about \$90. During the Communist rule, a 64 was available only through special shops for almost 10,000 crowns (\$330). A 1541 disk drive unit cost about the same amount.

At that time, though, the average salary was much lower, and the exchange rate was absurd. The only rational way to get a computer was to import it from Germany or another West European country. Thanks to bureaucratic Communist formalities, this was never an easy process. Nowadays, a 64 costs about 5000 crowns (\$165). Since it's now easy to travel throughout Europe and the formalities are minimal, most people prefer to buy their 64s in Germany.

Compared with other 8-bitters, 64s are probably the most widespread machines here; Sinclair Spectrums formerly held that distinction. There are also some Atari, Sord, and Sharp computers

around. As for 16-bit machines, the Amiga 500 is very popular, as is the Atari line. IBM compatibles are purchased by business people, but Apples and Macs are seldom seen.

Commodore software isn't available in stores here. As far as I know, there has never been any means of buying software for our beloved computers. As a result, 90 percent of all programs around here are pirated.

Here's another reason why pirating is so widespread: A standard game costs about 750 crowns (\$25), which is about one-third of an average monthly salary. Only a madman would consider buying software at that price. All over Europe there are teams of software crackers providing copies of pirated software, and programs without copy protection spread quickly.

The most common way to get software on disk or tape. which is still popular here, is to swap programs with your friends. Another method is to pick up a bunch of disks or a couple of tapes and head for a Commodore club. There are two of them here in Prague. and trading is popular. Members might swap Bard's Tale 3 for Last Ninja 3 or Boulder Dash for Maniac Mansion, or possibly buy a 1541 brochure. One club publishes instruction manuals for programs and peripherals as well as for computers. The club is combined with an Amiga group, which has a bad effect on weaker individuals, who, instead of squeezing bytes out of their 64s, bounce off to Amigaland.

Club meetings usually take place twice a month in a rented hall. Some tables are put together to form a counter for selling books and brochures; other tables are used for trading and copying. Copying is performed on 64s or 128s with

disk drive units or Datasette tape recorders, which often have some kind of homemade adapter for smooth copying. Members or visitors bring equipment from home, since the club doesn't provide computers. Once a month, lectures on computer topics are held. Most of the people you meet at a club are young.

I've noticed recently that the number of Commodore owners is slowly decreasing. I'll try to explain why. The 64 and 128 are generally considered to be affordable game machines. A person who wants to do word processing or some other "serious" application thinks of buying an IBM or compatible. Amigas are bought by wealthier game players (or serious users). Because some people have never learned to use their Commies fully, they don't think much of them, and they want to get rid of them.

Modems are almost unknown here. This is due partly to our rotting telecommunication system and also to public ignorance of electronic bulletin boards and E-mail. Moreover, long-distance calls are extremely expensive. Just a normal chat with an overseas friend can swallow and digest your salary in a jiffy.

Many new computer magazines are showing up on our newsstands, but several of them are just translations of German or other imported publications. Unfortunately, we don't get COMPUTE, and there isn't a good magazine available here that's dedicated to the 8-bit Commodores. That's too bad because, as I said, many Commodore owners in Czechoslovakia often never really learn what great machines they have.

Emil Heyrovsky lives in Prague. He is the coauthor of Padlock (January 1992).

The 64
and 128 remain
popular in
Czechoslovakia,
along with
tape drives, user
groups—and
software pirates.

Steve Vander Ark

### **GRAPHIC SCRAPS**

Since desktop publishing and writing are what I do most with GEOS, I collect graphics, along with utilities to handle them as efficiently as possible. In earlier columns I've mentioned some of the better sources for GEOS graphics—Lamb Art & Design, for example—and suggested ways to convert graphic images from other formats into GEOS.

After you've collected all these terrific graphics, you still have to get them into your documents. Back in the August 1991 column I mentioned Scrap It, a utility which clips photo scraps out of geoPaint documents. Since many collections of artwork for GEOS come in that form, Scrap It is essential. Other collections come in prepared photo albums, such as the clip art files from Susan Lamb (3575 East County 18th Street, Yuma, Arizona 85365) and those from GeoWorks itself (GEOS Clip Art Disk, 2150 Shattuck Avenue, Berkeley, California 94704). Graphics have to make it into photo scrap form, if they're going to be of any use, because photo scraps are the way GEOS moves images between applications.

A photo scrap is simply a small chunk of bitmap, the dot pattern that makes up a graphic image. The GEOS operating system tags photo scraps as system files and handles them in a special way. You can't rename a photo scrap, for example, since applications are designed to look for the filename PHOTO SCRAP when you select a tool to import a graphic into your document. There can be only one such file with that filename on any given disk at a time. Photo albums are collections of such scraps, and the key to using photo scraps efficiently is to handle albums efficiently.

The primary tool for handling photo albums is the photo manager desk accessory (currently in version 2.1, which works in 40- and 80-column modes). Since the photo manager can access any of the photo albums on the disk, you use it to find the image you want and copy or cut it into an individual scrap. That scrap can then be imported using the Edit menu functions.

So far that's basic GEOS operation, and you've likely mastered it already. But the more graphics you collect, the more you wish for a way to access and organize them better. The photo manager performs its job admirably, but it can't access scraps on another drive. This means your photo albums, which are tremendous disk-space eaters, must be specially prepared for each project, with only the images you'll require, or copied in and out as needed. But then if you want to create an album of only the clips you're likely to need, there's no easy way to move them from one album to another without opening and closing each album to make a transfer.

Now if you've read this column before, you know that I only pose dilemmas if I have a solution in mind. In the case of photo scraps, there are several excellent utilities available which can make all this shuffling of graphics a breeze. The program AlbumCopy by Michael Myers presents you with a control panel which allows you to select source and destination albums and then flip through the clips to choose which ones you'd like to transfer. It can't get much easier than that! To download it from Q-Link, request AL-BUMCOPY, which was uploaded by GeoLib PH.

This utility is also handy for reducing the size of any oversize photo albums you've creat-

ed with earlier versions of GEOS that the GEOS 2.0 photo manager can't handle. This happens because the version 2.0 albums hold only half as many clips as those of the older model-60 as compared to 120. If you'd rather just revert to the old version so you can work with the old photo manager, get a copy of Album Reverter, written by Joe Bucklev (ALBREV.SFX on Q-Link, uploaded by Red Storm). This utility reverses the update process that the new photo manager automatically performs when you try to open an olderstyle album.

But the single most helpful program you can get for using photo scraps comes in two incarnations, one a desk accessory and the other an application. Scrapgrab, the desk accessory version, lets you select a photo from an album or a scrap on a disk in a different drive. The application version, identical except that it handles larger scraps, is called Photograb. To download from Q-Link, look for SCRAPGRAB and PHOTOGRAB. GeoLib PH uploaded both of these.

With these utilities you can finally keep your photo collection where it belongs—on a graphics collection disk—and access your clip art when you need it from within geoPublish or other applications without those albums taking up every inch of disk space on your main work disk. The addition of these two files will let you effortlessly use your clip art, not be strapped down by it.

Imagine a disk of photo albums, all sorted into categories, which you can access, browse through, and select from at will as you geoPublish along. You'll never again have to drop out of your document to track down a graphic when you keep your graphics on a library disk and Scrapgrab on your work disk.

The more graphics you collect, the more you wish for a way to access and organize them better.

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## PROGRAMMER'S PAGE

Randy Thompson

#### POKE, WAIT, AND SYS

Use this handy reference sheet when you want to get your hands dirty mucking around in your 64's RAM, interrogating and manipulating memory, and making unconventional (and often unauthorized) direct calls to ROM.

Some commands will not work in immediate mode and must be run from within a program. Tips with an asterisk have been known to cause side effects—but sometimes you need to break a few rules to get the job done.

WAIT is probably the least utilized of these three commands, so I'll use the rest of this column for a mini lesson in its use. WAIT halts the execution of a BASIC program until the contents of the memory address meet the conditions specified.

What all this means is that WAIT is a great statement to simplify key fetches and delays. Here are a few ways it can be used in your programs.

#### 10 WAIT 198,15:GET A\$

This line waits for a key to be pressed.

#### 10 WAIT 197,63:KEY=PEEK(197) 20 WAIT 197,64

Line 10 waits for a key to be pressed, and line 20 waits for it to be released.

#### 10 WAIT 653,1 20 WAIT 643,1,1

Line 10 waits for Shift to be pressed, and line 20 waits for it to be released. Change the 1 in each line to 2, and the program waits for the press and release of the Commodore key. Substitute a 4 to wait for the Ctrl key.

Contributors to this list of coding voodoo are Michael Hall of De Soto, Texas; Jerry Krebs of Taylor, Texas; Stacy Olivas of Graham, Washington; and Helen Roth of Los Angeles, California.

"Programmer's Page" is interested in your programming tips and tricks. Send them to Programmer's Page, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We'll pay \$25-\$50 for each tip we publish.

#### Screen Command

POKE 646,*C* POKE 53280,*C* POKE 53281,*C* POKE 53272,21 POKE 53272,23 POKE 53265,PEEK

POKE 53265,PEEK(53265) AND 239 POKE 53265,PEEK(53265) OR 16 POKE 211,C

POKE 214,R SYS 59296 SYS 58726 SYS 59516 SYS 59626 SYS 59848 SYS 59749

#### **Keyboard Command**

POKE 198,0 POKE 650,128 POKE 650,127 POKE 650,0

POKE 649,1 POKE 649,0 POKE 649,10 POKE 808,239 POKE 792,193 POKE 808,234 POKE 808,237:POKE 792,71 WAIT 653,1 WAIT 653,2

#### BASIC Command POKE 818.32

WAIT 653.4

POKE 818,237 POKE 775,200 POKE 775,167 POKE 774,0 POKE 774,24 POKE 204,0 POKE 204,255 POKE 19,65 POKE 19,0

#### System Command

SYS 58266 SYS 65126 SYS 64738

#### Miscellaneous Command

POKE 56325,*R* POKE 54296,15:POKE 54296,0 WAIT 56320,16,16 WAIT 56321,16,16 SYS 62913

#### Function

changes cursor color (0–15)
changes border color (0–15)
changes background color (0–15)
switches to uppercase mode
switches to lowercase mode
turns off the screen display
turns on the screen display
moves cursor to specified column (0–79)
moves cursor to specified row (0–24)
clears the screen and prints READY
homes the cursor
moves the cursor down
scrolls the screen up
scrolls the screen down\*
inserts a line

#### Function

clears keyboard buffer
enables autorepeat for all keys
disables autorepeat for all keys
enables autorepeat for only the cursor keys,
space bar, and Inst/Del key (computer's default)
disables keyboard buffer
disables keyboard returns keyboard to normal
disables Run/Stop key\*
disables Restore key
disables Run/Stop-Restore and LIST\*
reenables Run/Stop-Restore and LIST
waits for Shift to be pressed
waits for Commodore key to be pressed
waits for Ctrl to be pressed

#### Function

disables SAVE
enables SAVE
disables LIST
enables LIST
prevents line numbers from listing
resurrects lines numbers
turns on cursor during GET\*
turns off cursor during GET
turns off question mark during INPUT\*
turns on question mark during INPUT

#### Function

prints startup message and erases BASIC program warm reboot (erases screen) cold reboot (erases program)

#### Function

changes cursor blink rate (0–255, 58 is normal) makes a click sound waits for fire button of joystick in port 2 to be pressed waits for fire button of joystick in port 1 to be pressed prints the name of the latest loaded or opened file

#### **FILE LOGGER**

By Roger Bachelder

File Logger is a short two-part program that will list all the files that you have on a disk. It presents you with the disk's BAM title, the disk ID, and each file's starting track and sector. File Logger's unique feature is that it also gives you each file's starting and ending address.

Typing It In

The first part of File Logger is written entirely in BASIC. To help avoid typing errors, use The Automatic Proofreader to enter the program. See "Typing Aids" elsewhere in this section. After entering the first part of the program, be sure to save it to disk before exiting.

The second part of File Logger is written in machine language. Use MLX, our machine language entry program, to type it in. Again, see "Typing Aids." When MLX prompts, respond with the following values.

Starting address: 6AA0 Ending address: 6E07

Save this machine language program as LOG.ML on the same disk as the BA-SIC program. File Logger will automatically load and run LOG.ML, so be sure to save it with this filename.

Reading Disks

After the program runs, you'll see a menu giving you the option to LOG DISK or EXIT TO BASIC. Insert the disk you want to check and enter 1. You'll then be asked whether or not you want the output sent to a printer.

File Logger will then read the directory and present you with the disk name, ID, file type, track, sector, and blocks. It will then ask you if you want to see the starting and ending addresses. It prints this information in hexadecimal notation.

#### **FILE LOGGER**

- HE 10 IFPEEK (830) = 1THEN720 CQ 15 IFPEEK (27296) <> 169THENLO AD"LOG.ML",8,1
- QJ 17 POKE808,225:POKE146,0 20 POKE 53281,6:POKE53280,6
- :CLR JR 25 DIMF\$(100):TP\$(0)="XXX": TP\$ (2) = "PRG": TP\$ (1) = "SEQ

- HG 30 TP\$(3) = "USR": TP\$(4) = "REL
- OD 40 H\$="0123456789ABCDEF" RH 50 PRINTCHR\$ (142); "{CLR} {DOWN} {BLK} (C) 1992 COM PUTE PUBLICATIONS INTL L TD"
- RA 51 PRINT" [10 SPACES] ALL RIG HTS RESERVED"
- JE 55 PRINT" (DOWN) (WHT) {9 SPACES}F I L E {3 SPACES}L O G G E R"
- DH 60 PRINT"{3 SPACES}{35 T}" DO 80 PRINT" [DOWN] [28 SPACES]"
- 90 PRINT" [3 DOWN] 1 --{YEL}LOG DISK"
- 100 PRINT" [DOWN] [WHT] 2 --{SPACE} {YEL} EXIT TO BAS IC"
- PH 120 PRINT" {2 DOWN } {WHT } PLEA SE SELECT (1 - 2):";:PO KE204,0
- FX 130 GETA\$
- QG 140 IFAS="1"THEN180
- KP 150 IFA\$="2"THENPOKE204,1:P RINTAS: END
- KR 170 GOTO130
- OK 180 PRINT"{CLR} {5 DOWN} {WHT} SEND OUTPUT TO PR INTER (Y/N):";: POKE 204,
- OE 190 GETAS
- RE 200 IFAS="Y"THENPOKE204,1:P RINTA\$: Z=4:GOTO23Ø
- IFA\$="N"THENPOKE 204, 1: P PO 210 RINTAS: Z=3:GOTO230
- RD 220 GOTO190
- MR 230 PRINT"{CLR}{4 DOWN} {WHT}LOOKING AT DIRECTO RY...";:BM\$="":OPEN15,8 ,15,"I":OPEN3,8,3,"\$"
- DK 240 CLOSE4: OPEN4, Z:DN=Z-3:T B=10\*DN
- CE 250 FORX=1T0142:GET#3,A\$:NE XT: PRINT".";
- ES 260 FORX=1TO16:GET#3,B\$:BM\$ =BM\$+B\$:NEXT:PRINT".";
- KX 270 GET#3, A\$, A\$: GET#3, I1\$, I 25
- EP 275 IFZ=4THENPRINT#4, CHR\$ (1 3); CHR\$ (13)
- CC 280 PRINT"{CLR}";:PRINT#4,T AB (TB); "{8 SPACES}BAM T ITLE {13 SPACES} ID"
- CA 290 IFZ=3THENPRINT" {WHT} {8 SPACES} {24 T}"
- GG 295 IFZ=4THENPRINT#4, TAB (TB );"{8 SPACES}----
- RF 300 ID\$=11\$+12\$:PRINT"{WHT} ";:PRINT#4,TAB(TB);" {8 SPACES}";:PRINT#4,BM \$;"{6 SPACES}";ID\$
- FJ 305 IFZ=4THENPRINT#4, CHR\$ (1 3); CHR\$ (13)
- GP 310 PRINT" {2 DOWN } { WHT } "; : P RINT#4, TAB (TB);" {3 SPACES}TRK SEC BLKS

- {4 SPACES}FILENAME {5 SPACES}TYPE"
- KA 320 IFZ=3THENPRINT" [WHT] {3 SPACES} {33 T}"
- SP 325 IFZ=4THENPRINT#4, TAB (TB );"{3 SPACES}----
- BG 330 FORJ=1TO92:GET#3,A\$:NEX
- BS 340 M=M+1:GET#3,K\$,T\$,S\$:IF SS=""THENSS=CHR\$ (0)
- PJ 350 F\$="":FORJ=1T016:GET#3, AS:FS=FS+AS:NEXTJ
- MR 360 FORJ=1TO10:GET#3, A\$:NEX
- JH 370 L=0:IFA\$<>""THENL=ASC (A
- DX 380 PRINT#4, TAB (TB);" {3 SPACES}";:PRINT" {WHT}";
- KR 390 LS=RIGHT\$(STR\$(L),2):IF LEFTS(LS,1)=" "THENLS=" "+RIGHT\$(L\$,1)
- BP 400 IFASC (T\$+CHR\$ (0)) = 0THEN IFL=ØTHEN56Ø
- KH 410 T\$=RIGHT\$ (STR\$ (ASC (T\$)) ,2):IFLEFT\$ (T\$,1) =" "TH ENTS="0"+RIGHTS (TS, 1)
- GK 420 S\$=RIGHT\$(STR\$(ASC(S\$)) ,2):IFLEFT\$(S\$,1)=" "TH ENSS="0"+RIGHTS(S\$,1)
- AH 430 K=ASC (K\$+CHR\$ (0))-128
- 440 IFK<10RK>5THENK=0 450 PRINT#4,T\$;"{2 SPACES}"
- :: PRINT" { WHT } "; 460 PRINT#4, S\$; "{2 SPACES}"
- ; : PRINT" { WHT } ";
- BS 470 PRINT#4, LS; "{3 SPACES}" ; : PRINT " { WHT } ";
- 480 K\$=TP\$(K):PRINT#4,F\$;" {SPACE}";:PRINT"{WHT}";
- DE 490 IFK=0THENPRINT" (WHT) "; EA 500 PRINT#4, K\$: IFK<>2THEN52
- 510 F\$(Q)=F\$:Q=Q+1
- PM 520 GET#3,A\$:IFM<8THENGET#3 , A\$, A\$: GOTO540
- EO 530 M=0 540 IFST=0THEN340 RC
- CS 550 CLOSE3
- ES 560 PRINT: PRINT" (DOWN) (YEL) DISPLAY {WHT} START {YEL}& {WHT}END {YEL}AD DRESSES ({WHT}Y{YEL}/ {WHT}N{YEL}) {WHT}:";:PO
- KE204,0 PO 570 GETAS
- MJ 580 IFA\$="Y"THENPOKE204,1:P RINTA\$: GOTO610
- PJ 590 IFA\$="N"THENPOKE204,1:P RINTAS: POKE830, 0: GOSUB9 ØØ: RUN
- CP 600 GOTO570
- JX 610 SYS27296
- 620 PRINT#4, CHR\$ (13); CHR\$ (1 3): PRINT" {CLR}" XP
- HA 630 CLOSE3: X=-1

AX	640	PRI	NT II	{WH	m } "		PRTI	JT #	4 т	6B40	• 1 a	60	Ca	7.7	ND.	10	6C	E9	5E
AA	040	AB (	TB)	; " {	5 5	PAC	ES	FI	LEN	6B48			CC	A9	Ø2		03		9F
				SPA						6B50			8C	10	6C		45		11
				CES						6B58	:E7	6B	20	AE	FF	78	AD		2A
CK	645	IFZ	=4T	HEN	IPRI	NT	44,7	rab	(TB	6B60	:DD	29	03	85	11	09	20	8D	A3
				SPA						6B68							FB	18	FC
										6B70			DØ	29	07	69	2F	8D	D8
CA	650	IFZ						IT }		6B78		6C 2Ø	A9 15	00 6C	8D AC	00	DØ 6E	85	99
FE	660			CES				IPMI	DOK	6B88		FØ	1000	A9		8D	01	6E	9B
FE	000			: GO					PUK	6B90						17	AE	02	EA
RC	670		100						4 . T	6B98		AC	Ø3	6E		B9		100	7B
				; " {						6BA0		737.534	04		C3	A4	100	86	34
		X);	11 11	;						6BA8		145,150			Ø3	AØ	00	E8	9B
DC	680						-1:I	2\$=1	MID	6BB0		00	6E		AE	E6	AE	DØ	8E
				(), V						6BB8			6E	EC	Ø1 BC	6E 2Ø	9Ø	EF 6B	E1 C4
PC	690							INE	VTX	6BC8		30	06		AE	A4	AF	18	A2
KH	700 710							0 1		6BDØ		4C	30		AD	12	6C	85	64
GP	720								291	6BD8		AD	13	6C		ØØ	DD	AD	A2
AH	730	PRI	NT"	{WH	T } "	::0	OSI	IB 78	80	6BEØ			8D		DØ	58	60	8D	16
XC	740	PRI	NT#	4,"	{2	SPA	CES	3}"	;	6BE8			A5			10000		24	2E
JH	750									6BFØ		30	13	A9	FF	20	93	FF	CØ
EF	760							JB78	80	6BF8		CØ	06	ØC 9Ø	6C F5	2Ø 6Ø	A8 20	FF D4	4D 7D
SB	770									6CØ8		4C	07	F7	4D	2D	45	02	B5
FP	780									6C10		20	00	97	ØØ	2C	00	DD	7A
VD	700			: GO					RN	6C18	:50	FB	AØ	ØØ	38	A6	11	EA	95
XA	790								-MT	6C20		12	DØ	E9	32	90	04	29	12
An	000			1+1			1).	. БО-	-111	6C28			F5	8E	00	DD	8A	09	FD
XA	810						RET	URN	V	6C3Ø			EA		24 4D	80	AD DD	00 4A	4E FA
PJ	900									6C4Ø					4D		DD	4A	75
PC	905									6C48				4D	00	DD	8E	00	23
				7 S					AN	6C5Ø	:DD	EA	99	00	6E	C8	DØ	C4	Ø3
an	010			TO						6C58			3F	A9	08	8D	00	18	AE
SB	910			EN9		: GE	TAS	>:11	AŞ	6060		01	A5		DØ	02	A9	12	95
KP	920			ENS	20					6C68		Ø6 A9	86	Ø7 2Ø	A9 25		2Ø C9	25 Ø2	3C 1E
ME	930			(HO	ME }	123	DC	NW	1	6C78		F2	8D	00	18	60		00	9F
				7 S						6080		F9	8D	98	Ø2	9D	5B	Ø2	95
		YK								6C88	:4C	C6	D5	85	06	86	07	18	BC
CH	940					: GE	TAS	: IE	A\$	6090		69	Øl	8D	76	Ø3	68	8D	ØF
	0.45			EN9	50					6C98		03	A5		20	Dl	03	A9	FA
FR	945			5						6CAØ		85 AD	31 Ø1	20 1C	ØA 91	F5	5Ø	FE	CD
	950									6CBØ		AØ	BA	50	FE	B8	AD	01	40
CD	,,,,		01111							6CB8		99	00	Øl		DØ	F4	20	A9
100	.ML									6CCØ					F5		3A	FØ	17
		-						-		6CC8		A9	100	-				1E	DD
	Ø: A9								50	6CDØ		ØF	07	ØD		ØB		09	84
	8:31 Ø:3Ø		6Ø A9	00	8D	A9	Ø3	8D 6Ø	62 7A	6CD8		ØE	Ø6 C5			ØA	Ø2 B9	08	8B 23
	8:00		3C		8E	3D		60	38	6CE8					4A	48	B9	00	2C
	Ø:85		A8		13	8C		6D	77	6CFØ		29		AA		78	Ø3	AA	24
	8:B1				FØ		A6		98	6CF8				ØØ	18	2C	ØØ		22
	Ø:EØ				EØ		90		C7	6DØØ			8E	00	18	8A	ØA	29	3C
	8:A5			A5					C8	6DØ8		8D			68	AA 29	BD	78 EA	31 4F
	Ø:FØ 8:EF		C8			DØ EF		BC EE	E6	6D18	100.7	8D		18 C8	ØA DØ	C8		Ø8	4F 4E
CONTRACTOR	Ø:6D		AF		A5	11		12	78	6D2Ø					ØØ	1C	8D		25
	8:6C			DD	8D		6C		8C	6D28		60	38	85	Ø6	E5	22	FØ	
6BØ	Ø:15	DØ	8D	14		A9			E5	6D3Ø			FF		69	Øl	ØA	AE	91
	8:6C			84	AF	A9		AØ	59	6D38			A8		Ø3	CA	88	2C	
Design of the last	0:03		ØF		8C	10		A9	9B	6D40 6D48		C8	8A 29		Ø3 Ø5	85		AD ØØ	ØA 73
6B1	8:57	20	E7	6B C8	AØ				6D 5C	6D48						18	2C		54
	0:20								79	6D58									

6B38:0F 6C 8D 0F 6C 90 03 EE EE 6D68:00 1C 29 9F 1D 1A 04 8D 50

6D58:18 30 FB 98 D0 D9 A5 06 93 6D60:85 22 20 4B F2 85 43 AD 21

```
6D70:00 1C 60 00 20 40 60 A9 CA
6D78:12 A2 Ø1 2Ø 32 Ø3 3Ø 5A 7F
6D80:A9 02 85 0A A8 B9 00 06 34
6D88:29 87 C9 82 DØ 21 AE 96 3A
6D90:04 BD 97 04 D9 03 06 F0 E7
6D98:08 C9 2A FØ 23 C9 3F DØ CD
6DAØ: ØE C8 E8 EC 95 Ø4 9Ø E9 68
6DA8:A9 AØ D9 Ø3 Ø6 FØ 11 18
                               1A
6DBØ: A5 ØA 69 20 90 CC AE Ø1 26
6DB8:06 AD 00 06 D0 BD F0 1A DB
6DCØ: A4 ØA C8 8C 5Ø Ø1 DØ Ø3 7D
6DC8:20 88 03 BE 01 06 B9 00 B5
6DD0:06 F0 11 30 0F 20 32 03 70 6DD8:10 EE 8C 50 01 A9 FF 8D 4A
6DEØ:00 06 30 E4 A9 12 20 D1 39
6DE8:03 A9 01 4C 69 F9 08 00 D7
6DFØ: 31 39 39 31 20 4C 4F 47 Ø5
6DF8: 2D 4D 2F 4C AØ AØ AØ AØ D1
6E00:F6 00 00 00 00 00 00 00 58
```

Roger Bachelder does his programming in Salem, Oregon.

#### **DEMO MAKER**

By Danny English

Creating a colorful, eye-catching demonstration can be a difficult task, but it's a snap with Demo Maker. You can create and edit rasters, text, scrolling effects, and many other options with the touch of a key. When you save your finished demo on disk, it can be loaded and run like a BASIC program.

You can use Demo Maker as a loader with instructions to load and execute another program, or you can use it to make an exciting title to your own creation. The vivid raster display will add luster to the dullest program.

Typing It In

Demo Maker consists of two programs. The first part is written entirely in machine language. You must enter this program with MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts you, respond with the values given below.

Starting address: 3F7B Ending address: 4A7A

When you've finished typing, be sure to save the program to disk with the name DEMO.CODE. The second part of Demo Maker will load this program by that name.

Demo Maker's editor is written entirely in BASIC. To help avoid typing er-

6B28:20 AE FF 18 98 65 AE 85 79

6B30:AE 90 03 E6 AF 18 98 6D CD

rors, use The Automatic Proofreader to enter this program. See "Typing Aids" again.

#### Raster Magic

When both programs are saved on disk, load the BASIC Demo Maker and type RUN. The demo code will be loaded, followed by the menu screen.

Creating a demo with the editor is very simple. Use the cursor keys to move the pointer up and down the options. To change colors, move the pointer to the color you wish to change and press the + or - keys. The colors will cycle forward or backward to the color you desire.

The raster colors are all coded by shades. For example, shades of red include brown, pink, and orange. Shades of yellow are actually a rainbow of colors. For effect, the large scrolling raster is split in half, allowing two shades to be seen at once.

#### **Text Options**

The demo screen has a scrolling text display in the lower screen, fading or flashing text in the middle, and large title text at the top. There are options on the menu to edit all of these. To select one of the options, move the pointer and press Return.

Because of the way the text is stored, a special text-entry routine is used that doesn't allow you to use the cursor keys. You simply type from left to right, however, and the cursor will wrap around normally. The Delete key does work in its normal fashion. Press Return when you've finished entering, and the text will be stored in the demo.

The large title letters were created using a special character set. This character set doesn't contain punctuation marks or numbers; therefore, use only letters A to Z when entering the title.

In the center of the screen is a large section of text that's fading or flashing. The menu has options to control the color and speed of the fading. Notice that the top and bottom lines of this text appear on rasters in the demo. The color of these lines is specified in the menu by the text on raster color.

#### Saving the Demo

You can preview your demo at any time by pressing the space bar. Press-

ing the space bar again will return to the menu. When the demo looks the way you want it, move the pointer to the save option and press Return. You'll then be asked if it should boot another file. If you enter Y, you'll be prompted for the filename and SYS address if it's a machine language program. If you enter N, the program will tell the demo to return to BASIC after viewing.

The next prompt is the filename for the actual demo. Saving the program takes more than a minute, but then it can be loaded and run like a BASIC program. If the demo is to boot another file, be sure to save it on the same disk. After watching the demo, press the space bar to continue.

Feel free to experiment with color combinations and creative text displays. Whether you're making the title to a game or just an attractive display, Demo Maker will amaze you.

## DEMO.CODE | Should be OB

3F7B:00 08 08 0A 00 9E 32 30 6D 3F83:36 34 00 00 00 49 00 8C DB 3F8B:EA EA EA EA EA EA EA EA 3F93:EA EA EA EA EA EA EA EA 12 3F9B:EA EA EA EA EA EA EA EA IA 3FA3:18 A9 78 85 FB 69 85 85 16 3FAB: 25 A9 ØA 85 FC 69 08 85 E3 3FB3:26 18 A9 00 65 FB 85 27 CD 3FBB: A9 40 65 FC 85 28 A2 FF AD 3FC3:AØ ØØ 8C FE CF 8C FF CF 94 3FCB:FØ Ø4 B1 25 91 27 C6 25 28 3FD3:E4 25 DØ Ø2 C6 26 C6 27 CB 3FDB:E4 27 DØ 02 C6 28 FB C6 31 3FE3:E4 FB DØ E6 C6 FC E4 FC 4D 3FEB:DØ EØ A5 28 C9 AØ BØ ØA 7E 3FF3:85 85 38 27 34 A5 85 33 3FFB:85 37 4C B2 46 20 20 20 D2 4003:20 20 20 20 20 20 20 20 83 20 20 20 20 20 400B:20 20 20 8B 4013:20 20 20 20 20 20 20 20 93 401B:20 20 20 20 20 20 20 20 9B 4023:20 20 20 20 20 20 05 01 4E 402B:13 19 ØF 20 03 20 14 15 D4 ØF ØD Ø9 1A 4033:13 14 05 20 CF 403B:09 ØE 14 ØF 20 19 ØF 15 CF 4043:12 ØF 17 ØE 20 04 20 95 26 20 404B:0D 0F 21 21 20 20 20 2E 4053:20 20 20 20 20 20 20 20 D3 405B:20 20 20 20 20 20 20 20 DB 4063:20 20 20 20 20 20 20 20 E3 406B:20 20 20 20 20 20 20 20 EB 4073:20 20 20 20 20 20 20 2A FD 407B:20 01 13 14 Ø5 12 20 DA 12 4083:03 ØF ØC ØF 12 13 20 20 F8 408B:20 20 20 20 2A 20 14 05 29 4093:18 20 03 ØF ØC ØF 12 32 409B:13 20 20 20 20 20 20 20 95 40A3:20 20 20 20 20 20 20 20 24

40AB: 20 20 20 20 20 20 20 20 20 2C

42E3:14 Ø8 Ø5 12 2Ø Ø6 Ø9 ØC 6D	4513:FØ FØ FØ F8 ØØ 7F 70 70 4F	4743:4C BC FE 8D 20 D0 8D 21 60
42EB:05 2E 20 20 14 08 05 20 6F	451B:70 70 7F FF 00 E0 E0 E0 10	474B:DØ 6Ø A9 C8 8D 16 DØ A9 2C
42F3:10 0F 13 13 09 02 09 0C 46	4523:70 78 3F ØF ØØ 7Ø 7Ø FF	4753:15 8D 18 DØ 6Ø ØA ØA ØA 29
42FB:09 14 09 05 13 20 01 12 A8	452B:70 70 7F FF 00 7F 78 78 61	475B:08 08 08 02 02 02 00 00 29
4303:05 20 05 0E 04 0C 05 13 03	4533:78 78 7F FF 00 7F 78 78 6F	4763:00 0B 0B 0B 0C 0C 0C 0F 7E
43ØB:13 21 2Ø 2Ø 15 ØE ØC Ø5 67	453B:78 78 78 FC 00 E0 E0 E0 25	476B:0F 0F 01 01 01 01 01 01 84
4313:01 13 08 20 14 08 05 20 CC	4543:70 78 3F ØF ØØ 7F 78 78 64	4773:0F 0F 0F 0C 0C 0C 00 00 80
431B:07 12 01 10 08 09 03 20 55	454B:78 78 78 FC 00 03 03 03 24	477B:00 09 09 09 02 02 02 08 22
4323:10 0F 17 05 12 20 0F 06 DD	4553:03 03 03 1F 00 00 F8 70 D4	4783:08 08 0A 0A 0A 00 06 0E 64
432B:20 19 0F 15 12 20 36 34 EC	455B:70 78 3F 1F 00 7F 79 78 7F	478B:03 01 01 03 0E 06 00 0B BF
4333:2E 2E 2E 20 2A 2A 20 14 72	4563:78 78 78 FC ØØ 78 78 78 72	4793:0C 0F 01 01 0F 0C 0B 00 DA
433B:08 05 20 03 0F 0D 10 15 1D	456B:78 78 7F FF 00 70 70 70 53	479B:00 00 05 02 00 01 01 00 F0
4343:14 Ø5 2Ø Ø4 Ø5 ØD ØF 2Ø F3	4573:70 70 70 F8 00 70 70 70 03	47A3:00 05 20 20 20 57 45 4C AE
434B: ØD Ø1 ØB Ø5 12 20 2A 2A D9 4353: 20 20 Ø2 19 20 Ø4 Ø1 ØE E4	457B:70 70 70 F8 00 E0 E0 E0 1E	47AB:43 4F 4D 45 20 54 4F 20 BE
	4583:70 78 3F 0F 00 7F 70 70 8C	47B3:54 48 45 20 20 20 20 43 2E 47BB:4F 4D 50 55 54 45 20 44 E0
435B:0E 19 20 05 0E 07 0C 09 31 4363:13 08 20 20 20 20 20 20 5D	458B:70 70 70 F8 00 E1 E1 E0 34 4593:70 78 3F 0F 00 7F 71 70 9E	47BB:4F 4D 50 55 54 45 20 44 E0 47C3:45 4D 4F 20 4D 41 4B 45 7F
436B:20 20 20 20 00 00 07 0F 2D	459B:70 70 70 F8 00 03 00 00 24	47CB:52 20 C2 C4 CE CD 47 AD 1A
4373:1F 3C 78 FØ FØ ØØ FF 7F BD	45A3:F8 78 3F ØF ØØ Ø3 Ø3 Ø3 B6	47D3:CD 47 C9 BF FØ Ø1 6Ø A9 46
437B:70 70 70 70 7F 00 0F 3F C4	45AB:03 03 03 07 00 70 70 70 5C	47DB:C7 8D CD 47 AØ ØØ B9 71 C9
4383:78 70 E0 E0 E0 00 FF 7F 13	45B3:70 38 3F 0F 00 0E 0E 07 B8	47E3:07 99 70 07 C8 C0 27 D0 43
438B:70 70 70 70 70 00 FF 7F 7E	45BB: 07 03 03 01 00 73 77 7F 37	47EB:F5 AØ ØØ Bl FE C9 ØØ DØ A8
4393:78 78 78 78 7F 00 FF 7F 86	45C3:7E 7C 78 FØ ØØ Ø3 Ø7 ØE F2	47F3:09 A9 E0 85 FE A9 41 85 8C
439B:78 78 78 78 7F 00 0F 3F 6C	45CB:1C 38 70 F8 00 03 03 03 25	47FB:FF 60 8D 97 07 A5 FE 18 B2
43A3:78 70 E0 E0 E0 00 FC 78 26	45D3:03 03 03 07 00 07 0F 1E C9	4803:69 01 85 FE A5 FF 69 00 29
43AB:78 78 78 78 7F 00 1F 03 60	45DB:3C 78 FF FF 00 1E FE FE 18	480B:85 FF 60 A2 00 A0 00 B9 D0
43B3:03 03 03 03 03 00 03 00 2B	45E3:1E 1E 1E 3E 00 FC 1E 0E EA	4813:A5 47 C9 20 D0 05 E8 E8 D8
43BB:00 00 00 00 00 00 FC 78 B4	45EB: ØE 3E FC FØ ØØ ØØ ØØ ØØ BB	481B:4C 38 48 38 E9 40 9D 50 48
43C3:78 78 78 79 7F 00 FC 78 B9	45F3:1C 3C F8 EØ ØØ ØE ØE ØE 2B	4823:04 18 69 40 9D 51 04 18 3F
43CB:78 78 78 78 78 00 F0 78 61	45FB:0E 1C FC F0 00 F0 10 00 27	482B:69 40 9D 78 04 18 69 40 4F
43D3:7C 7E 77 73 71 00 F0 78 44 43DB:7C 7E 77 73 71 00 0F 3F 4F	4603:00 02 FE FE 00 E0 20 00 A3	4833:9D 79 Ø4 E8 E8 C8 CØ 14 FF
43DB:7C 7E 77 73 71 00 0F 3F 4F 43E3:78 70 E0 E0 E0 00 FF 7F 73	460B:00 00 00 00 00 7E 7E 0E 9C 4613:1C 3C F8 E0 00 FC 3C 3C 92	483B:DØ D5 A2 ØØ AØ ØØ B9 B9 3Ø 4843:47 C9 2Ø DØ Ø5 E8 E8 4C E4
43EB:70 70 70 70 7F 00 0F 3F 35	461B:3C 3C 3C 7E 00 C0 C0 C0 89	484B:67 48 38 E9 40 9D A0 04 05
43F3:78 70 E0 E0 E0 00 FF 7F 83	4623:CØ CØ CØ F8 ØØ 78 78 78 33	4853:18 69 40 9D Al 04 18 69 E2
43FB:70 70 70 70 7F 00 0F 3F 45	462B:78 FØ FØ EØ ØØ 8Ø CØ EØ CØ	485B:40 9D C8 04 18 69 40 9D 51
4403:78 70 78 3E 0F 00 FF FF 4F	4633:70 38 1C 3E 00 00 00 00 6D	4863:C9 Ø4 E8 E8 C8 CØ 14 DØ C7
440B:83 03 03 03 03 00 F8 70 21	463B:00 08 F8 F8 00 1C 1C 1C 3D	486B:D5 60 A0 00 99 70 DB C8 22
4413:70 70 70 70 70 00 F8 70 EA	4643:1C 1C 1C 3E 00 FC 7C 3C 75	4873:CØ 28 DØ F8 60 AØ ØØ 99 37
441B:70 38 38 1C 1C 00 F8 70 F5	464B:1C 1C 1C 3E 00 0E 0E 0E B6	487B:50 D8 C8 C0 A0 D0 F8 60 2A
4423:70 70 70 70 71 00 F8 70 03	4653:1C 3C F8 EØ ØØ EØ ØØ ØØ AD	4883:AØ ØØ 99 68 D9 99 F8 D9 1F
442B:38 1C ØE Ø7 Ø3 ØØ F8 7Ø 83 4433:38 1C ØE Ø7 Ø3 ØØ FF FF 29	465B:00 00 00 00 00 0E 8E EE 2C 4663:7C 3C FC E6 00 E0 C0 E0 31	488B:C8 CØ FF DØ F5 6Ø AØ ØØ 3Ø
4433:38 IC 0E 07 03 00 FF FF 29	466B:70 38 1C 3E 00 F0 78 1C 76	4893:99 40 D9 99 F8 DA C8 C0 5B 489B:28 D0 F5 60 EE F0 CF AD C1
4443:FØ 78 3C 1E 1E ØØ EØ F8 77	4673:1C 3C F8 EØ ØØ 8Ø 8Ø 8Ø CD	48A3:FØ CF CD 9D 47 BØ 17 AC ØC
444B:3E ØE ØE 1C F8 ØØ CØ F8 3C	467B:80 80 80 C0 00 1C 1C 1C 49	48AB:F1 CF B9 91 47 20 83 48 83
4453:3C 1C 00 00 00 00 F0 FC DF	4683:1C 38 F8 EØ ØØ EØ EØ CØ 5F	48B3:AD F1 CF C9 ØB BØ Ø1 6Ø AB
445B:1C ØE ØE ØE ØE ØØ FE FE 85	468B:CØ 8Ø 8Ø ØØ ØØ 9C DC FC D1	48BB:A9 00 8D F1 CF 60 EE F1 C1
4463:02 00 00 10 F0 00 FE FE 72	4693:FC 7C 3C 1E 00 80 C0 E0 8B	48C3:CF A9 00 8D F0 CF 60 AD B4
446B:02 00 00 20 E0 00 C0 F8 78	469B:70 38 1C 3E 00 80 80 80 59	48CB:A1 47 C9 Ø1 FØ Ø1 6Ø EE 83
4473:3C 1C 00 00 00 00 7E 3C 5A	46A3:80 80 80 C0 00 80 00 00 AE	48D3:F3 CF AD F3 CF C9 Ø3 BØ A3
447B:3C 3C 3C 3C FC 00 F8 C0 17		48DB:01 60 A9 00 8D F3 CF AD C3
4483:CØ CØ CØ CØ CØ ØØ FE 78 3D 448B:78 78 78 78 78 ØØ 3E 1C 61		48E3:F2 CF C9 Ø1 FØ 16 CE CE 77 48EB:47 AD CE 47 C9 BF FØ Ø1 ØA
4493:38 70 E0 C0 80 00 00 00 80		48F3:60 A9 C0 8D CE 47 A9 01 F7
449B:00 00 00 00 00 00 1E 3C 9C		48FB:8D F2 CF 60 EE CE 47 AD FE
44A3:7C FC DC 9C 1C 00 1E 1C 48		4903:CE 47 C9 C8 F0 01 60 A9 8A
44AB:1C 1C 1C 9C DC 00 C0 F8 F7		490B:C7 8D CE 47 A9 00 8D F2 8E
44B3:3C 1C ØE ØE ØE ØØ EØ F8 2F	46E3:47 20 4D 47 A0 00 A2 70 F4	4913:CF 60 A0 00 B9 70 43 99 69
44BB:3C 1C 1C 3C F8 00 C0 F8 F2		491B:08 30 B9 40 44 99 08 32 C3
44C3:3C 1C 0E 0E 0E 00 E0 F8 3F		4923:B9 10 45 99 08 34 B9 E0 3E
44CB: 3C 1C 1C 3C F8 00 E0 F8 43		492B:45 99 Ø8 36 C8 CØ DØ DØ E6
44D3:3C 3E 00 00 C0 00 FE FE 0D		4933:E3 AØ ØØ A9 ØØ 99 ØØ 31 12
44DB:82 80 80 80 80 00 3E 1C 7A 44E3:1C 1C 1C 1C 1C 00 3E 1C 40		493B:C8 CØ Ø8 DØ F8 6Ø AD 11 26 4943:DØ 29 7F 8D 11 DØ A9 7F EF
44EB:1C 38 38 70 70 00 3E 1C 40		4948:8D ØD DC AØ 46 A2 B5 8E 44
44F3:1C 1C 1C 1C 1C 00 3E 1C 50		4953:14 Ø3 8C 15 Ø3 A9 81 8D E2
44FB:38 70 E0 C0 80 00 3E 1C 81	472B:B9 58 47 99 57 47 C8 CØ 59	495B:1A DØ 6Ø 78 A9 FØ 8D 1A Ø9
4503:38 70 E0 C0 80 00 FE FE EE	4733:30 DØ F5 8E 87 47 AD ØD 77	4963:DØ A9 31 8D 14 Ø3 A9 EA B2
450B:3C 78 F0 E0 C0 F0 FF FF C7		496B:8D 15 Ø3 A9 81 8D ØD DC 3E
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497	3 . 2	Ø A3	FD	20	5B	FF	58	A9	F5	
497	B:0	0 20	46	47	4C	4D	47	A9	23	
	3:0 B:F			CF			CA 6Ø	DØ AØ		
499	3:0	Ø B9	29	4A	99	A7	02	C8	96	
	B:C				60			49		
	3:A B:D		8D A9		02		93 FF	A9	63 53	
49B	3:0	Ø 8D	15	DØ	AØ		B9	00	Dl	
	B: 4		4Ø C8		B9 EF		4Ø EF	99	D4 57	
	B: 4	1 49	20	ØE	48	AD	9F	47		
	3:2		-		00 6D		83	48 9E	Ø8	
	3:4	D AØ	91		AØ		A2	EØ		
	B:8	6 FE	84		A9	00	8D	FØ		
	3:C	F 8D 3 CF		CF 82	8D	F2	CF	8D 47	72 5A	
4AØ	3:2	Ø 9F	48	20	CA	48	A5	C5	23	
	B:C 3:9		DØ D2	EE		5E			53 F2	
	B: A		4A		Ø2	DØ	01		6C	
	3:2		49		B8	02	02	2A	56	
	B: 2		2A 2A		2A 2A		2A 2A		BF 47	
4A3	B:0	Ø 8D	86	Ø2	A9	10	A2	A8		
	3:A B:Ø	Ø Ø2 8 AØ		BD 20		A9 FF	20	A2 D5		
	3:F	F AD	29	4A	C9	01	FØ	Ø3		
	B: 40		CØ	A9	52	8D				
		9 55 9 Ø2		78 ØD			4E Ø2		3C 47	
		4 85								
DEA	101	MAKE	D							
						10		201		
BA	10	REM TE P	UBL							
		- A	LL	RIG	HTS	RE	SEF	EVE	)	
SA	20	IF A	= Ø	THE	N A	=1:	LOP	D"I	DEM	
HD	30	DIM	C\$ (	15)	, V (	9),	R (4	1)		
SS	40	FOR				: RE	AD	A\$	C\$	
CG	50	(X) = FOR				REA	D A	V:V	(X)	
		=A:N	EXT							
PD	60	FOR E X+						A: I	POK	
AA	70	R(Ø)						-5:I	R (3	
-		)=6:	R (4	) = 7						
RF	80	T\$="	YES	":S	=11	85:	KŞ=	"A'	':X	
KS	90	B\$="	{WH	т}-						
		_"								
RD	100	POK	E53	272	, 23	: PC	KES	5328	31.	
		Ø:P	OKE	532	180,	11				
PH	110	PRI	NT"	{CL	R } {	DOV	IN)	[7]	NE	
		R *	*"	ACE	101		EFIC	-	ANE	
QE	120	PRI	NT"						-	
			SPA RS{							
		<b>{6}</b>	"C\$	(V (	(0))		-			
AE	130	PRI	NT"	{3	SPA	CES				

ROLLING TEXT COLOR: {6}

XT ON RASTER COLOR: {6}

"C\$ (V(1))

CE 140 PRINT" [3 SPACES] [WHT] TE

	CE	150	"C\$(V(2)) PRINT"{3 SPACES}{YEL}MI D BACKGROUND COLOR: {7}	BS	430	THEN 700 IF X=14 AND C\$=CHR\$(13) THEN 1100
	HD	160	"C\$(V(3)) PRINT"{3 SPACES}{YEL}LO	FP	440	IF C\$=" " THEN POKE 189 85,2:GOSUB 940:SYS 1809
			W BACKGROUND COLOR: {7}			8:GOTO 100 GOTO 280
	DX	170	PRINT"{3 SPACES}{GRN}MA IN RASTER{2 SPACES}PART			IFT\$="YES" THEN T\$="NO" :GOTO100
3	PT	100	1: {3}"C\$(V(5))" SHADE S" PRINT"{3 SPACES}{GRN}MA			IFT\$="NO" THEN T\$="YES" :GOTO100 V(X)=V(X)+1:IF V(X)=3TH
	FJ	100	IN RASTER (2 SPACES) PART 2: {3}"C\$(V(6))" SHADE		490	ENV(X)=5 GOTO100
	DG	190	S" PRINT"{3 SPACES}{GRN}SM	KE		V(X) = V(X) - 1 : IF V(X) = 4TH ENV(X) = 2
			ALL RASTER COLORS: {PUR}"C\$(V(7))" SHADES"		520	GOTO100 REM * TEXT INPUT *
	SG	200	PRINT"{3 SPACES}{GRN}MI DDLE FADER COLORS: {PUR}"C\$(V(8))" SHADES"	-	530 540	PRINT" (RVS) (WHT) (OFF)"
	QR	210	PRINT"{3 SPACES}{CYN}FA DER SPEED (Ø TO 10):			GET C\$:IFC\$=""THEN550 PRINT"{LEFT} {LEFT}";:I
	PF	220	{PUR}"V'(9) PRINT"{3 SPACES}{YEL}AN			FC\$=CHR\$(13)THEN RETURN IFC\$<>CHR\$(20)THEN610
	AX	230	IMATE TITLE: {6}"T\$ PRINT"[3 SPACES]{WHT}EN TER TITLE TEXT"	444		IF M=0THEN540 M=M-1:PRINT"{LEFT} {LEFT}";:IFM<1THEN530
	XE	240	PRINT" {3 SPACES } ENTER S CROLLING TEXT"	0000		GOTO540 IF C\$="{F1}"THEN RETURN
			PRINT"{3 SPACES}ENTER M IDDLE TEXT"	MR	620	IFM>=LE OR (C\$<" "ORC\$> "Z") THEN540
			PRINT" [3 SPACES] {CYN} SA  VE THE DEMO"  PRINT" [2 DOWN] [6]	НН	640	M=M+1:PRINTC\$;:GOTO540 REM * SCROLLING TEXT * PRINT CHR\$(147)B\$"
	RJ	210	{4 SPACES}PRESS SPACE TO PREVIEW THE DEMO"	JE	050	{10 DOWN}"B\$"{YEL} {DOWN}ENTER THE SCROLL
			SC=S+X*40:POKE SC,62:PO KESC+54272,1	нх	660	{SPACE}TEXT NOW." PRINT"{DOWN}PRESS <retu< td=""></retu<>
	FD	290	GET C\$:IFC\$="{DOWN}" AND X<14 THEN POKESC, 32:X			RN> TO STORE, {2 SPACES} <f1> TO ABORT {HOME}  {WHT} {DOWN}";</f1>
	SE	300	IFC\$="{UP}"AND X>0 THEN- POKESC,32:X=X-1	SP	670	FOR Y=16864 TO 17263:PO KE Y-15800, PEEK (Y): NEXT
	GC FJ		IF C\$ <> "+" THEN 350 IF X<=4 THEN IF V(X)<15	PX	680	:LE=398:GOSUB 520 IF C\$<>"{F1}"THEN FOR Y
	DS	330	THEN $V(X) = V(X) + 1$ : GOTO1 00 IF $X=9$ THEN IF $V(X) < 10$			=1064 TO 1463:POKE Y+15 800,PEEK(Y):POKE Y,42:N EXT
			${SPACE}THEN V(X)=V(X)+1$ :GOTO100	100		GOTO100 REM * MIDDLE TEXT *
			IF X<=8 THEN IF V(X)<7 {SPACE}THEN 480	МВ	710	PRINT CHR\$(147)B\$" {12 DOWN}"B\$"{YEL}
			IF C\$ <> "-" THEN 390 IF X<=4 THEN IF V(X)>0 {SPACE}THEN V(X)=V(X)-1	111		{DOWN}ENTER THE MIDDLE {SPACE}TEXT NOW. {2 SPACES}FIRST AND
	RA	370	:GOTO100 IF X=9 THEN IF V(X)>0 T	PR	720	PRINT"LAST LINES ARE TE XT ON RASTERS."
	XG	380	HEN $V(X) = V(X) - 1$ : GOTO100 IF X<=8 THEN IF $V(X) > 1$	AD	730	PRINT" (DOWN) PRESS < RETU RN> TO STORE, {2 SPACES}
	JA	390	{SPACE}THEN 500 IF X=10 AND C\$=CHR\$(13) THEN 460	PF	740	<pre> <f1> TO ABORT {HOME} {WHT} {DOWN}"; FOR Y=16384 TO 16863:PO </f1></pre>
	HP	400	IF X=11 AND C\$=CHR\$(13) THEN 770	EE	140	KE Y-15320, PEEK(Y): NEXT

THEN 770

THEN 640

FB 410 IF X=12 AND C\$=CHR\$ (13)

GF 420 IF X=13 AND C\$=CHR\$ (13)

=1064 TO 1543: POKE Y+15

320, PEEK (Y): POKE Y, 42:N

:LE=479:GOSUB 520

FE 750 IF C\$<>"{F1}"THEN FOR Y

-		EXT Y
PR	760	GOTO100
RX		REM * TITLE *
		PRINT CHR\$(147)B\$"
CI	100	{2 DOWN}"B\$"{YEL}{DOWN}
		ENTER THE TITLE LETTERS
		NOW."
VD	790	POKE1084,45:POKE1124,45
KX		
MA	ששס	PRINT" (DOWN) 18 LETTERS
		{SPACE}PER LINE (SPACES
200		INCLUDED) "
QD	810	PRINT"NO PUNCTUATION IS
		ALLOWED IN TITLE."
HH	820	PRINT" {DOWN } PRESS < RETU
		RN> AT END OF EACH LINE
		11
XS	830	FOR Y=18341 TO 18360:P=
		Y-17277: V=PEEK(Y): IF V<
		>32 THEN V=V-64
GK	840	POKEP, V: NEXT
	850	FOR Y=18361 TO 18380:P=
LQ	030	Y-17257: V=PEEK(Y): IF V<
		>32 THEN V=V-64
00	oca	
	860	POKEP, V: NEXT
GE	870	PRINT" (HOME) {WHT} {DOWN}
		";:LE=19:GOSUB520
	880	PRINT:LE=19:GOSUB520
PB	890	FOR Y=1064 TO 1083:P=Y+
		17277: V=PEEK(Y): IF V<>3
		2 THEN V=V+64
QD	900	POKEP, V: POKE Y, 42: NEXT
KC	910	FOR Y=1104 TO 1122:P=Y+
		17257:V=PEEK(Y):IF V<>3
		2 THEN V=V+64
ER	920	POKEP, V: POKE Y, 42: NEXT
	930	GOTO100
	940	REM * CUSTOMIZER *
	950	PRINT"{CLR}"
		AD=18333:POKE AD, V(9):P
PP	960	
		OKE AD+1, V(2): POKE AD+2
		,V(Ø):POKE AD+3,V(1)
BG	970	POKE AD+4,0:IF T\$="YES"
		THEN POKE AD+4,1
PQ	980	
		7, V(4)
BP		REM * RASTERCOL *
FK	100	Ø Y=32768:FOR T=Ø TO 3:I
		F R(T) <> V(7) THEN Y=Y+
		9:NEXT
XC	101	Ø A=18312:GOSUB1090
SR	102	Ø Y=32768:FOR T=Ø TO 3:I
DIC		F R(T) <> V(8) THEN Y=Y+
		9: NEXT
ED	102	Ø A=18321:GOSUB1090
ED	103	Ø Y=32768:FOR T=Ø TO 3:I
нп	104	
		F R(T) <>V(5) THEN Y=Y+
		9: NEXT
MR	105	Ø A=18264:FOR T=Y TO Y+7
		:FOR U=Ø TO 2:POKE A,P
		EEK(T):A=A+1:NEXT U:NE
		XT T
AS	106	Ø Y=32768:FOR T=Ø TO 3:I
		F R(T) <> V(6) THEN Y=Y+
		9:NEXT
AP	107	Ø A=18288:FOR T=Y TO Y+7
111	201	:FOR U=Ø TO 2:POKE A,P
		EEK(T):A=A+1:NEXT U:NE
		XT T
		A1 1
	-	OMPLITE ILINE 1002

XF AB	1080 1090	RETURN FOR T=Y TO Y+9:POKE A, PEEK(T):A=A+1:NEXT:RET
QE KJ		
ΔR	1120	{WHT}{DOWN}SHOULD DEMO BOOT ANOTHER FILE? Y {3 LEFT}"; A\$ IF A\$="N" THEN POKE 18
EX		985,2:GOTO 1200 PRINT"{CLR}{2 DOWN}"B\$
	-	"{YEL}ENTER THE NAME OF FILE TO BOOT"
CF	1140	OF NAME) {HOME} ": POKE1
хм	1150	080,45:LE=15:GOSUB520 FOR Y=1064 TO 1079:A=Y +17922:V=PEEK(Y):IF V
		{SPACE}> Ø AND V < 27 {SPACE}THEN V=V+64
	1160 1170	POKE A,V:NEXT:PRINT INPUT" {4 DOWN } {CYN } ENT ER SYS (RETURN = BASIC) "
DD	1180	;SY IF SY=0 THEN POKE18985 ,1:GOTO 1200
sc	1190	POKE 18985, Ø:H=INT (SY/ 256):L=SY-256*H:POKE 1
MF	1200	9036,L:POKE 19037,H INPUT"{CLR}{2 DOWN} {WHT}FILENAME OF DEMO"
PK	1210	;F\$ PRINT"{2 DOWN}{GRN}SAV ING DEMO";
BG	1220	OPEN2,8,2,"Ø:"+F\$+",P,
ХН	1230	PRINT#2, CHR\$(1); CHR\$(8);
нв	1240	FOR J=16252 TO 19064:P RINT#2,CHR\$(PEEK(J));
CS	1250	IF ST > Ø THEN PRINT" {SPACE}ERROR DURING SA VE":PRINT#2:CLOSE2:END
PG	1260	
AM	1270	DATA BLACK, WHITE, RED, C YAN, PURPLE, GREEN, BLUE,
НА	1280	YELLOW DATA ORANGE, BROWN, LT R ED, DK GRAY, MED GRAY, LT GREEN, LT BLUE, LT GRAY
JP	1290	DATA 0,1,11,0,5,1,2,6,
вк	1300	
SF	1310	DATA 0,9,2,8,10,10,8,2
KF	1320	DATA 0,5,3,13,1,1,13,3
XD	1330	DATA 0,6,14,3,1,1,3,14

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FF 1340 DATA 10,7,13,3,14,3,13

### F/X PLOT 128

By Kevin Davis

At one time or another, any student of mathematics has had to deal with coordinate plane graphing. Graphing calculators have been recognized by educators as helpful tools for understanding graphs, but these calculators can cost up to \$300.

While programs such as Arbplot exist for Apple and IBM computers, few are available for 8-bit Commodores. F/X Plot 128 tries to change this. The program itself was designed using the popular TI-81 as a benchmark. It's a menu-driven, user-friendly, colorful program designed to make good use of the 128's high-resolution graphics in 40-column mode.

**Entering the Program** 

F/X Plot 128 consists of a main program and a sprite. The main program is written in BASIC 7.0 and should be entered with The Automatic Proofreader to avoid typing errors. See "Typing Aids" elsewhere in this section.

The sprite data used to create an onscreen pointer or tracer is written in machine language. Enter it with MLX, our machine language entry program. See "Typing Aids" again. When MLX prompts, respond with the following values.

Starting address: 0E00 Ending address: 0E3F

Be sure to save the program as F/X PLOT.SPR on the same disk as the main program. The main program loads this data when it runs.

When you first run F/X Plot, the top of the screen will be jumbled. Clear the screen from the Options menu, press Run/Stop–Restore, and then run the program again. This process is required only when you first run the program.

From then on, you'll see a screen divided into quarters with a menu at the bottom. The program is completely menu driven. First, let's look at the Options menu. Press 4.

With this menu, you'll be presented with five numbered options. Press the number in front of the one you want.

**Simultaneous/Sequence** F/X Plot can hold formulas for up to four graphs.

Simultaneous will graph all selected formulas at the same time. Sequence graphs them one at a time. Always select Sequence when you have only one formula to graph. (Sequence is also a little faster in this case.)

**Enable/Disable Formulas** You can toggle here to enable or disable certain formulas. Only the enabled ones, denoted by their numbers appearing in reverse mode, will be graphed.

**Clear Graphics Screen** This will clear the graphics screen and return you to the Main menu.

**Set Tracer Speed** This option allows you to set the speed at which the tracer moves. A smaller number will move more slowly but will be more accurate. Three is the default.

Connected/Dotted This works in a fashion similar to the Enable/Disable toggle. The formulas set to Connected will draw a line between each plotted point. Experimentation with the program will give you an idea of when it's a good idea to set formulas to Connected. Connected formulas are in reverse.

Use the Esc key to move from the Options screen to the Main menu. Here are the Main menu options.

**Set Range** Set the X-Minimum (the least *x* value graphed), X-Maximum (the greatest *x* value graphed), Y-Minimum, and Y-Maximum. Defaults are 10 to 10 on both axes. The resolution (scaling) of the graph is determined by the distance between the maximum and minimum values. In other words, a range of -1 to 1 will appear much closer in (like a zoom lens) and have a higher resolution than -100 to 100. For trigonometric graphs, use plus or minus 3.14 as pi and plus or minus 6.28 as two pi.

**Tracer** The Tracer requires a joystick in port 2. When you choose this, you'll see the range values and a gray device somewhat like cross hairs in the upper left corner of the screen. Its speed is controlled from the Options menu. You're shown the *x*-coordinate and *y*-coordinate of the cross hairs as they

move around the screen. This option can be helpful in evaluating certain points along the graph.

In order to zoom into a section of the graph, move to the upper left corner of the rectangular section you want to zoom into and press and release the fire button. There will be a bell tone and a brief pause. Then move the cross hairs to the lower right corner and do likewise. This process sets the next range of values. Use the Esc key to exit, select Clear from the Options menu, and choose Graph from the Main menu to proceed.

**Graph** This is the most important, and easiest, function of F/X Plot. It graphs the enabled functions on the screen. Each function is graphed in its corresponding color as shown in the Enable/Disable menu. As each point is graphed, its x and y values are printed at the bottom of the screen. The coordinates of the last five points graphed are visible at the bottom of the screen. To pause the graphing, use the No Scroll key.

If the program attempts to graph a value that BASIC cannot handle (such as the point on an asymptote in a trigonometric function), a bell tone will sound, and that point won't be graphed. An error-trapping routine prevents the program from stopping. It'll just move on to the next value.

#### Plotting Functions

F/X Plot comes with four formulas already entered, but, naturally, you'll want to enter your own. These are stored as DEF DN statements in lines 60–90. The BASIC DEF FN command, however, cannot be implemented from program mode. In order to set or change the formulas, you must exit the program by pressing the Run/Stop-Restore keys simultaneously. Type LIST 60–90 and press Return.

Then use the cursor keys to edit each line with the formula of your choice for FN(A), FN(B), FN(C), and FN(D). Remember to press Return after entering your formulas. Then run the program again.

All formulas must be entered using BASIC's normal mathematical commands. These include SIN, COS, LOG, TAN, ABS, and operators +, -, \*, and /.

Anyone who has ever done any programming should be familiar with these operators and their use. New users may want to check the appendix dealing with mathematical commands in the 128 System Guide for the proper format.

#### Helpful Hints

While the program can graph only four functions at once, the graphics screen isn't erased when you stop the program. If you want to graph more than four formulas, graph the first four, exit the program, change the formulas, run the program again, and graph the second group. The graphs will overlap as long as you make sure that the ranges are the same.

Don't wait until the night before your big geometry examination to learn how to use F/X Plot 128! It's a powerful and versatile program that can be utilized fully only by thorough use and repeated experimentation.

While the theory is untested, I'd imagine that any program that captures the hi-res split screen and sends it to a printer could be used to make hardcopies of any graphs you create.

#### F/X PLOT 128

- RP 5 REM COPYRIGHT 1992 COMPUT E PUBLICATIONS INTL LTD {2 SPACES}ALL RIGHTS RESE RVED HX 10 CLR: XM=-10: XX=10: YM=-10: YX=10:SP=3:EA=1:EB=1:EC= 1:ED=1:TRAP 1890 SA 20 DIMJA(8):DIMJB(8):FORKO= 1TO8: READJA (KQ): NEXT RK 30 BLOAD ("F/X PLOT.SPR") PJ 40 FOR KQ=1TO8:READJB(KQ):N EXT MA 50 POKE53280,0:POKE53281,0 AQ 60 DEF FN A(X)= $X^{\uparrow}2$ PF 70 DEF FN B(X)=X+4EJ 80 DEF FN C(X) = ((SIN(X)))OK 90 DEF FN D(X) = (-1\*(SQR(X))MA 100 GRAPHIC 4,0 MM 110 REM DRAW ZEROS KS 120 IF XM<0 AND XX>0 THEN X z=1RP 130 IF YM<0 AND YX>0 THEN Y 7 = 1RR 150 GOSUB 840 FR 160 SLEEP1:GOTO890 MB 200 GOSUB 770 CG 210 IF XZ<>1 THEN 270 SM 220 REM DRAW X-ZERO DG 230 AM=ABS(XM):XL=AM/XR
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					and agent and an analysis of the same			WH 274 ( 0 CD 2 CD 2 ) "
		XL=160*XL	FD	700	IF XD>YX OR XD <ym td="" then<=""><td>UV</td><td>1020</td><td>NU(7) {2 SPACES}"</td></ym>	UV	1020	NU(7) {2 SPACES}"
		COLOR 1,16		71.0	(SPACE)740	HX	1030	PRINT" (RVS) (H) 3(N)
		DRAW 1, XL, Ø TO XL, 159	DF	110	QP=YX-XD:FP=QP/YR:CP=16			{OFF} CLEAR GRAPHIC SC
		IF YZ<>1 THEN 320			Ø*FP:COLOR1,11:DRAW1,TT	20	1040	PRINT" {RVS} (H) 4(N)
		YQ=ABS (YM):YU=YQ/YR	VD	720	,CP	EF	TOAR	{OFF} SET TRACER SPEED
		YL=160*YU:YL=160-YL	YR	120	IF TT=0 OR CQ<>1 THEN74			II
нв	300	IF YL>160 OR YL<0 THEN	JC	730	DRAW1,TT,CP TO ID,PD:ID	GM	1050	PRINT" {RVS} {H}5{N}
DD	210	(SPACE) 320	UC	DE	=TT:PD=CP	GIT	1030	{OFF} CONNECT/DOTTED";
DR	210	COLOR2,16:DRAW1,0,YLTO1	AE	740	IF EA=1 OR EB=1 OR EC=1	XX	1060	GETKEY GK\$: IFGK\$=CHR\$(
FC	320	59,YL REM PLOT			OR ED=1 OR SS=Ø THEN N			27) THEN 890
		XS=XR/160:YS=YR/160			EXT TT	PK	1070	GK=VAL (GK\$): IF GK>50RG
		UX=0:UY=0	AP	750	IF EA=Ø AND EB=Ø AND EC			K<1THEN1060
		FOR TT=ØTO159			=Ø AND ED=Ø THEN 760	BS	1080	ON GK GOTO 1090,1160,1
		IF EA=Ø THEN 46Ø			GOT0890		S. Carlotte	370,1400,1690
		XA=FNA((XM+(TT*XS)))	BC	770	IF XX<=Ø AND XM<=Ø THEN	RB	1090	PRINT" {CLR} {20 DOWN}
BA	380	PRINT" {CYN}X=" ((XM+(TT*			XR=ABS (XM) -ABS (XX)			{GRN}1] SEQUENCE (GRAP
		XS)))TAB(20)"Y="XA	BF	780	IF XX>Ø AND XM<Ø THEN X	-	1100	HED IN ORDER)"
RK	390	IF XA>YX OR XA <ym td="" then<=""><td>wa</td><td>700</td><td>R=ABS (XM) +ABS (XX)</td><td>PR</td><td>1100</td><td>PRINT"2] SIMULTANEOUS</td></ym>	wa	700	R=ABS (XM) +ABS (XX)	PR	1100	PRINT"2] SIMULTANEOUS
2000		{SPACE}450			IF XM>0 THEN XR=XX-XM			{SPACE} (GRAPHED AT SAM E TIME) "
XX	400	QP=YX-XA:FP=QP/YR:CP=16	AM	000	IF YX<=Ø AND YM<=Ø THEN YR=ABS(YM)-ABS(YX)	SS	1110	GETKEY GK\$: GK=VAL (GK\$)
	41.0	Ø*FP	HR	810	IF YX>0 AND YM<0 THEN Y	50		:IFGK=1THENSS=1
		COLOR 1,4 DRAW 1,TT,CP			R=ABS (YM) +ABS (YX)	GO	1120	IF GK=2 THEN SS=Ø
		IF TT=0 OR CA<>1 THEN45	AD	820	IF YM>0 THEN YR=YX-YM			IF GK\$=CHR\$(27) THEN 8
****	150	g on on on the individual	7000		RETURN	122		90
AS	440	DRAW1, TT, CP TO IA, PA: IA	(4)		REM PIC	FP	1140	IF SS<ØORSS>1THEN111Ø
	- 10	=TT:PA=CP	200		PRINT"{CLR}{20 DOWN}";	HM	1150	GOTO890
KF	450	IF SS=1 THEN NEXT TT			PRINT"{YEL} (40 @}"	MR	1160	PRINT"{CLR}{20 DOWN}
		IF EB=Ø THEN 57Ø	DJ	870	PRINT"{YEL}{16 @}{3}F			{1}PRESS FORMULA TO EN
PH	470	IF SS=1 THEN UX=0:UY=0:			{CYN}/{7}X {6}PLOT{YEL}	100		ABLE (HI-LIGHTED)"
		FOR TT=0 TO 159		Jan San	{16 @}"	JS	1170	PRINT"OR DISABLE.
		XB=FNB((XM+(TT*XS)))	1700 7 9		RETURN			{RVS}RETURN{OFF} EXITS
SS	490	PRINT" {GRN}X=" ((XM+(TT*	BD	890	GOSUB840: PRINT" {6}	W.11	1100	. II
		XS)))TAB(20)"Y="XB			{RVS}{H}1{N}{OFF} SET R	KH	1180	IF EA=1THENPRINT"{7}
MD	500	IF XB>YX OR XB <ym td="" then<=""><td></td><td></td><td>ANGE VALS{2 SPACES}</td><td></td><td></td><td>{RVS}{G}1{N}{OFF}";:GO TO1200</td></ym>			ANGE VALS{2 SPACES}			{RVS}{G}1{N}{OFF}";:GO TO1200
711	510	(SPACE) 560			{RVS}{H}2{N}{OFF} USE T RACER"	ΔΤ,	1190	IF EA<>1 THEN PRINT"
JH	210	QP=YX-XB:FP=QP/YR:CP=16 Ø*FP	ДЦ	900	PRINT" {RVS}{H}3{N}	UA	1130	{7} 1 ";
SB	520	COLOR1,6	An	200	{OFF} GRAPH FUNCTION	EX	1200	IF EB=1THENPRINT"{GRN}
		DRAW 1,TT,CP			{2 SPACES} {RVS} {H}4{N}			{RVS}{H}2{N}{OFF}";:GO
		IF TT=0 OR CB<>1 THEN56			{OFF} OPTIONS"			TO1220
		0	DB	910	GETKEY GK\$: GK=VAL (GK\$):	PP	1210	IF EB<>1 THEN PRINT"
RR	550	DRAW1, TT, CP TO IB, PB: IB			IF GK>4 OR GK<1 THEN 91			{GRN} 2 ";
		=TT:PB=CP	1900		Ø	RS	1220	IF EC=1THENPRINT" {YEL}
		IF SS=1 THEN NEXT TT	RG	920	ON GK GOTO 930,1450,170			{RVS}{H}3{N}{OFF}";:GO
		IF EC=0 THEN 660	1	E all sent	,990	75.1	1000	T01240
KS	580	IF SS=1 THEN UX=0:UY=0:			REM SET VALUES	KH	1230	IF EC<>1 THEN PRINT"
DV	FOG	FORTT=ØTO159	MX	940	INPUT" {CLR} {20 DOWN}X-M	PO	1240	{YEL} 3 ";
		XC=FNC((XM+(TT*XS)))	WD.	QEA	INIMUM [XMIN]";XM	PQ	1240	IF ED=1THENPRINT"{3}
DB	GOOD	PRINT"{YEL}X="((XM+(TT* XS)))TAB(20)"Y="XC	KB	220	INPUT"X-MAXIMUM [XMAX]"			{RVS}{H}4{N}{OFF}";:GO TO1260
НМ	610	IF XC>YX OR XC <ym td="" then<=""><td>MD</td><td>960</td><td>;XX INPUT"Y-MINIMUM [YMIN]"</td><td>co</td><td>1250</td><td>IF ED&lt;&gt;1 THEN PRINT"</td></ym>	MD	960	;XX INPUT"Y-MINIMUM [YMIN]"	co	1250	IF ED<>1 THEN PRINT"
	010	{SPACE}650	110	200	;YM	-×		{3} 4 ";
EF	620	QP=YX-XC:FP=QP/YR:CP=16	QG	970	INPUT"Y-MAXIMUM [YMAX]"	QX	1260	GETKEY CD\$: IFCD\$=CHR\$ (
		Ø*FP:COLOR1,8:DRAW1,TT,	-		;YX			13)THEN89Ø
	- 31-	CP	GM	980	PRINT"{CLR}":GOTO890	JR	1270	CD=VAL (CD\$): IFCD>40RCD
AA	630	IF TT=0 OR CC<>1 THEN65			REM OPTIONS MENU			<1THEN1260
		0	MJ	1000	PRINT"{CLR}{19 DOWN}	BB	1280	IF CD=1 AND EA=0 THEN
G	640	DRAW1, TT, CP TO IC, PC: IC	- 1		{8 SPACES} {7}	-		{SPACE}EA=1:GOTO1300
CD	cra	=TT:PC=CP			{20 SPACES}"	EP	1290	IF CD=1 AND EA=1 THEN
		IF SS=1 THEN NEXT TT	QP	1010	PRINT" (RVS) (H) 1 (N)	PC	1200	{SPACE}EA=Ø
		IF ED=0 THEN 740 IF SS=1 THEN UX=0:UY=0:			{OFF} SIMULTANEOUS/SEQ	DG	1300	IF CD=2 AND EB=Ø THEN
GD	0/0	FORTT=OTO159			UENCE [3 SPACES] {3}OPTI	KE	1310	{SPACE}EB=1:GOTO1320 IF CD=2 AND EB=1 THEN
PF	680	XD=FND((XM+(TT*XS)))	ум	1000	ONS {7}" PRINT" {RVS} {H}2{N}	KE	TOTA	{SPACE}EB=Ø
		PRINT"{3}X="((XM+(TT*XS))	API	TUZY	{OFF} ENABLE/DISABLE F	SB	1320	IF CD=3 AND EC=0 THEN
-	202.5	)))TAB(20)"Y="XD			ORMULAS (3 SPACES) (3) ME			{SPACE}EC=1:GOTO1340
151 741								1.00101310

DA	1330	IF CD=3 AND EC=1 THEN {SPACE}EC=0
PJ	1340	IF CD=4 AND ED=Ø THEN
RX	1350	{SPACE}ED=1:GOTO1360 IF CD=4 AND ED=1 THEN
KA	1330	{SPACE}ED=Ø
JS		PRINT" (UP)": GOTO 1180
FP	1370	PRINT"{CLR}{22 DOWN} {WHT}CLEAR SCREEN: ARE
		YOU SURE?"
SC	1380	GETKEY YN\$: IF YN\$="Y"T HENGRAPHIC4,1
GM		GOTO 890
CG	1400	PRINT"{CLR}{21 DOWN} {PUR}"
CM	1410	PRINT"CURRENT SPEED:
		{WHT}"SP:PRINT"{PUR}EN TER NEW VALUE [1-5]"
CD	1420	GETKEY SP\$: IF SP\$=CHR\$
	1420	(27) THEN890
KH	1430	SP=VAL(SP\$):IF SP<1ORS P>5THEN1420
RQ		GOT0890
PR	1450	
DM	1470	PX=17:PY=-209:PN=0
SX	1480	PRINT"{CLR}{33 DOWN}" PRINT"{YEL}X-MIN:"XM""
FK	1490	TAB (20) "X-MAX: "XX: PRIN
		T"Y-MIN: "YM" "TAB (20) "Y -MAX: "YX
HE	1500	SPRITE1,1,2,0
RK	1510	MOVSPR1, PX, PY
KD BC	1520 1530	GOSUB770 XS=XR/160:YS=YR/160
PQ	1540	JS=Ø:JS=JOY(2)
DH	155Ø 156Ø	IF JS>128 THEN1540 IF JS=128 THEN 1660
PM		PX=PX+(JA(JS)*SP):PY=P
KD	1580	Y+(JB(JS)*SP) MOVSPR1,PX,PY
GD		ZX=XM+(.5*((PX-17)*XS)
СМ	1600	):ZY=YX-((PY+2Ø9)*YS) PRINT"{6}{HOME}
CM	1000	{21 DOWN}X="ZX""TAB(20
	1610	) "Y=" (ZY)
KF	1610	GETX\$: IFX\$=CHR\$(27)THE NGOTO1630
QB		
GJ	1630	SPRITE1,0 GOTO890
	1650	DATA Ø,1,1,1,0,-1,-1,-
FO	1660	1,-1,-1,0,1,1,1,0,-1 PN=PN+1:IF PN=1 THEN A
LV	1000	X=ZX:AY=ZY:PRINT CHR\$(
77	1670	7):SLEEP1:GOTO1540 IF PN=2 THEN BX=ZX:BY=
AA	10/0	ZY: PRINT CHR\$ (7): XM=AX
		:XX=BX:YX=AY:YM=BY:GOT O1540
	1680	GOTO1540
	1690	
		{SPACE}CONNECTED /
	,	{RVS}RETURN{OFF}"
DD	1700	IF CA=1THENPRINT"{7} {RVS}{H}1{N}{OFF}";:GO
		T01720

QD	1710	IF CA<>1 THEN PRINT"
		{7} 1 ";
GX	1720	IF CB=1THENPRINT" {GRN}
		{RVS}{H}2{N}{OFF}";:GO
	1700	T01740
HP	1730	IF CB<>1 THEN PRINT"
	1710	{GRN} 2 ";
KS	1740	IF CC=1THENPRINT"{YEL}
		{RVS}{H}3{N}{OFF}";:GO
BE	1750	TO1760 IF CC<>1 THEN PRINT"
DL	1/30	{YEL} 3 ";
HF	1760	IF CQ=1THENPRINT"{3}
nr	1700	{RVS} {H}4{N}{OFF}";:GO
		T01780
хн	1770	
All	TITE	{3} 4 ";
FG	1780	GETKEY SQ\$: IFSQ\$=CHR\$(
	1.00	13)THEN890
HC	1790	SQ=VAL(SQ\$):IFSQ>4ORSQ
	_,,,,	<1THEN1780
MG	1800	IF SO=1 AND CA=Ø THEN
		{SPACE}CA=1:GOTO1820
FD	1810	IF SQ=1 AND CA=1 THEN
		{SPACE}CA=0
XB	1820	IF SQ=2 AND CB=0 THEN
		{SPACE}CB=1:GOTO1840
DS	1830	IF SQ=2 AND CB=1 THEN
		{SPACE}CB=0
AK	1840	IF SQ=3 AND CC=Ø THEN
		{SPACE}CC=1:GOTO1860
JF	1850	IF SQ=3 AND CC=1 THEN
		{SPACE}CC=Ø
JC	1860	IF SQ=4 AND CQ=Ø THEN
		{SPACE}CQ=1:GOTO1880
GG	1870	IF SQ=4 AND CQ=1 THEN
	1000	{SPACE}CQ=Ø
AR	1880	PRINT"{UP}":GOTO 1700
ER	1890	REM ERROR TRAP ROUTINE IF ER=11 OR ER=14 OR E
XA	1900	R=20 OR ER=10 OR ER=15
		THEN PRINT"{G}";:RESU
		ME NEXT
нн	1910	PRINT"PROGRAMMING ERRO
	1710	R:"
AC	1920	PRINT" {RVS}"; : PRINTERR
		S(ER);:PRINT"{OFF}"
AX	1930	PRINT"{8}IN LINE"EL
CK	1940	END
	2000000	
E	V DIC	T CDD

#### F/X PLOT.SPR

	ØEØØ:02	00	ØØ	ØA	80	ØØ	28	AØ	B2	
	ØEØ8:00	AØ	28	00	28	AØ	00	ØA	1F	
	ØE10:80	00	02	00	00	00	00	00	AC	
l	ØE18:00	00	00	00	00	ØØ	ØØ	00	34	
ŀ	ØE20:00	ØØ	00	00	ØØ	ØØ	ØØ	00	3C	
ı	ØE28:00	ØØ	ØØ	00	ØØ	ØØ	00	00	44	
l	ØE30:00	ØØ	00	00	00	ØØ	00	00	4C	
l	ØE38:00	00	00	ØØ	ØØ	ØØ	00	00	54	
ſ										

Kevin Davis is the author of Sport Card Collector (November 1991). F/X Plot 128 helped him survive honors geometry this year at Trinity Preparatory School in Winter Park, Florida.

#### **SPRINT III**

By Farid Ahmad

Commodore BASIC isn't exactly known for its speed. It's not the language itself that's at fault, however; it's the way the computer implements the language. BASIC is interpreted. Most faster languages are compiled.

Before a computer can execute any program, the commands must be converted into the machine language of the computer. Every time a statement in an interpreted language is run, the computer must translate it. This slows execution considerably. A compiler, however, translates the entire program before it runs. This boosts execution speed.

Sprint III is a BASIC compiler that supports a subset of BASIC statements available to the 64. Earlier versions of the program were published in January 1986 and January 1988. Sprint II added several features to its original version, but there was still room for improvement.

**Entering the Program** 

Sprint III is written entirely in machine language. To enter it, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following values.

Starting address: 0801 Ending address: 1D40

Be sure to save a copy of Sprint III before exiting MLX.

Using the Program

A typical session with Sprint III might start with the following commands.

LOAD "Sprint III",8,1 NEW SYS32768

At this point your screen will turn black and BASIC pointers will be adjusted. You'll also see a SYNTAX ERROR message, which you should ignore, and a READY prompt. Now you can load a BASIC program or start to write one from scratch. You may run your program at any time for testing. When you are ready to compile it, use either the SYS32768,E or SYS32768,F command. These and other Sprint III commands

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are explained below. When the compilation finishes, you can run your compiled program or save it as usual.

If you want to make some corrections or modifications to your program, use the SYS32768,L command to load your BASIC program from the RAM disk. After it's edited, the program can be compiled as before.

#### Commands

All Sprint III commands consist of a SYS statement followed by a comma and a single letter. The following commands are available.

**SYS32768,F** Saves the BASIC program to the RAM disk and then compiles it. The entire source program is listed during compilation. It also locks the RAM disk.

**SYS32768,E** Same as above except that Sprint lists only lines containing an error.

**SYS32768,L** Loads your source program after a compile operation. Unlocks the RAM disk.

SYS32768,U Unlocks the RAM disk.

#### A Better Way

One of the advantages of using Sprint II was speed. You could save the source code on disk; run Sprint II; and get a compiled program in memory, ready to run. However, if you wanted to make corrections or modifications to your program, you had to load the source code, modify it, save it back to disk, and compile again. Since a program almost never works perfectly without a debugging session, this procedure soon became tedious.

There's a better way. Sprint III turns Sprint into a RAM-based compiler. Now, when you compile your program, the source code is saved to a RAM disk and is compiled from there. When compilation is finished, you have two versions of your program in memory: the compiled program in the normal BA-SIC working area and the source program in the RAM disk.

Suppose Sprint III has reported some errors during compilation or you simply want to make some modifications. You issue the load command to

the RAM disk, and within seconds, your BASIC source program is back, ready for editing and recompiling.

#### Speed

Apart from the convenience of not having to save and load repeatedly, Sprint III also reduces compilation time by more than half. For even faster compiling, you're given the option of listing the entire BASIC program during compilation or listing only those lines that contain an error. If you choose the error-only option, time for compiling is reduced to less than one-fourth that of Sprint II.

#### Other Options

A list pause has been provided. When a BASIC program is being listed to the screen during compilation, hold down any control key to freeze the display. This is useful for writing down any errors reported by Sprint III.

One potential mistake that can occur when using Sprint III is the one of accidentally compiling a program that's already compiled. Suppose that you want to load the source program but give the compile command by mistake. The BASIC program in the RAM disk would be overwritten by the compiled program, and you'd lose your source code. To prevent this, the RAM disk is automatically locked after each compilation. This prevents you from using the compile command. It'll be unlocked automatically when you load your source program, or you can use the unlock command if you wish to start a new program.

#### Expressions

Sprint III works much the same as BA-SIC, but as with Sprint II there are some differences you should keep in mind when programming.

Strings are limited to ten characters unless specified otherwise. If you want to include more characters, dimension the string as if it were an array.

In numeric expressions, parentheses aren't allowed. Unlike interpreted BASIC, expressions are evaluated strictly from left to right; there's no operator precedence. To get around this, you must break up the expression into several smaller expressions and then put the results back together. For example,

the following expression:

SUM = A + X\*Y + B + I\*J

becomes

Q1 = X\*Y: Q2 = I\*J: SUM = A +Q1+B+Q2.

You may get a NOT SUPPORTED error message if the statement is legal in Commodore BASIC but illegal in Sprint III. You may get a SYNTAX ERROR message if a keyword is misspelled or extra parentheses are used.

#### Memory Organization

Memory locations \$A000-\$C7FF and \$E000-\$FFFF are used by the RAM disk. Since this is an 18K area of memory, the BASIC program must fit within this length. You'll be warned if you exceed this limit. A full 30K, however, is available for the compiled program. Also, if you run your BASIC source program for testing, a full 30K of working area is available for strings, variables, and so on. It's only the BASIC program text that shouldn't exceed 18K.

Sprint III is designed to stay resident in memory while you edit your BASIC programs. Therefore, it moves down the top of the BASIC area pointer to protect itself. To set this pointer, you can either use a Sprint III command before running a BASIC program or use SYS32768 without a letter. The second method will produce a SYNTAX ERROR message, but the pointer will be adjusted. Also, when the pointer is set, the list pause will become available for BASIC editing.

#### Updates from Sprint II

Programmers who may have disassembled Sprint II may be interested in the following changes.

The address \$8000 now jumps to \$AB00 where the new routines reside. The interface routine sets some pointers and also the colors. It then looks for a comma followed by a letter. If a valid command is found, the appropriate routines are called to move programs to or from the RAM disk.

In Sprint II, addresses \$825E and \$80A2 called a subroutine to initialize the disk file. They now call a new short

routine at \$802B which initializes the new input from the RAM disk routine.

The area \$8C0D-\$8C45 contained calls to a Kernal routine to get a byte from disk. These calls have been changed so that the new input from the RAM disk routine is called at \$8815.

The instruction at \$C800 has been changed from LDA#\$C0 to LDA#\$C8. As a result, Sprint now uses the memory area \$C800 onward for line number storage.

When the E command is used, the JSR\$8AAC instruction at \$82B6 address is bypassed, preventing each line from being listed. Also the instruction at \$8A85 is changed from JSR\$888C to JSR\$8850. Address \$8850 contains a short routine to print the current line.

When Sprint III is used for the first time, it places the list freeze subroutine at \$CFEC-\$CFFF. I use Sprint III with a multifunction cartridge that causes problems if the freeze routine is placed between \$8000 and \$A000.

#### SPRINT III

Ø8Ø1:ØB Ø8 7Ø 17 9E 32 34 3Ø 6E 00 00 00 20 20 20 20 96 0809:37 0811:20 20 20 20 20 AØ C4 B9 Ø6 Ø819:3C Ø8 99 F8 00 B9 FD Ø8 F6 93 88 DØ F1 09 4C Ø821:99 33 AØ Ø829:B9 ØC 08 99 FF Ø3 DØ 88 Ø831:F7 A9 D1 85 2D A9 24 85 Ø839:2E 4C 99 01 16 60 Ø6 D1 93 0841:24 B8 18 B9 6E 09 99 E8 44 F7 Ø1 EE CR DA EE 02 19 0849:07 Ø851:Ø5 Ø1 C6 F9 DØ ED A2 03 23 0859:20 34 03 FØ 33 C9 07 DØ 95 al 20 34 03 DØ ØA AØ 0861:16 A2 07 Ø869:A2 Ø4 20 34 03 18 69 65 85 0871:10 05 ØA 20 34 03 A2 10 Ø879:A8 A5 A7 85 A9 A5 FE 85 FB Ø881:F7 A5 FF 85 F8 20 6C 03 F7 FE 85 FF A5 85 72 0889:A5 F8 Ø891:E8 20 34 93 DØ 1E A2 98 21 0899:20 03 AØ Ø2 A8 85 18 FC 65 85 F7 58 Ø8A1:A6 A5 A6 FD 65 A7 85 F8 20 6C EF Ø8A9:A5 Ø8B1: Ø3 4C 13 Ø1 E8 20 34 Ø8B9:DØ 1C AØ 03 84 A8 E8 20 36 Ø8 34 Ø8C1:34 03 FØ A2 08 20 F4 ØD Ø8C9: Ø3 4C 5C Ø1 A2 20 34 C7 Ø8D1:03 E6 A7 4C 5C 01 E8 20 AF Ø8D9:34 03 DØ ØA E8 20 34 03 B2 20 69 Ø4 A8 DØ D6 E8 37 08E1:18 Ø8E9:34 Ø3 DØ ØA A2 Ø2 20 34 21 08 Ø8F1: Ø3 18 69 06 DØ ED A2 A2 85 03 DØ E6 A9 00 F7 Ø8F9:20 34 0901:A7 A4 FB F0 0C 06 FA 2A 37 0909:26 A7 C6 FB CA D0 F2 A8 D8

FE DØ Ø2 C6 Ø919:85 FB 68 A4 4A Ø921:FF C6 FE Ca E.7 DØ DE A4 B5 0929:FF Ca 97 DØ D8 A9 37 85 BA 4C aa 80 A4 A8 FØ 3C 0931:01 58 Ø939:22 A5 F7 38 E5 A8 BØ 93 7E Ø941:C6 F8 38 85 F7 A5 FC E5 FC Ø949:A8 RØ 02 C6 FD 85 R1 34 0951:F7 88 91 FC 98 DØ F8 C4 42 F7 C6 76 ØA C6 FD Ø959:A9 FØ B1 C6 A9 Ø961:F8 10 EC 60 78 E6 98 0969:01 4C 16 as 60 aa 4C aa ED 9D C6 A9 Ø971:9A EA 34 34 69 02 0979:09 27 A9 81 CA 12 A9 8D E3 85 19 43 D6 CØ 44 89 0981:FE 42 0989:34 7C 4C 4F 55 CF CI 18 D8 Ø991:8D A9 AØ 80 33 88 CC 32 88 Ø999:6Ø A9 51 8E E.5 6F 38 8D EE 3A 99 Ø9A1:60 AD 00 E4 FO EE 63 3A CF 86 E3 AC Ø9A9:6A 88 4C 57 08 3B 84 F7 A9 85 F8 2E Ø9B1:34 EG 85 83 92 B9 BB Ø9B9:A9 EE 11 10 82 48 Ø9C1:7Ø 30 ØR 2A BB 3C Ø9C9:C9 97 50 44 92 C9 D5 90 Ø9D1:E9 A9 FF 85 F9 87 D3 A9 DA 8D 54 Ø9D9:8B FA 85 07 82 31 2E 1F 6F 94 80 18 85 70 AF Ø9E1:FF A9 Ø9E9:3B 12 38 C8 85 39 EC 7B Ø9F1:A1 20 76 81 85 07 30 82 EE 17 54 18 6D Ø9F9:A5 17 2A E.6 E 6 A5 38 51 ØAØ1:34 B3 40 38 67 16 95 C9 ØC 38 90 5E 39 ØAØ9:38 EØ ØA11:CØ ØØ 93 94 7A 80 91 Q4 02 ØA19:D3 86 2B 05 86 82 25 1F 58 44 DØ 76 DØ 5C DF ØA21:C9 83 ØA29:0C E.6 44 5C 2D E3 ØB 40 9A ØA31:69 91 E. 7 96 4F 62 ØC 42 F5 ØC 3C CØ 4E 46 BØ ØA39:CB 70 C6 ØA41:ED 09 60 A6 34 DØ 12 AC BA ØA49:74 68 6C 4F E2 66 ØF 81 al 04 C6 10 F2 30 FØ ØA51:60 B9 06 ØA59:66 F7 85 DB ØE ØE 4E 70 ØA61:42 DC 85 43 22 21 99 8C E6 ØA69:84 22 26 6F CE 81 50 62 83 ØA71:C9 8F 95 11 D2 08 25 4D 60 01 02 ØA79:38 9F 1F DØ BØ 47 DA ØA81:20 F4 21 27 4F 40 96 CØ D3 ØA89: ØF 49 CE ØF 31 9A 43 1D D9 ac 72 F9 54 ØA91:05 1E DE 08 12 ØA99:72 60 ØC 85 F9 AD 26 FA A6 00 C8 ØAA1:E9 aa 85 FA F7 6A 68 98 90 E8 44 68 16 6C GAA9: BD D1 ØAB1:F5 BØ 03 67 BE 81 07 F4 C2 ØAB9:07 A5 80 4B BØ FØ 12 06 02 EØ 8B EØ ØAC1:8C 97 97 AØ 6A ØAC9:10 A8 96 6D 8E 29 81 73 37 87 ØAD1:95 08 A6 ØA C9 22 C1 05 DØ F1 84 70 aa 98 ØAD9:17 A2 37 ØAE1:89 30 C8 8A 91 06 66 A9 1A 66 ØF 60 DØ 60 21 10 10 ØAE9:A4 ØAF1:14 92 42 60 A 9 ØA 60 20 35 94 ØAF9:A5 1F 91 74 91 28 A2 EØ 30 ØE ØBØ1:80 2F 21 44 73 ØBØ9:D1 F2 69 1A A5 13 85 ØC 24 ØB11:A4 02 B8 09 03 06 2D 81 AD E.6 3A ØB19: ØC 60 F2 93 Da A5 B8 ØB21:06 38 E5 19 17 20 46 85 E1 ØB29:19 A5 07 E5 1A 18 85 2D DD D1 ØB31:85 80 81 80 3D 08 53 41 ØB39:8D 3E Ø8 A9 04 D1 F9 2B C7

Ø911:60 48 B1 FE 85 FA A9 08 FE

ØB49:4C ØØ 4A 25 AC 52 10 ØB51:70 08 11 72 08 F7 72 98 90 20 2C ØB59:40 91 A5 20 EØ ED 2D 36 71 86 E.5 ØB61:E6 EC 45 C7 ØB69:94 15 60 92 16 3A 83 CØ 60 85 AB ØB71:EØ 13 41 14 1E 11 FØ A9 90 95 DD ØB79:DØ DE EØ 12 09 88 F1 15 00 8A ØB81:A9 78 ØB89: AA A9 A7 A 9 R1 91 an DD 82 61 ØB91:C8 BD DC 80 D5 33 60 DØ E8 FØ 7E 86 F9 07 ØB99:A2 DØ ØBA1:86 05 ØE 5E 85 C2 83 AE ØBA9:85 CF 83 CD 84 8F 84 07 36 49 85 C9 83 C2 82 ØBB1:88 DØ 84 ØBB9:87 EØ B8 EØ 45 87 4E 85 5B ØBC1:20 7C 34 09 94 Cl F8 90 73 C5 18 DØ 98 1A ØBC9:11 F7 ØBD1:06 55 C5 17 BØ 33 41 Ca FF ØBD9:82 F7 40 as FR 72 ØBE1:3C 13 19 85 14 C7 ØA AØ 19 9E ØBE9: Ø2 28 80 60 El A5 A5 A9 ØE 83 FA 19 4C ØBF1:96 A 3 1 A ØBF9: Ø5 56 F3 aF 20 CC 8A 91 E1 7F gcg1:40 Ø8 A9 1A BA FF A2 AC ØCØ9:CØ FD 3D 95 aa 2A 7F 10 B9 2E A5 F9 8D 1B E9 ØC11: Ø2 2D 32 ØC19: Ø8 A5 8D 1F 08 6C 02 FA FØ 12 6E 3D ØC21:AØ A5 2E B 2 3F 01 ØC29:8Ø 04 F7 ØC 6C 02 13 13 2E DØ EA 5C 60 17 E1 ØC31:C6 ØC39:3Ø 18 4C 13 aa Fl 18 69 8B ØC41: Ø2 Ø4 38 4D Ca 8E 90 ØC49:34 al 20 DA 18 60 B6 05 68 68 27 5D 98 A a ØC51:B9 CØ ØC59:9Ø 84 DI ØF 2C aa FØ 99 EC 7C 01 3C ØC61:A9 B2 18 ØC69:C2 A5 33 48 BE FD 43 CC 78 40 Ø4 A9 A 6 ØC71:2F ac 47 E8 27 31 22 92 ØC79:8D DØ ØF B6 50 48 A7 ØC81:8A C2 9D 85 40 4F 70 9C 98 39 2A EA A2 ØC89:61 50 A5 40 5E BE 09 ØC91:28 11 1C FD 2E FC E2 7E 68 31 AC 0C99:A5 A9 C5 BD 71 ØCA1:F8 8B A5 3F FØ ØCA9:65 18 02 02 8E 58 E6 E1 60 C3 9D 08 23 1D 90 DR QCB1:C1 CE ØCB9:EØ 40 DØ 15 4C 14 13 11 83 ØCC1:AB 4C 48 84 E6 2E 98 09 DØ 82 9E DC E8 EØ ØCC9: Ø2 41 84 40 58 18 F7 26 E9 ØCD1:F5 DC ØCD9:C2 10 A8 81 A9 A7 32 C8 96 B9 73 ØCE1: ØC A9 89 7B CD ØF. ØCE9:DØ F6 88 04 60 92 69 A9 43 ØCF1:4C 52 98 BC CC 58 2C 27 53 C9 7E BØ ØCF9: ØF FØ 01 93 83 CØ 85 2B 58 57 ØDØ1:65 2A A9 14 gpg9:41 18 13 C8 98 C5 69 02 85 4E ØD11:FØ 1C 95 10 18 C5 39 86 ØD19:2A FA 71 2B 2B 38 90 DA C2 ØD21:58 C5 6D 2A ØD29:4E 57 D1 1D 19 38 E9 AA 42 ØD31:04 85 19 BØ 92 C6 1A El 90 41 90 F8 13 ØD39:F7 58 4E 43 91 19 50 16 C4 FC ØD41:43 A5 14 ØD49:C8 B1 05 A3 30 3E 03 50 19 60 ØD51:07 A5 02 75 2E A9 84 Al 1D C7 ØD59:B8 41 ØE 36 Fl ØD61:17 BØ 20 6F CE 3B 2E 12 12 ØD69:58 4E 00 14 3C 27 40 8E 12

aB41:80 20 10 8C E0 00 0C BE

ØD71:92 94 26	E7 0E 2	D 80 E1 45	ØFA1:DE 89 EC 89 Ø2 8A 10 8A AC   11D1:A6 23 82 84 82 AØ 48 73 43
ØD79:81 3F DI			ØFA9:24 8A 36 8A 49 DA Ø3 8A 32 11D9:9Ø AD 82 41 ØØ 3A 4C 8Ø 16
ØD81:3F CC 89			ØFB1:5D 8A 2C 16 F3 EØ 28 41 BC   11E1:8B 46 9Ø A1 96 2Ø ØA 19 E9
ØD89:85 FD 40			
ØD91:D5 68 DE			
ØD99:AF 85 BC			ØFC9:C4 B3 Ø8 D9 BØ 2B 88 E2 FB   11F9:Ø8 F8 A5 F8 C9 CØ 36 AF 1Ø
ØDA1: ØB 80 C2			ØFD1:42 C1 91 84 ØB 9C 48 22 79   1201:F7 Ø1 BØ Ø3 A4 ØF 41 23 AE
ØDA9:FØ 2E C9			ØFD9:6C 63 61 31 67 21 ØE 79 9B   1209:0D 89 Ø1 18 B6 Ø1 C3 1E 17
ØDB1:26 C9 A3			ØFE1:EØ 2Ø 32 2E 2E 46 ØC B8 FC   1211:AC Ø3 91 FB A2 18 1A 10 F7
ØDB9:45 E2 DE			ØFE9:00 DD 0D 46 9F 2C 50 01 D4 1219:80 8A 8D 1B AA F0 1D 23 F9
ØDC1:DØ ØD 2E	25 D9 7	2 72 80 3D	ØFF1:6D 44 2E 8A 12 91 05 D0 F7   1221:C8 10 31 85 11 A8 20 0F A6
ØDC9:72 86 5D			ØFF9:C8 F8 D8 3A 2Ø 2Ø B3 29 8B   1229:15 88 B5 25 ØA 9D 28 15 2F
ØDD1:61 Ø4 D3	D8 DØ B	8 DØ 33 E3	1001:D6 53 55 50 50 30 73 C3 FE   1231:E8 E0 50 B0 0B 90 EF 86 18
ØDD9:3C 6D 34	ØF 19 6:	3 86 A9 F1	1009:79 44 27 4B 45 9A 33 3C C7   1239:0E E2 3B 45 34 AC 80 05 33
ØDE1:80 9E ØE	75 60 6	4 9C 59 44	1011:76 EA 46 55 4E 43 64 DB 69   1241:20 8C 88 2E A1 90 81 28 07
ØDE9:34 7B 80	ØE Ø5 8:	3 CD C9 89	1019:E0 D9 20 2D 93 1C 68 82 57   1249:40 A4 32 C4 0E B0 1D 77 2E
ØDF1:3A FØ CS			1021:2D 60 4C 6B CE 40 53 59 A7 1251:02 8D 6C C8 48 27 04 45 20
ØDF9:00 1C 09			1029:85 42 41 58 88 06 FC 22 C2 1259:34 85 34 61 55 01 04 B3 FF
ØEØ1:20 ED ØE			1031:81 4E 59 43 27 19 6C 90 0C 1261:F0 E6 84 32 84 16 10 03 0B
ØEØ9:83 51 B8			BET TENTON TO THE TENTON EN
ØE11:6C DØ 13			
ØE19:EØ A9 DØ			
			1049:4E 45 58 F0 57 49 80 90 6D   1279:A4 31 72 C7 85 32 C8 84 12
ØE21:86 A5 F8			1051:4F 55 28 46 4F 3E 00 54 9F   1281:31 A8 B9 FF 01 85 33 A4 C8
ØE29:05 77 40			1059:59 50 90 0D 3C 0A 13 54 Al   1289:26 60 85 35 30 5D 09 10 F5
ØE31:43 50 00			1061:43 48 00 0D E5 28 8C 22 11   1291:82 80 09 C5 35 F0 0A 8D A3
ØE39:C2 ØD 46			1069:41 54 49 C7 20 41 42 63 D2   1299:CB F7 19 03 04 45 34 D0 63
ØE41:00 79 1E			1071:45 54 45 44 A6 55 E1 51 D5   12A1:F2 E6 31 BB 72 08 06 5B F5
ØE49:01 7A Ø1			1079:4D 4D 41 62 13 50 41 77 B5   12A9:61 41 68 18 36 2C 3A 9A CE
ØE51:A1 CA DØ	FA 60 8	4 2A 90 B4	1081:E9 00 48 8F D8 C0 00 E0 43   12B1:64 30 90 01 60 40 22 03 81
ØE59:1C 54 84	21 30 A	A 76 2E 82	1089:DC A1 02 2E 43 4F 94 0F 33   12B9:00 85 36 6E 05 5E 60 A3 F2
ØE61:C5 14 D0	04 E4 1	3 FØ 10 25	1091:00 99 86 20 49 2F 4F D2 63   12C1:33 C9 AB 13 E6 36 A2 44 32
ØE69:76 78 86	4C 02 A	B 61 00 F5	1099:52 52 84 A4 22 2A 2A 2A 8A   12C9:82 32 85 37 97 95 2F 29 7A
ØE71:41 2A 73	3B 2B 7	Ø 22 ØB 45	10A1:37 44 45 56 49 43 45 20 7E   12D1:CF 85 16 A5 1D 15 21 15 F0
ØE79:83 43 E4	17 85 31	D AC 8A 3B	10A9:4E 4F 54 61 3C 52 45 53 6E 12D9:20 0A 26 50 15 00 4C A5 41
ØE81:8C C5 82	26 58 11	E 9A A6 1F	10B1:45 4E 54 0D 00 4D 49 53 7E   12E1:15 65 07 06 13 26 14 A5 2A
ØE89:7B 48 20			10B9:06 B9 4E 47 20 45 51 55 97   12E9:13 65 16 D3 70 10 40 14 49
ØE91:8A 96 80			10C1:41 4C 20 53 49 47 4E 00 D2   12F1:6E 6A CE F0 0B A5 32 C5 E9
ØE99:4B 20 AE			10C9:A2 FA 9A 48 A9 40 85 12 3D   12F9:37 32 F8 00 90 A5 36 F0 DD
ØEA1:BD B1 60			
ØEA9:39 Ø4 19			10D1:82 77 0A 31 C1 6C 20 AC 12   1301:0D D3 38 E5 13 C0 10 61 25 10D9:8A A9 64 02 50 88 68 5A 26   1309:E5 14 96 0E 60 85 6C 10 DC
ØEB1:CE CD E			
			10E1:2F 20 D4 A0 A9 3A 96 75 1F 1311:23 20 0A 30 94 00 90 09 E3
ØEB9:33 41 F8			10E9:C1 0A 49 D8 A5 49 61 82 BB   1319:85 41 E8 18 84 D0 ED C9 FD
ØEC1: 2A 3Ø 19			10F1:A5 3A CØ 56 D3 8Ø 4C 94 BE   1321:25 32 1A 18 2A C9 24 DØ BC
ØEC9:5A A3 8E			10F9:82 C0 32 20 A5 10 75 1D 49   1329:09 72 21 20 04 D4 F0 1D 09
ØED1:34 B8 77			1101:11 0D A2 88 84 1F A2 DD 8F   1331:C9 28 D0 19 A5 1F 1B 5E 30
ØED9:60 69 E6			1109:42 2A 40 48 2A DD 51 07 D5   1339:50 28 D0 0B 54 0F 01 8E CB
ØEE1:33 C9 20			1111:60 8D 2A 38 FD 23 48 03 9F   1341:14 1E F0 04 A9 10 85 1E 0E
ØEE9: ØC C1 82			1119:2A A5 2B FD 24 C5 2B C8 56   1349:EØ 1Ø E2 54 A2 ØF 86 1D Ø1
ØEF1:95 45 E8			1121:DØ EØ C7 41 85 CØ 53 A4 6B   1351:28 3E E8 2Ø E1 FF 6B 5E 7E
ØEF9:C7 81 Ø2			1129:20 70 9E 98 09 30 4C Al 18   1359:84 88 94 F6 C0 F0 40 29 59
ØFØ1:02 86 B8			1131:E6 20 3A 52 C6 CC 9B D2 AE   1361:0F 85 20 C5 1D D0 28 E3 31
ØFØ9:E2 43 84	E8 78 81	E ØA A9 44	1139:38 4F 34 CC 17 10 0A A6 52   1369:08 29 F0 C5 1E D0 20 4C 19
ØF11:11 41 EF			1141:34 20 13 20 2D 8B 4C 19 33   1371:90 0C E3 3C 28 A2 00 BC AB
ØF19:49 2F 14	Ø8 C9 7:	2 Ø5 A9 76	1149:8B D8 ØA Ø6 3Ø 56 ØØ A9 8D   1379:76 Ø7 DD D1 98 DØ Ø7 E8 74
ØF21:EØ 8D 33	88 AD Ø	C AØ A2 83	1151:22 EB A5 C8 C4 ØE 90 DF 20   1381:E4 1D 90 F3 C7 63 A5 20 E9
ØF29:37 86 Ø1	AE 6B 8	8 58 47 05	1159: ØD 54 1A 98 89 C2 38 E9 95   1389: A8 79 DØ Ø2 E6 23 4C A1 9A
ØF31:9D 2E 20	E2 EC 4:	3 ØB ØF 75	1161:7F AA 33 B6 FF CA FØ Ø8 D4   1391:8D 4D ØB EC 81 AØ 3F 6D 7C
ØF39:84 8C 97			1169:3C C8 10 FA 30 F5 C8 B9 32   1399:6C B0 25 2B AF 19 C9 C4 B3
ØF41:B5 ØØ 90			1171:9E AØ 3Ø Ø6 E3 Ø7 4C 4Ø 85   13A1:FØ 15 C9 C7 9Ø Ø4 C9 CB 2F
ØF49:4C ØA 80			1179:8B 29 7F ED 85 22 56 8Ø 5C   13A9:9Ø ØD 41 73 6B BØ 11 4A 45
ØF51:01 37 AS			1181:81 82 83 85 86 87 88 89 BA 13B1:19 DØ Ø8 72 1D E6 3F 4C 1Ø
ØF59:00 02 DI			
ØF61:F5 4C 86			
ØF69:52 83 BA			- 프로젝트 - TT - 프로그 - 프로그 - 프로그 - 프로그 - 프로그 - TT - 프로그 - 프로그 - 트로그 - 트로그 - 프로그 - 트로그 - 프로그 - 프로그 - 프로그 - 프로그 - 프로그
ØF71:A6 88 85			1199:C5 C6 C7 CA C1 C7 CA ØB C3   13C9:99 40 60 20 3C E9 2A 3E F6
ØF79:FØ EA 34			11A1:43 12 88 55 91 12 53 51 1D   13D1:78 13 0F F6 54 09 02 D1 E6
			11A9:88 A4 27 88 CØ 4Ø 69 9A 1B   13D9:AF 18 5Ø 6E 82 Ø4 1E 91 CØ
ØF81:88 Ø7 89			11B1:20 E8 32 F0 27 73 CE 0A 22   13E1:40 C8 09 A6 8E 4A 4E D0 F0
ØF89:25 89 31			11B9:86 12 86 21 86 12 AB A2 FC   13E9:7E 53 90 BD 7F 35 0E BE BD
ØF91:67 89 7E			11C1:86 0F A6 27 FC 3A 84 01 0D   13F1:80 2C 8E 60 3D 09 4B 09 E8
ØF99:01 89 A9	89 B/ 8	9 CD 89 /1	11C9:A2 00 02 0F C6 A9 86 27 7F   13F9:59 09 84 09 E4 0D D3 09 3C

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1861:00 F0 05 D6 F8 26 EC 67
1401:EØ Ø9 25 ØA 1B ØA 31 ØA 8E
                                   1631: ØA 42 ØA 38 ØA 4C ØA 54 Al
1409:45 ØA 3B ØA 4F ØA D2 8D 34
                                   1639:DD ØC B4 DØ
                                                     22
                                                         20
                                                            59
                                                               10 4F
                                                                       1869:30
                                                                                25
                                                                       1871:05
                                                                                   5E
                     AB FØ Ø1 7Ø
                                                         20
           11 52 C9
                                   1641:5D
                                           91
                                               A5 D8 D6
                                                           Al A2 DE
1411:20
        00
                                                        AØ A8 Ø8 E9
                                   1649:49 C8
                                               13
                                                  21 A9
                                                                       1879:11
                                                                                38
        54 Ø1 2C A1 24 Ø1 3D A8
1419:25
                                                                                   05
                                   1651:A5
                                           14 AA
                                                  94
                                                     4C
                                                         BD
                                                            92
                                                               C9
                                                                  30
                                                                       1881:03
                                                                                C5
                 30 E3 9A E1 EA
1421:86
        3E E7
              94
                                                                       1889:60
                                                                               38
                                                  20 A7
                                                         8F
                                                            4C
                                                               77
                                                                  38
                  83
                     99 E1
                           24
                              92
                                   1659:80 90 06
1429:71
        94
           E1
               CB
                                                  8C BØ AA
                                                           37
                                                              00 3E
              18
                 69
                     Ø1 A6 3E 43
                                   1661:91 20 C3
        62 E6
1431:30
                                   1669:3C
                                           34 20 47
                                                     8D A5
                                                            1E
                                                               C9
                                                                  42
                                                                       1899:85
                                                                                93
                                                                                   60
1439:B5 2C 84 84 8C DØ 27 D7 ED
1441:07
        20 Fl A5
                  3D
                     FØ
                        B6
                           34
                               DC
                                   1671:20 FØ
                                               Ø5 A9
                                                     10
                                                         4C
                                                            70
                                                               8A 42
                           2B BE
                                   1679:A9 AD
                                               48 EF
                                                     20 03
                                                           8C E6 FA
                                                                       18A9:37
                 C9
                     20
              FØ
                        3A
1449:DC
        AØ C9
                                                  14 DØ B7
                                                            BB
                                                               88
                                                                  6C
                                                                       18B1:D1
                                                                               DØ
                                   1681:13 6B 85
        20 B9 B2 14
                     5B 8F
                           2Ø 9D
1451:D8
                     ØD A9
                           BD
                               7E
                                   1689:A2 A1
                                               94
                                                  A9
                                                     9A
                                                         34
                                                            91
                                                               6A BD
1459:CD
        30
           22
               ØF.
                 F3
                                   1691:A5 33 FØ ØD C9
                                                        22 FØ Ø9 ØE
           22
              40 C0 B1 94 01 44
1461:2F
        SF
                                   1699:9D E2
                                               37
                                                  7Ø E8
                                                        Da
                                                            EF
                                                               86
                                                                  20
                                                                       1809:85
                                                                                17
1469:20 2E 72
              2Ø 9B 8E 36 2Ø 21
                                                        06 DØ F1 AF
                        35
                           ØA
                              1D
                                   16A1:1D 20
                                               4D
                                                  8C
                                                     A5
                                                                       18D1:03
1471:DD 8C 6A A1
                  01
                     63
                                   16A9:1A A5 Ø7 85
              E4 F4 AA CA 61 C9
                                                     23 A4 3D 22 CD
1479:E8 B4
           77
                                           30 D0
                                                        41 C5
                                                               1D
                                                                  ØE
                                                                       18E1:02
                                                                                01
                                   16B1:C9
                                                  21 AC
        1B 40 00 F0 0E C9 10 84
1481:51
                                                                       18E9:98
                                   16B9:DØ
                                            18
                                               49
                                                  90
                                                     13
                                                         C8 B1
                                                               87
                                                                  20
           11 02
                  1C
                     AC
                        41
                           C3 65
1489: DØ BC
                                                        1D FØ 18 41
                                   16C1:14 AØ FF C8 C4
                           8B 43
                        54
1491:4C 6E 8F A2
                  aa DD
                                   16C9:B1 13 D9 D1 98
                                                        FØ F4 A9 Ø8
1499:FØ ØA E8 EØ 1F 9Ø F6 A3 B4
                                                                       1901:90
14A1:9F Ø3 EØ 12 AD
                     60
                        ØE CØ
                               63
                                   16D1:30
                                            29
                                               ØF
                                                  18
                                                     69
                                                         04
                                                            65
                                                               22 ØC
                                   16D9:85
                                           22
                                               90 CC E6
                                                        23 DØ
                                                               C8 5E
                              72
14A9:C8 02
           8A E9 12
                     ØA AA BD
                                                               29
                                                                  48
                                                                       1911:08
                                   16E1:60 20
                                               5A 91 A6
                                                        FC
                                                            A5
                     8F
                        48
                           4C 4B
14B1:D2 82 ØF BD D1
                                   16E9:DØ
                                            ØC.
                                               BD DE
                                                     81
                                                         85
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B51:85	1B49:35	86	02	15	79	37	A9	80	C9
1859:46				Ca	4C				
1B61:55         FØ         1E         D3         74         C6         67         82         8F           1B69:A9         8C         8D         86         8A         2Ø         B2         9A         86           1B71:AD         4C         4E         DØ         03         44         ØF         45         F4           1B79:TO         71         59         88         50         3D         ØI         8D         82           1B81:82         6F         9B         4C         8D         9A         20         73         97           1B89:ØC         DE         AD         21         3D         CD         42         FØ         DB           1B91:Ø4         BØ         ØE         9Ø         ØF         AD         04         9C         94           1B99:CD         45         66         FØ         ØA         ØA         01         01         E1         E3           1BA1:D4         Ø2         42         ØA         ØA         10         01         E1         E3           1BB9:Ø9         21         FF         1Ø         ØE         4F         1C         8E         36					70.00				
B69:A9									
1B71:AD 4C 4E DØ Ø3 44 ØF 45 F4 1B79:77 71 59 88 50 3D Ø1 8D 82 1B81:82 6F 9B 4C 8D 9A 20 73 97 1B89:ØC DE AD 21 3D CD 42 FØ DB 1B91:Ø4 BØ ØE 9Ø ØF AD Ø4 9C 94 1B99:CD 45 66 FØ ØA BØ Ø2 9Ø 8B 1BA1:D4 Ø2 42 ØA ØA Ø1 Ø1 E1 E3 1BA9:Ø1 33 1Ø AD 11 9C FØ 45 2C 1BB1:13 4E 19 DA FØ Ø8 19 CA 7A 1BB9:Ø9 21 FF 1Ø 8E 4F 1C 8E 36 1BC1:Ø2 79 38 27 1A 8E ØA A9 99 1BC9:Ø3 8D ØA 4F 1B Ø8 8D ØB 3A 1BD1:9C 2Ø 91 9A C9 Ø1 E2 84 D6 1BD9:33 ØD 61 85 87 8D 82 Ø8 FØ 1BE1:C2 8D 83 Ø8 38 A5 2D E9 6A 1BE9:62 2D 9Ø 8D Ø8 A5 2E E9 A4 1BF1:Ø7 14 4A 8D 35 4C 4Ø 37 65 1BF9:E2 Ø3 91 Ø5 47 B7 16 43 6D 1CØ1:97 11 A9 15 97 57 E1 Ø1 AE 1CØ9:8D 14 97 97 E2 3B 9B AD 62 1C1:12 59 ØØ Ø8 AD 13 9C 8D A9 1C19:78 AD 20 39 11 AD 55 4E C8 1C21:ØC A9 42 E7 73 6Ø AD ØC 15 1C29:1F 2D AD ØD 81 C1 2E 78 AA 1C31:A9 35 AØ Ø8 B8 CØ 85 Ø5 F8 1C39:A9 Ø8 Ø8 86 A9 AØ DØ ØD 36 1C41:18 B1 Ø5 91 Ø3 38 CE ØF 51 1C49:Ø1 27 1B CE 1Ø 9C DØ 16 C6 1C51:A9 37 85 Ø1 58 A9 1E 85 18 1C59:Ø3 A9 9C 85 Ø4 2Ø F5 9B 91 1C61:A9 Ø8 BØ 84 AD 8D Ø2 ØE 1C81:DØ FB 68 28 4C CA F1 AØ C2 1C89:BD FB 68 28 4C CA F1 AØ C2 1C89:Ø1 AP 00 00 40 B1 C1 2E 78 AA C21:PO C8 DØ Ø4 AP EØ 85 Ø6 FC 1C79:4C BØ 9B Ø8 48 AD BD Ø2 ØE 1C81:DØ FB 68 28 4C CA F1 AØ C2 1C89:Ø0 AP ØD 10 E1 ØD B1 Ø3 78 1C91:F0 C8 DØ Ø4 AP EØ 85 Ø6 FC 1C79:4C BØ 9B Ø8 48 AD BD Ø2 ØE 1C81:DØ FB 68 28 4C CA F1 AØ C2 1C89:BD FB 68 28 4C CA F1 AØ C2 1C89:P0 FB 68 28 4C CA F1 AØ C2 1C89:P0 FB 68 28 4C CA F1 AØ C2 1C89:P0 FB 68 28 4C CA F1 AØ C2 1C89:P0 FB 68 28 4C CA F1 AØ C2 1C89:P0 FB 68 28 4C CA F1 AØ C2 1C89:P0 FB 68 28 4C CA F1 AØ C2 1C89:P0 FB 68 28 4C CA F1 AØ C2 1C89:P0 FB 68 29 23 28 23 9A 3E 5Ø 1CA1:P0 11 Ø0 Ø0 Ø0 ØB 53 41 7Ø 1CA9:56 5D 11 82 2Ø 52 88 48 52 1CB1:86 ØB 2C ØØ 4F 2Ø ØE 59 E5 1CB9:4E 47 1Ø 49 12 53 35 C7 91									
1B79:77 71 59 88 50 3D 01 8D 82 1B81:82 6F 9B 4C 8D 9A 20 73 97 1B89:0C DE AD 21 3D CD 42 F0 DB 1B91:04 B0 0E 90 0F AD 04 9C 94 1B99:CD 45 66 F0 0A B0 02 90 8B 1BA1:D4 02 42 0A 0A 01 01 E1 E3 1BA9:01 33 10 AD 11 9C F0 45 2C 1BB1:13 4E 19 DA F0 08 19 CA 7A 1BB9:09 21 FF 10 8E 4F 1C 8E 36 1BC1:02 79 38 27 1A 8E 0A A9 99 1BC9:03 8D 0A 4F 1B 08 8D 0B 3A 1BD1:9C 20 91 9A C9 01 E2 84 D6 1BD9:33 0D 61 85 87 8D 82 08 F0 1BE1:C2 8D 83 08 38 A5 2D E9 6A 1BF1:07 14 4A 8D 35 4C 40 37 65 1BF9:E2 03 91 05 47 B7 16 43 6D 1C01:97 11 A9 15 97 57 E1 01 AE 1C09:8D 14 97 97 E2 3B 9B AD 62 1C11:12 59 00 08 AD 81 30 9C AD 15 1C29:1F 2D AD 0D 81 C1 2E 78 AA 1C31:A9 35 A0 08 B8 C0 85 05 F8 1C39:A9 37 85 01 58 A9 1E 85 18 1C59:03 A9 9C 85 04 20 F5 9B 91 1C61:A9 00 8D 11 9C 60 C0 C1 DA 1C61:97 1B 68 28 AD 82 08 F0 1C31:A9 37 85 01 58 A9 1E 85 18 1C59:03 A9 9C 85 04 20 F5 9B 91 1C61:A9 00 8D 11 9C 60 C0 C1 DA 1C69:27 0E 60 04 40 88 53 41 70 1C9:96 60 C9 22 32 82 33 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 20 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 20 23 28 23 A3 E5 01 C19:96 60 20 23 28 23 A3 E5 01 C19:96 60 29 23 28 23 A3 E5 01 C19:96 60 20 22 52 88 48 52 1C19:96 60 20 20 52 88 48 52 1C19:									
B81:82 6F 9B 4C 8D 9A 20 73 97	1B71:AD	4C			DOWN BR.	-5.5	100000	45	- CO. CO. P.
1889:0C   DE   AD   21   3D   CD   42   F0   DB   1891:04   B0   0E   90   0F   AD   04   9C   94   1899:CD   45   66   F0   0A   B0   02   90   8B   18A1:D4   02   42   0A   0A   01   01   E1   E3   18A9:01   33   10   AD   11   9C   F0   45   2C   18B1:13   4E   19   DA   F0   08   19   CA   7A   18B9:09   21   FF   10   8E   4F   1C   8E   36   18C1:02   79   38   27   1A   8E   0A   A9   99   18C9:03   8D   0A   4F   1B   08   8D   0B   3A   18D1:9C   20   91   9A   C9   01   E2   84   D6   18D9:33   0D   61   85   87   8D   82   08   F0   18E9:62   2D   90   8D   08   A5   2E   E9   A4   18F1:07   14   4A   8D   35   4C   40   37   65   18F9:E2   03   91   05   47   87   16   43   6D   1C01:97   11   A9   15   97   57   E1   01   AE   1C09:8D   14   97   97   E2   3B   9B   AD   62   1C11:12   59   00   08   AD   13   9C   8D   A9   1C19:78   AD   20   39   11   AD   55   4E   C8   1C21:0C   A9   42   E7   73   60   AD   0C   15   1C29:1F   2D   AD   0D   81   C1   2E   78   AA   1C31:A9   35   A0   08   88   C0   85   05   F8   1C39:A9   08   08   86   A9   A0   00   0D   30   1C41:18   81   05   91   03   38   CE   0F   51   1C49:01   27   18   CE   10   9C   D0   16   C6   1C51:A9   37   85   01   58   A9   1E   85   18   1C59:03   A9   9C   85   04   20   F5   9B   91   1C69:27   0E   60   4E   60   6A   50   6F   7C   7C71:C9   C8   D0   04   A9   E0   85   06   FC   1C79:4C   B0   9B   08   48   AD   8D   02   0E   1C99:9B   60   29   23   28   23   9A   3E   50   1CA1:90   11   00   00   40   08   53   41   70   1CA9:56   5D   11   82   20   52   88   48   52   1CB1:86   0B   2C   00   4F   20   0E   59   E5   1CB9:4E   47   10   49   12   53   35   C7   91	1B79:77	71	59	88	50	3D	01	8D	82
1889:0C   DE   AD   21   3D   CD   42   F0   DB   1891:04   B0   0E   90   0F   AD   04   9C   94   1899:CD   45   66   F0   0A   B0   02   90   8B   18A1:D4   02   42   0A   0A   01   01   E1   E3   18A9:01   33   10   AD   11   9C   F0   45   2C   18B1:13   4E   19   DA   F0   08   19   CA   7A   18B9:09   21   FF   10   8E   4F   1C   8E   36   18C1:02   79   38   27   1A   8E   0A   A9   99   18C9:03   8D   0A   4F   1B   08   8D   0B   3A   18D1:9C   20   91   9A   C9   01   E2   84   D6   18D9:33   0D   61   85   87   8D   82   08   F0   18E9:62   2D   90   8D   08   A5   2E   E9   A4   18F1:07   14   4A   8D   35   4C   40   37   65   18F9:E2   03   91   05   47   87   16   43   6D   1C01:97   11   A9   15   97   57   E1   01   AE   1C09:8D   14   97   97   E2   3B   9B   AD   62   1C11:12   59   00   08   AD   13   9C   8D   A9   1C19:78   AD   20   39   11   AD   55   4E   C8   1C21:0C   A9   42   E7   73   60   AD   0C   15   1C29:1F   2D   AD   0D   81   C1   2E   78   AA   1C31:A9   35   A0   08   88   C0   85   05   F8   1C39:A9   08   08   86   A9   A0   00   0D   30   1C41:18   81   05   91   03   38   CE   0F   51   1C49:01   27   18   CE   10   9C   D0   16   C6   1C51:A9   37   85   01   58   A9   1E   85   18   1C59:03   A9   9C   85   04   20   F5   9B   91   1C69:27   0E   60   4E   60   6A   50   6F   7C   7C71:C9   C8   D0   04   A9   E0   85   06   FC   1C79:4C   B0   9B   08   48   AD   8D   02   0E   1C99:9B   60   29   23   28   23   9A   3E   50   1CA1:90   11   00   00   40   08   53   41   70   1CA9:56   5D   11   82   20   52   88   48   52   1CB1:86   0B   2C   00   4F   20   0E   59   E5   1CB9:4E   47   10   49   12   53   35   C7   91	1B81:82	6F	9B	4C	8D	9A	20	73	97
B91:04 B0			AD		3D	CD	42	FØ	DB
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BA1:D4									
1BA9:01 33 10 AD 11 9C F0 45 2C									
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1BB9:09         21         FF         10         8E         4F         1C         8E         36           1BC1:02         79         38         27         1A         8E         0A         A9         99           1BC9:03         8D         0A         4F         1B         08         8D         0B         3A           1BD1:9C         20         91         AC         90         1E         28         4D         AB           1BD9:33         0D         61         85         87         8D         82         08         FØ           1BE1:C2         8D         83         08         3A         AD         2D         6A         1BE9:G2         2D         90         8D         08         AD         2E         E9         A4           1BE9:62         2D         90         8D         08         AD         2E         E9         A4           1BF1:07         14         4A         8D         35         4C         40         37         65           1BF9:22         03         91         05         47         B7         16         43         6D           1C01:97         <									
1BC1:02         79         38         27         1A         8E         ØA         A9         99           1BC9:03         8D         ØA         4F         1B         Ø8         8D         ØB         3A           1BD1:9C         20         91         9A         C9         01         E2         84         D6           1BD9:33         0D         61         85         87         8D         20         8F         Ø           1BE1:C2         8D         83         Ø8         38         A5         2D         E9         6A           1BE9:62         2D         90         8D         Ø8         A5         2D         E9         6A           1BF1:07         14         4A         8D         35         4C         40         37         65           1BF9:E2         03         91         05         47         B7         16         43         6D           1C01:97         11         A9         15         97         57         E1         01         AE           1C01:125         59         06         8A         AD         13         AD         AD         AD         AD	1BB1:13	4E	19	DA	FØ	08	19	CA	7A
BC9:03	1BB9:09	21	FF	10	8E	4F	1C	8E	36
BC9:03		79	38	27	1A	8E	ØA	A9	99
BD1:9C									
1BD9:33         ØD         61         85         87         8D         82         Ø8         FØ           1BE1:C2         8D         83         Ø8         38         A5         2D         E9         6A           1BE9:62         2D         90         8D         Ø8         A5         2E         E9         A4           1BF9:E2         Ø3         91         Ø5         47         B7         16         43         6D           1CØ1:97         11         A9         15         97         57         E1         Ø1         AE           1CØ9:8D         14         97         97         E2         3B         9B         AD         62           1CØ1:97         AD         Ø0         Ø8         AD         13         9C         8D         A9           1C19:78         AD         Ø0         Ø8         AD         13         9C         8D         A9           1C19:78         AD         Ø3         91         AD         55         4E         C8         12         12         78         AA           1C19:78         AD         Ø0         Ø1         C1         2E         78									
1BE1:C2         8D         83         08         38         A5         2D         E9         6A           1BE9:62         2D         90         8D         08         A5         2E         E9         A4           1BF1:07         14         4A         8D         35         4C         40         37         65           1BF9:E2         03         91         05         47         B7         16         43         6D           1C01:97         11         A9         15         97         57         E1         01         AE           1C09:8D         14         97         97         E2         3B         9B         AD         62           1C11:12         59         00         08         AD         13         9C         8D         A9           1C19:78         AD         20         39         11         AD         55         4E         C8           1C21:0C         A9         42         E7         73         60         AD         0C         15           1C29:1F         2D         AD         0D         81         12         C8         8D         0D         0D									
The color of the									
1BF1:07         14         4A         8D         35         4C         40         37         65           1BF9:E2         03         91         05         47         B7         16         43         6D           1C01:97         11         A9         15         97         57         E1         01         AE           1C09:80         14         97         97         E2         3B         9B         AD         62           1C11:12         59         06         08         AD         13         9C         8D         AP           1C19:78         AD         20         39         11         AD         55         4E         C8           1C21:0C         A9         42         E7         73         60         AD         0C         15           1C29:1F         2D         AD         0B         81         C1         2E         78         AA           1C31:A9         36         08         88         A9         AD         00         D         30           1C41:18         B1         05         91         03         38         CE         0F         51      <									
The property of the property	1BE9:62	2D	90	8D	08	A5	2E	E9	A4
10   10   11   12   15   97   57   E1   01   AE     10   10   12   13   15   97   57   E1   01   AE     10   10   13   14   97   97   E2   3B   9B   AD   62     10   11   12   59   00   00   8A   AD   13   9C   8D   A9     10   12   13   14   AD   55   4E   C8     10   12   17   AD   20   39   11   AD   55   4E   C8     10   12   17   AD   20   31   1   AD   55   4E   C8     10   12   13   AD   00   81   C1   2E   78   AA     10   13   13   AO   08   B8   CO   85   05   F8     10   13   14   15   15   10   13   38   CE   07   51     10   14   13   13   15   10   13   38   CE   07   51     10   14   13   13   15   10   13   38   CE   07   51     10   14   13   13   15   14   15   15     10   14   15   15   15   15   15     10   15   15   15   15   15   15     10   15   15   15   15   15   15     10   15   15   15   15   15   15     10   15   15   15   15   15   15     10   15   15   15   15   15   15     10   15   15   15   15   15   15     10   15   15   15   15   15   15     10   15   15   15   15   15   15     10   10   10   10   10   10   10     10   10	1BF1:07	14	4A	8D	35	4C	40	37	65
10   10   11   12   15   15   17   18   18   18   18   19   18   18   18	1BF9:E2	03	91	05	47	B7	16	43	6D
1C09:8D	1001:97			15	97	57	E1	01	AE
1C11:12 59 00 08 AD 13 9C 8D A9 1C19:78 AD 20 39 11 AD 55 4E C8 1C21:0C A9 42 E7 73 60 AD 0C 15 1C29:1F 2D AD 0D 81 C1 2E 78 AA 1C31:A9 35 A0 08 B8 C0 85 05 F8 1C39:A9 08 08 86 A9 A0 D0 0D 30 1C41:18 B1 05 91 03 38 CE 0F 51 1C49:01 27 1B CE 10 9C D0 16 C6 1C51:A9 37 85 01 58 A9 1E 85 18 1C59:03 A9 9C 85 04 20 F5 9B 91 1C61:A9 00 8D 11 9C 60 C0 C1 DA 1C69:27 0E E6 04 E6 06 A5 06 76 1C71:C9 C8 D0 04 A9 E0 85 06 FC 1C79:4C B0 9B 08 48 AD 8D 02 0E 1C81:D0 FB 68 28 4C CA F1 A0 C2 1C89:00 A9 0D D2 FF C8 4C FC ED 1C99:9B 60 29 23 28 23 9A 3E 50 1CA1:90 11 00 00 40 08 53 41 70 1CA9:56 5D 11 82 20 52 88 48 52 1CB1:86 0B 2C 00 4F 20 0E 59 E5 1CB9:4E 47 10 49 12 53 35 C7 91									
1C19:78									
1C21:ØC A9 42 E7 73 60 AD ØC 15 1C29:1F 2D AD ØD 81 C1 2E 78 AA 1C31:A9 35 A0 Ø8 B8 CØ 85 Ø5 F8 1C39:A9 Ø8 Ø8 86 A9 A0 DØ ØD 30 1C41:18 B1 Ø5 91 Ø3 38 CE ØF 51 1C49:Ø1 27 1B CE 1Ø 9C DØ 16 C6 1C51:A9 37 85 Ø1 58 A9 1E 85 18 1C59:Ø3 A9 9C 85 Ø4 2Ø F5 9B 91 1C61:A9 ØØ 8D 11 9C 6Ø CØ C1 DA 1C69:27 ØE E6 Ø4 E6 Ø6 A5 Ø6 76 1C71:C9 C8 DØ Ø4 A9 EØ 85 Ø6 FC 1C79:4C BØ 9B Ø8 48 AD 8D Ø2 ØE 1C81:DØ FB 68 28 4C CA F1 AØ C2 1C89:ØØ A9 ØD 1Ø E1 ØD B1 Ø3 78 1C91:FØ Ø7 2Ø D2 FF C8 4C FC ED 1C99:9B 6Ø 29 23 28 23 9A 3E 5Ø 1CA1:9Ø 11 ØØ ØØ 4Ø Ø8 53 41 7Ø 1CA9:56 5D 11 82 2Ø 52 88 48 52 1CB1:86 ØB 2C ØØ 4F 2Ø ØE 59 E5 1CB9:4E 47 1Ø 49 12 53 35 C7 91									
1C29:1F									
1C31:A9 35 AØ Ø8 B8 CØ 85 Ø5 F8 1C39:A9 Ø8 Ø8 86 A9 AØ DØ ØD 3Ø 1C41:18 B1 Ø5 91 Ø3 38 CE ØF 51 1C49:Ø1 27 1B CE 1Ø 9C DØ 16 C6 1C51:A9 37 85 Ø1 58 A9 1E 85 18 1C59:Ø3 A9 9C 85 Ø4 2Ø F5 9B 91 1C61:A9 ØØ 8D 11 9C 6Ø CØ C1 DA 1C69:27 ØE E6 Ø4 E6 Ø6 A5 Ø6 76 1C71:C9 C8 DØ Ø4 A9 EØ 85 Ø6 FC 1C79:4C BØ 9B Ø8 48 AD 8D Ø2 ØE 1C81:DØ FB 68 28 4C CA F1 AØ C2 1C89:ØØ A9 ØD 1Ø E1 ØD B1 Ø3 78 1C91:FØ Ø7 2Ø D2 FF C8 4C FC ED 1C99:9B 6Ø 29 23 28 23 9A 3E 5Ø 1CA1:9Ø 11 ØØ ØØ 4Ø Ø8 53 41 7Ø 1CA9:56 5D 11 82 2Ø 52 88 48 52 1CB1:86 ØB 2C ØØ 4F 2Ø ØE 59 E5 1CB9:4E 47 1Ø 49 12 53 35 C7 91									
1C39:A9 08 08 86 A9 A0 D0 0D 30 1C41:18 B1 05 91 03 38 CE 0F 51 1C49:01 27 1B CE 10 9C D0 16 C6 1C51:A9 37 85 01 58 A9 1E 85 18 1C59:03 A9 9C 85 04 20 F5 9B 91 1C61:A9 00 8D 11 9C 60 C0 C1 DA 1C69:27 0E E6 04 E6 06 A5 06 76 1C71:C9 C8 D0 04 A9 E0 85 06 FC 1C79:4C B0 9B 08 48 AD 8D 02 0E 1C81:D0 A9 0D 10 E1 0D B1 03 78 1C91:F0 07 20 D2 FF C8 4C FC ED 1C99:9B 60 29 23 28 23 9A 3E 50 1CA1:90 11 00 00 47 08 53 41 70 1CA9:56 5D 11 82 20 52 88 48 52 1CB1:86 0B 2C 00 4F 20 0E 59 E5 1CB9:4E 47 10 49 12 53 35 C7 91									
1C41:18 B1 Ø5 91 Ø3 38 CE ØF 51 1C49:01 27 1B CE 10 9C DØ 16 C6 1C51:A9 37 85 Ø1 58 A9 1E 85 18 1C59:03 A9 9C 85 Ø4 2Ø F5 9B 91 1C61:A9 ØØ 8D 11 9C 6Ø CØ C1 DA 1C69:27 ØE E6 Ø4 E6 Ø6 A5 Ø6 76 1C71:C9 C8 DØ Ø4 A9 EØ 85 Ø6 FC 1C79:4C BØ 9B Ø8 48 AD 8D Ø2 ØE 1C81:DØ FB 68 28 4C CA F1 AØ C2 1C89:ØØ A9 ØD 10 E1 ØD B1 Ø3 78 1C91:FØ Ø7 2Ø D2 FF C8 4C FC ED 1C99:9B 6Ø 29 23 28 23 9A 3E 5Ø 1CA1:9Ø 11 ØØ ØØ 4Ø Ø8 53 41 7Ø 1CA9:56 5D 11 82 2Ø 52 88 48 52 1CB1:86 ØB 2C ØØ 4F 2Ø ØE 59 E5 1CB9:4E 47 1Ø 49 12 53 35 C7 91	1C31:A9	35	AØ	Ø8	B8	CØ	85	Ø5	F8
1C49:01 27 1B CE 10 9C D0 16 C6 1C51:A9 37 85 01 58 A9 1E 85 18 1C59:03 A9 9C 85 04 20 F5 9B 91 1C61:A9 00 8D 11 9C 60 C0 C1 DA 1C69:27 0E E6 04 E6 06 A5 06 76 1C71:C9 C8 D0 04 A9 E0 85 06 FC 1C79:4C B0 9B 08 48 AD 8D 02 0E 1C81:D0 FB 68 28 4C CA F1 A0 C2 1C89:00 A9 0D 10 E1 0D B1 03 78 1C99:9B 60 29 23 28 23 9A 3E 50 1CA1:90 11 00 00 40 08 53 41 70 1CA9:56 5D 11 82 20 52 88 48 52 1CB1:86 0B 2C 00 4F 20 0E 59 E5 1CB9:4E 47 10 49 12 53 35 C7 91	1C39:A9	08	08	86	A9	AØ	DØ	ØD	30
1C49:01 27 1B CE 10 9C D0 16 C6 1C51:A9 37 85 01 58 A9 1E 85 18 1C59:03 A9 9C 85 04 20 F5 9B 91 1C61:A9 00 8D 11 9C 60 C0 C1 DA 1C69:27 0E E6 04 E6 06 A5 06 76 1C71:C9 C8 D0 04 A9 E0 85 06 FC 1C79:4C B0 9B 08 48 AD 8D 02 0E 1C81:D0 FB 68 28 4C CA F1 A0 C2 1C89:00 A9 0D 10 E1 0D B1 03 78 1C99:9B 60 29 23 28 23 9A 3E 50 1CA1:90 11 00 00 40 08 53 41 70 1CA9:56 5D 11 82 20 52 88 48 52 1CB1:86 0B 2C 00 4F 20 0E 59 E5 1CB9:4E 47 10 49 12 53 35 C7 91	1C41:18	B1	05	91	03	38	CE	ØF	51
1C51:A9 37 85 01 58 A9 1E 85 18 1C59:03 A9 9C 85 04 20 F5 9B 91 1C61:A9 00 8D 11 9C 60 C0 C1 DA 1C69:27 0E E6 04 E6 06 A5 06 76 1C71:C9 C8 D0 04 A9 E0 85 06 FC 1C79:4C B0 9B 08 48 AD 8D 02 0E 1C81:D0 FB 68 28 4C CA F1 A0 C2 1C89:00 A9 0D 10 E1 0D B1 03 78 1C91:F0 07 20 D2 FF C8 4C FC ED 1C99:9B 60 29 23 28 23 9A 3E 50 1CA1:90 11 00 00 40 08 53 41 70 1CA9:56 5D 11 82 20 52 88 48 52 1CB1:86 0B 2C 00 4F 20 0E 59 E5 1CB9:4E 47 10 49 12 53 35 C7 91		27			10	9C		16	
1C59:03 A9 9C 85 04 20 F5 9B 91 1C61:A9 00 8D 11 9C 60 C0 C1 DA 1C69:27 0E E6 04 E6 06 A5 06 76 1C71:C9 C8 D0 04 A9 E0 85 06 FC 1C79:4C B0 9B 08 48 AD 8D 02 0E 1C81:D0 FB 68 28 4C CA F1 A0 C2 1C89:00 A9 0D 10 E1 0D B1 03 78 1C91:F0 07 20 D2 FF C8 4C FC ED 1C99:9B 60 29 23 28 23 9A 3E 50 1CA1:90 11 00 00 40 08 53 41 70 1CA9:56 5D 11 82 20 52 88 48 52 1CB1:86 0B 2C 00 4F 20 0E 59 E5 1CB9:4E 47 10 49 12 53 35 C7 91									
1C61:A9 00 8D 11 9C 60 C0 C1 DA 1C69:27 0E E6 04 E6 06 A5 06 76 1C71:C9 C8 D0 04 A9 E0 85 06 FC 1C79:4C B0 9B 08 48 AD 8D 02 0E 1C81:D0 FB 68 28 4C CA F1 A0 C2 1C89:00 A9 0D 10 E1 0D B1 03 78 1C91:F0 07 20 D2 FF C8 4C FC ED 1C99:9B 60 29 23 28 23 9A 3E 50 1CA1:90 11 00 00 40 08 53 41 70 1CA9:56 5D 11 82 20 52 88 48 52 1CB1:86 0B 2C 00 4F 20 0E 59 E5 1CB9:4E 47 10 49 12 53 35 C7 91									
1C69:27 ØE E6 Ø4 E6 Ø6 A5 Ø6 76 1C71:C9 C8 DØ Ø4 A9 EØ 85 Ø6 FC 1C79:4C BØ 9B Ø8 48 AD 8D Ø2 ØE 1C81:DØ FB 68 28 4C CA F1 AØ C2 1C89:ØØ A9 ØD 1Ø E1 ØD B1 Ø3 78 1C91:FØ Ø7 2Ø D2 FF C8 4C FC ED 1C99:9B 6Ø 29 23 28 23 9A 3E 5Ø 1CA1:9Ø 11 ØØ ØØ 4Ø Ø8 53 41 7Ø 1CA9:56 5D 11 82 2Ø 52 88 48 52 1CB1:86 ØB 2C ØØ 4F 2Ø ØE 59 E5 1CB9:4E 47 1Ø 49 12 53 35 C7 91									
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1C89:00 A9 0D 10 E1 0D B1 03 78 1C91:F0 07 20 D2 FF C8 4C FC ED 1C99:9B 60 29 23 28 23 9A 3E 50 1CA1:90 11 00 00 40 08 53 41 70 1CA9:56 5D 11 82 20 52 88 48 52 1CB1:86 0B 2C 00 4F 20 0E 59 E5 1CB9:4E 47 10 49 12 53 35 C7 91		FB					Fl		
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1CB1:86 ØB 2C ØØ 4F 2Ø ØE 59 E5 1CB9:4E 47 1Ø 49 12 53 35 C7 91									
1CB9:4E 47 10 49 12 53 35 C7 91									
	1CB1:86	ØB	2C						
C 20 COMPLITE ILLAS 1000	1CB9:4E	47	10	49	12	53	35	C7	91
	0.00	24.400	TE	11.11	IF 40	00			

```
1CC1:42 85 07 20 57 48 9F 5D D7
1CC9: 3F ØØ 12 4C 4F 43 4B Ø1 C7
1CD1:87 21 21 00 93 57 45 4C 0B
1CD9:02 DE 52 68 54 4F 50 2E 4A
1CE1:2E 11 11 12 80 06 DD 49 D9
1CE9:92 75 ØD 22 1E 19 3C 20 7A
1CF1:45 53 40 2E 42 41 53 49 93
1CF9:43 20 43 CØ 3B 50 49 4C 4A
1DØ1:45 70 46 4F 52 20 54 48 BB
1D09:45 20 36 34 C0 B8 55 50 DB
1D11:44 41 54 45 09 5F 46 52 41
1D19:4F 4D 20 53 50 00 67 4E 27
1D21:54 20 49 49 20 42 59 20 28
1D29:46 41 52 49 44 20 41 48 23
1D31:4D 41 44 ØD ØD ØØ 7Ø C1 C6
1D39:0F 64 04 EA EA EA 00 00 46
```

Farid Ahmad programs his 64 in Islamabad, Pakistan.

#### **PAD DESIGN**

By Robert C. Marcus

Impedance matching is an important concept in radio and electronics work. To get the maximum power from your ham radio to your antenna, for example, you'll have to match the impedance of your antenna to the impedance of your transmitter.

If you want a filter to pass a desired band of frequencies, you'll have to make sure the input and output impedances of the filter match those of your input and output circuits.

If you want to get the most power out of a stereo speaker, then the speaker impedance must match the output impedance of your amplifier.

If you're a ham radio operator or an electronics hobbyist, these are just a few of the times when you might find it necessary to design an attenuator network, or what's generally referred to as a pad.

Whether you want to insert additional attenuation or merely match impedances, the math that's involved can be intimidating. That's where Pad Design can help. It does all the number crunching necessary to calculate the resistive elements necessary to meet the design requirements that you specify.

The program is set up to deal with unbalanced T and Pi networks, but it can also deal with balanced H and O networks. The minimum-loss pad for impedance matching is included as well.

In many applications, it's possible to use commercial standard-value resistors. Their low cost and availability are tradeoffs for a slight compromise in the attenuation and impedances being matched.

The advantage of using Pad Design is that it lets you try out various standard values to produce a network that is closest to the design criteria.

Pad Design is written entirely in BA-SIC. To help avoid typing errors, enter it with The Automatic Proofreader. See "Typing Aids" elsewhere in this section.

#### Using the Program

When the program is run, you can choose the type of network to be used: T, H, Pi, O, or MIN-LOSS. Pad Design then prompts for the input and output impedances that will be used, and if the network is a T/H or Pi/O, the insertion loss in decibels is asked for. The program then displays the network and gives the values required for the resistive arms.

At this point you may select to end the program, return to the menu, or changes resistors to obtain the best choice of standard values.

If you decide to make changes to the resistors, you'll be prompted for new values. The program limits the deviation of value to plus or minus 20 percent of the actual design value; this is more than adequate when you are using standard resistors whose values may vary by 10 percent. For more precise values, 5- or 1-percent resistors would be items of choice. If the original design value is to be retained for a particular resistor, just press Return.

After you make your changes, the network is displayed again. This time it lists two sets of impedances. The first gives the value of ZI, which results from the new R values when ZO terminates in the originally specified impedance. The second value gives ZO as it appears when ZI terminates in its specified impedance. The insertion loss—calculated with the existing changes—is displayed as well.

#### **Balanced Networks**

When dealing with balanced networks, remember that the value of the series arm or arms is halved. Since the values given and entered are on a single-unit basis, you'll have to multiply by two when choosing standard values.

#### **Decimal Places**

The calculated values for resistors and impedances are rounded off at two dec-

imal places for values below 1 ohm and one decimal place for values between 1 and 1000 ohms. Attenuation values are rounded off at two decimal places.

Should you wish to set your own values for resistors and impedances, you can alter the multiplier. The multiplier is the function FNPM(x), which is defined in line 110. It is, in effect, powers of 10 used with the INT() function to set the number of decimal places, such as INT(FNPM(n)\*n+.5)/FNPM(n) where n is a floating point number.

The function can be interpreted as  $FNPM(x)=10^{(BASE-(x<LL+(x>HL)))}$ .

Base is the number of places that are to be rounded: 1 sets one decimal place, 2 sets two decimal places, and so on. LL is the lower limit. Below this value the number of places increases by one over the base number. HL is the high limit at which the number of places decreases by one from the base.

To sum up our application, there's one decimal place (base) between 1 (LL) and 1000 (HL), there are two decimal places below 1, and there are no decimal places for 1000 and over.

Programmers using this method for rounding off floating point numbers should note that making the base a negative number produces rounding to tenths, hundredths, and so on.

#### PAD DESIGN

- BA 10 REM COPYRIGHT 1992 COMPU
  TE PUBLICATIONS INTL LTD
   ALL RIGHTS RESERVED
- KQ 100 REM \*\*\*{2 SPACES}INITIA LIZE{2 SPACES}\*\*\*
- PB 110 HD\$="{RVS}{10 SPACES}PA
  D DESIGN{9 SPACES}":DEF
  FNPM(X)=10↑(1-(X<1)+(X>
  1000))
- CM 120 CC\$(1)=" ":CC\$(2)="
  {CYN}RESULTS WITH NEW '
  R' VALUES {7}"
- DP 130 LO\$(1)="INSERTION LOSS" :LO\$(2)="MINIMUM-LOSS"
- FE 140 AN\$(1)="T OR H ":AN\$(2) ="1 OR O ":AN\$(3)="MIN-LOSS"
- DE 150 POKE783, PEEK (783) AND 254 : POKE53281, 0: POKE53280,
- JE 160 REM \*\*\*{2 SPACES}MAIN M ENU{2 SPACES}\*\*\*
- AC 170 PRINT" (CLR)";:FORI=1T04
  0:PRINT" (RVS) ";:NEXT

- RS 180 PRINT" [HOME] "TAB (5) HD\$

  KJ 190 RO=3:CO=5:GOSUB1150:PRI

  NT"SELECT: ":CO=10:FORI=
- PQ 200 RO=RO+2:GOSUB1150:PRINT I" - "AN\$(I):NEXT
- JG 210 INPUT" (DOWN) CHOICE: "; P\$ :IFP\$<"1"ORP\$>"3"THEN21
- JG 220 PH=1
- PC 230 INPUT"{DOWN}ENTER INPUT {2 SPACES}IMPEDANCE";ZI :IFZI=0 THENGOSUB1260:G OTO230
- GH 240 INPUT "ENTER OUTPUT IMPE DANCE"; ZO: IFZO=0THENGOS UB1260: GOTO240
- HM 250 IFP\$="3"ANDZO=ZITHENPRI
  NT"{DOWN}{RVS}MIN-LOSS
  {SPACE}IS TO MATCH Z'S"
  :GOTO1210
- KS 260 IFP\$="3"THEN300
- SS 270 INPUT"ENTER ATTENUATION
  IN DB."; AT
- BQ 280 IFAT=0THEN1250
- BP 290 N=EXP(LOG(10)\*AT/10)
- MJ 300 ONVAL (P\$) GOTO310,440,57
- RB 310 REM \*\*\*{2 SPACES}CALC F OR T OR H{3 SPACES}\*\*\*
- FQ 320 R3=2\*SQR(ZI\*ZO\*N)/(N-1)
- FS 330 R1=ZI\*(N+1)/(N-1)-R3:R1 =INT(FNPM(R1)\*R1+.5)/FN PM(R1)
- DA 340 R2=ZO\*(N+1)/(N-1)-R3:R2 =INT(FNPM(R2)\*R2+.5)/FN PM(R2)
- KQ 350 R3=INT(FNPM(R3)\*R3+.5)/ FNPM(R3)
- FK 360 IFSGN(R2) =-1THEN1230
- JP 370 RA=R1:RB=R2:RC=R3
- **НА 380 GOTO690**
- HM 390 ZA=(ZO+R2)\*R3/(ZO+R2+R3 )+R1:ZA=INT(FNPM(ZA)\*ZA +.5)/FNPM(ZA)
- SF 400 ZB=(ZI+R1)\*R3/(ZI+R1+R3 )+R2:ZB=INT(FNPM(ZB)\*ZB +.5)/FNPM(ZB)
- KX 410 VL=1/((ZO+R2)\*R3/((ZO+R 2+R3)\*ZA)\*ZO/(ZO+R2))
- GJ 420 AT=INT(100\*(20\*LOG(VL)/ LOG(10)-10\*LOG(ZA/ZO)/L OG(10))+.5)/100
- SD 430 GOTO690
- HD 440 REM \*\*\*{2 SPACES}CALC F OR ' OR O{3 SPACES}\*\*\*
- GR 450 R3=(N-1)/2\*SQR(ZI\*ZO/N) PB 460 R1=1/(1/ZI\*(N+1)/(N-1)-
- PB 460 Rl=1/(1/ZI\*(N+1)/(N-1)-(1/R3)):Rl=INT(FNPM(R1) \*Rl+.5)/FNPM(R1)
- AX 470 R2=1/(1/ZO\*(N+1)/(N-1)-(1/R3)):R2=INT(FNPM(R2) \*R2+.5)/FNPM(R2)
- CE 480 R3=INT(FNPM(R3)\*R3+.5)/ FNPM(R3)
- AB 490 IFSGN(R1)=-1THEN1230 RD 500 RA=R1:RB=R2:RC=R3
- DH 510 GOTO870

- XX 520 OZ=ZO\*R2/(ZO+R2):IZ=ZI\* R1/(ZI+R1)
- XP 530 ZA=(OZ+R3)\*R1/(OZ+R1+R3
  ):ZA=INT(FNPM(ZA)\*ZA+.5
  )/FNPM(ZA)
- BS 540 ZB=(IZ+R3)\*R2/(IZ+R2+R3 ):ZB=INT(FNPM(ZB)\*ZB+.5 )/FNPM(ZB)
- FX 550 AT=INT(100\*(20\*LOG((0Z+ R3)/OZ)/LOG(10)-10\*LOG( ZA/ZO)/LOG(10))+.5)/100
- HP 560 GOTO870
- XD 570 REM \*\*\*{2 SPACES}CALC F OR MIN-LOSS{2 SPACES}\*\*
- EP 580 IFZO>ZITHENZ=ZI:ZI=ZO:Z
- PA 590 R3=ZO/SQR(1-(ZO/ZI)):R3 =INT(FNPM(R3)\*R3+.5)/FN PM(R3)
- DM 600 R1=ZI\*SQR(1-(ZO/ZI)):R1 =INT(FNPM(R1)\*R1+.5)/FN PM(R1)
- XG 610 ZA=ZI
- MP 620 RA=R1:RB=R2:RC=R3
- XS 630 GOTO660
- GH 640 ZA=ZO\*R3/(ZO+R3)+R1:ZA= INT(FNPM(ZA)\*ZA+.5)/FNP M(ZA)
- BD 650 ZB=(ZI+R1)\*R3/(ZI+R1+R3 ):ZB=INT(FNPM(ZB)\*ZB+.5 )/FNPM(ZB)
- MX 660 VL=ZA/(ZO\*R3/(ZO+R3)) XJ 670 AT=INT(100\*(20\*LOG(VL)/
- XJ 670 AT=INT (100\*(20\*LOG(VL)/ LOG(10)-10\*LOG(ZA/ZO)/L OG(10))+.5)/100
- XR 680 GOTO1000 MA 690 REM \*\*\*\* {2 SPACES}DISPLA
- MA 690 REM \*\*\* {2 SPACES}DISPLA
  Y T NETWORK {2 SPACES} \*\*
  \*
- HD 700 PRINT"{CLR}"HD\$"
  {2 SPACES}"AN\$(1)
- MK 710 PRINTTAB (5) CC\$ (PH)
- SQ 720 PRINTTAB (49) "CCCC {RVS} {WHT} {3 SPACES} {7} {OFF} CC {RVS} {WHT}
- 73 SPACES \$ \( 7\) \{ OFF \} CCC"

  PF 730 PRINTTAB (10) "\{ 8 SPACES \}

  B"
- MR 740 PRINTTAB(10)"{3 SPACES}
  R1{3 SPACES}{RVS}{WHT}
  {SPACE}{7}{OFF}
- [4 SPACFS]R2"
  ME 750 PRINTTAB(10)"[8 SPACES]
- "{RVS}{WHT} {7}{OFF} R3"
  HP 760 PRINTTAB(10)"{8 SPACES}
  {RVS}{WHT} {7}{OFF}"
- GS 780 PRINTTAB (9) "CCCCCCCCC {E}CCCCCCCC"
- XJ 790 PRINTTAB(10)"{3 SPACES} {WHT}{T}^{T}{7} {5 SPACES}{WHT}{T}^{T}
- SM 800 PRINT"{3 DOWN} NOTE: I

		F BALANCED H THEN R1 &
		{SPACE}R2"
AQ	810	PRINT" {8 SPACES} ARE HAL
		VED."
AJ	820	PRINT" {DOWN } R1 = "R1TAB (1
		5) "R2="R2TAB(30) "R3="R3
XQ	830	RO=5:CO=3:GOSUB1150:IFP
		H=1THENPRINT"ZI"ZITAB(3
		Ø) "ZO"ZO:GOTO85Ø
FB	840	PRINT"ZI (CYN) "ZATAB (30)
		"{7}ZO"ZO:RO=7:GOSUB115
		Ø:PRINT"{2 SPACES}"ZITA
		B(30)"{2 SPACES}{CYN}"Z
		B"{7}"
XF	850	RO=11:CO=10:GOSUB1150:P
		RINTLOS (INT (VAL (P\$)/2+.
	0.50	5));AT" DB"
HR		
KA	870	
		Y 1 NETWORK{2 SPACES}**
CD	000	
CB	990	PRINT"{CLR}"HD\$" {2 SPACES}"AN\$(2)
CP	890	
SF	900	
NB	900	{RVS}{WHT}{3 SPACES}
		{OFF}{7}CC{R}CCCC"
WII	910	PRINTTAB (10) "{5 SPACES}
KH	910	B{7 SPACES}B"
VII	920	
ΛП	520	{RVS}{WHT} {OFF}{7}
		{3 SPACES}R3{2 SPACES}
		{RVS}{WHT} {OFF}{7}"
BY	930	PRINTTAB(10)"{5 SPACES}
DA	220	{RVS}{WHT} {OFF}{7} R1
		{4 SPACES} {RVS} {WHT}
		{OFF}{7} R2"
AC	940	PRINTTAB(10)"{5 SPACES}
AG	740	{RVS}{WHT} {OFF}{7}
		{7 SPACES} {RVS} {WHT}
		{OFF}{7}"
MD	950	PRINTTAB (10) "{5 SPACES}
110	220	B{2 SPACES}{WHT}{3 @}
		{7}{2 SPACES}B"
SD	960	PRINTTAB (10) "CCCCC (E)CC
		PRINTTAB (10) "CCCCC {E}CC CCCC {E}CCC"
MK	970	PRINTTAB (10) "{8 SPACES}
		{WHT} {T}   {T} {7}"
CJ	980	PRINT"{3 DOWN} NOTE: I
7		F BALANCED O THEN R3 IS
		HALVED"
CF	990	GOT0820
SD		
		AY MIN-LOSS {2 SPACES}*
		**
AC	101	PRINT"{CLR}"HD\$"
		{2 SPACES}"AN\$(3)
QC	102	Ø PRINTTAB (5) CC\$ (PH)
PJ	103	PRINTTAB (49) "CCCC (RVS)
		{WHT}{3 SPACES}{7}
		{OFF}CC{R}CCCCCCC"
MH	104	Ø PRINTTAB(10)"
		{8 SPACES}B"
RG	105	Ø PRINTTAB (10)"
		{3 SPACES}R1{3 SPACES}
		{RVS}{WHT} {7}{OFF}"
ES	106	Ø PRINTTAB(10)"
		{8 SPACES}{RVS}{WHT}

		{7}{OFF} R3"
FS	1070	PRINTTAB (10)"
		{8 SPACES} {RVS} {WHT}
		{7}{OFF}"
FJ	1080	PRINTTAB (10)"
		{3 SPACES}{WHT}{3 @}
		{7}{2 SPACES}B"
QS	1090	PRINTTAB (9) "CCCCCCCC
		{E}CCCCCCC"
CD	1100	PRINTTAB (10)"
		{3 SPACES} {WHT} {T}   {T}
		<b>{7}"</b>
BM	1110	PRINT"{3 DOWN} NOTE:
		{SPACE} IF BALANCED THE
		N R1 IS HALVED."
SD	1120	PRINT" {DOWN} R1="RITAB (
		3Ø) "R3="R3
KE	1130	GOT0830
KS	1140	REM *** SUB-RTES ***
PQ	1150	POKE781, RO: POKE782, CO:
		SYS65520: RETURN
SH	1160	RO=22:CO=Ø:GOSUB115Ø:P
		RINT" {CYN}1-ENTER NEW
		{SPACE}R VALUES
		{4 SPACES}2-MENU
		{4 SPACES}3-QUIT{7}"
CK	1170	GETAS: IFAS<>"1"ANDAS<>

"2"ANDA\$<>"3"THEN1170

{CLR}": POKE 53281, 6: POK

:ONVAL (P\$) GOTO 390,520,

HIFT TO REDO {7}":WAIT6

ED IS > OR < THAN 20%

{SPACE}OF": PRINTTAB (10

NSERTION LOSS IS < MIN

EDO OR CHOOSE MIN.LOSS

INSERTION LOSS MUST E

IMPEDANCE MUST EXIST {SPACE}":RETURN

INT" {CYN} {RVS} RETURN

L R VALUE (7) (DOWN)"
RK 1290 PH=2:R1\$="":R2\$="":R3\$

{OFF} ONLY FOR ORIGINA

UE"; R1\$: R1=VAL(R1\$): IF R1\$=""THENR1=RA: GOTO13

RATHENR=RA:R1\$="":GOSU

RM 1180 IFAS="2"THEN160 XR 1190 IFAS="3"THENPRINT"

640

E53280,14:END AJ 1200 PRINT"{CLR}":GOSUB1270

AA 1210 PRINT" [DOWN] [CYN] HIT S

KH 1220 PRINT" [RVS] VALUE ENTER

MK 1240 PRINT" [5 SPACES] {RVS}R

RR 1250 PRINT" [DOWN] [RVS] SOME

XIST ":GOTO1210

JK 1260 PRINT" [DOWN] [RVS] SOME

HP 1270 REM \*\*\* GET NEW R VALU

MP 1280 RO=4:CO=5:GOSUB1150:PR

CR 1300 INPUT"ENTER NEW R1 VAL

DK 1310 IFABS (VAL (R1\$)-RA)>. 2\*

ES \*\*\*

20

53,1:GOTO160

)R:RETURN AD 1230 PRINT"{DOWN}{RVS}THE I

.LOSS -"

":GOTO1210

Ontario, Canada. He's the author of CoilCalc (June 1991).

Robert C. Marcus lives in St. Thomas.

B1220:GOTO1300 KG 1320 IFP\$="3"THEN1350 CA 1330 INPUT"ENTER NEW R2 VAL

SG 1340 IFABS (VAL (R2\$)-RB)>.2\*

B1220:GOTO1330 SS 1350 INPUT"ENTER NEW R3 VAL

XA 1360 IFABS (VAL (R3\$)-RC)>.2\*

B1220:GOTO1350

JR 1370 IFR1=RAANDR2=RBANDR3=R
CTHENPH=1

50

70

JG 1380 RETURN

UE"; R2\$: R2=VAL(R2\$): IF R2\$=""THENR2=RB: GOTO13

RBTHENR=RB:R2\$="":GOSU

UE"; R3\$: R3=VAL(R3\$): IF R3\$=""THENR3=RC: GOTO13

RCTHENR=RC:R3\$="":GOSU

## TYPING AIDS

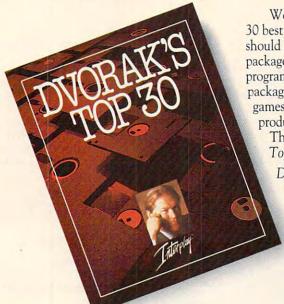
MLX, our machine language entry program for the 64 and 128, and The Automatic Proofreader are utilities that help you type in Gazette programs without making mistakes. To make room for more programs, we no longer include these labor-saving utilities in every issue, but they can be found on each Gazette Disk and are printed in all issues of Gazette through June 1990.

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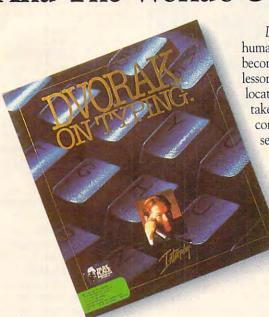
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## STACKER AT/16

I should admit up front that I'm highly prejudiced about this product. I've already called Stacker 1.0 one of the all-time great software programs. Now Stacker 2.0 and Stacker AT/16 come along with even more features. I'll try to restrain myself, but I'm likely to gush with superlatives.

Stacker compresses the data on your hard drive, giving you—on average—twice the available storage space. If you have a crammed 20MB hard drive, Stacker could turn it into a more roomy 40MB drive. Once you install the software, it works in the background. You basically set it and forget it.

Stac Electronics currently offers four different Stacker products: Stacker 2.0 (the software-only version, \$149), Stacker XT/8 (Stacker 2.0 with an 8-bit coprocessor card, \$199), Stacker AT/16 (Stacker 2.0 with a 16-bit coprocessor card, \$249), and Stacker MC/16 (Stacker 2.0 with a microchannel 16bit coprocessor card, \$299). The software-only version is perfect for laptops. The notebook computer I'm writing on right now has a 60MB drive that Stacker 2.0 has converted to a 110MB drive. But don't just take my word for it; both Central Point Software and Symantec license the Stacker software compression technology for their bestselling backup programs: PC Tools Backup and Norton Backup.

So why use Stacker with a coprocessor card if the software works so well by itself? The card offers significantly faster performance. On my 20-MHz 80386 computer, the software-only version caused the hard drive to run about 35 percent slower than it did before it was com-

pressed, while Stacker AT/ 16 caused the hard drive to run only about 5 percent slower. The card also offers a slightly better compression ratio. On the same 386, Stacker AT/16 achieved a 2.1 : 1 ratio compared to Stacker 2.0's 1.9 : 1 ratio. In addition, the card has no jumppends on your computer. If you have a lot of compressed files on your hard drive, such as ZIP or GIF files, your compression ratio could be well below the 2: 1 average—making Stacker much less of a bargain. And while my 386 ran just 35 percent slower with the Stacker

your current hard drive, but it will essentially double any hard drive you buy in the future. If you have a 10- or 12-MHz 286, the decision is tougher, as you'll have to choose between size and speed for your hard drive.

IBM PC and compatibles, 512K RAM, hard drive, open 16-bit slot—\$249

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Stacker's compression capabilities can double the size of some hard drives, but it also slows some down considerably.

ers, switches, or interrupts to worry about—like the software, you basically set it and forget it.

The AT/16 card uses a new compression chip that runs 39 percent faster than the chip used by the Stacker 1.0 8-bit card. And the new Stacker 2.0 software is as much as 30 percent faster than version 1.0, can take up as little as 14K of conventional memory (or can be loaded into high memory with DOS 5.0 or a memory manager program), includes a special disk-optimizing program (regular defragmentation programs won't work), and can compress floppies, RAM disks, and Bernoulli disks, as well as hard drives.

Is Stacker for you? It de-

2.0 software and a mere 5 percent slower with the Stacker AT/16 software-and-card combination, a much slower XT compatible with a 68-ms hard drive could run as much as 500 percent slower with the Stacker 2.0 software and 200 percent slower with the Stacker XT/8 softwareand-card combination. To continue the comparisons, you can expect a 10-MHz 286 computer to run about 400 percent slower with Stacker 2.0 and about 50 percent slower with Stacker AT/ 16. Clearly, the faster the processor, the faster Stacker can compress and decompress your files.

If you have a 386 or 486, Stacker AT/16 is a no-brainer. Not only will it compress

## **PROCALC 3D**

Most spreadsheets are like one big sheet of graph paper divided into numbered rows and lettered columns. Pro-Calc 3D is like a big cube of graph paper (called a workcube in ProCalc lingo) divided into pages, with each page a separate worksheet.

Each worksheet in a workcube can detail the performance of a corporate division or profits in a year or any other meaningful division, and you can page through these with a keystroke. The paper metaphor ends there, however, because with ProCalc, you can view your data not just from the front but from the sides. back, top, and bottom. For example, you can rotate the workcube to see all the A columns on one page, the B columns on the next, and so on.

This is easier to see than to describe, but it does work. You'll have to stretch your mind to grasp working with data in three dimensions instead of the usual two, but if you can, you can do things that are difficult or impossible with an ordinary spreadsheet. It does take some thought to design worksheet pages that provide co-

# THE GENERA

Each generation lives a little longer, thanks to modern science. But the breakthroughs that could extend human life all the way to its theoretical limit of 120 are just beginning, says Kathy Keeton, founder and president of Longevity magazine. Now, in her new bestseller LONGEVITY: The Science of Staying Young, written in cooperation with specialists from the National Institute of Aging, Ms. Keeton tells you about amazing new discoveries that bring the dream of perpetual youth closer than ever before.

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Kathy Keeton shares everything she's learned from the experts and from her own experience: the secrets of proper diet, the dietary supplements that work, physical workouts and mental exercises that promise longer life — as well as tips on which drugs work and which don't, cosmeceuticals and plastic surgery techniques that will make you feel half your age. There's good news about maintaining your brain power, sexual activity, body tone or youthful appearance on every page of this exciting book.

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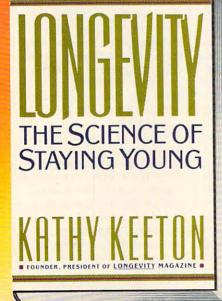
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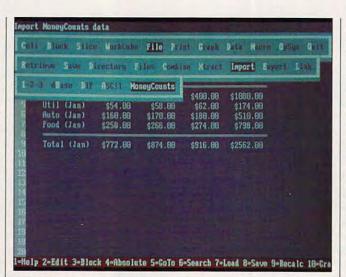


Clip this coupon and send to: P.O. Box 999 Bergenfield, NJ 07621-0999 OR ORDER BY PHONE: 1-800-253-6476 Allow a minimum of 4-6 weeks for delivery. herent information when viewed from various angles. Your best bet is to settle on a layout for the first page and stick to it on every page, although you don't have to.

Being able to examine any slice of data at any time is a real boon for preparing reports that have to provide multiple views of data. For example, you could create two charts, one showing yearly profits by department and a second showing profits in January over a five-year period, simply by changing your view of the cube and making a chart from the selected columns or rows.

Does ProCalc have sufficient capacity to handle those really big jobs? You have access to 512 rows. 512 columns, and 512 pages, yielding 134 million cells. That ought to be enough for any spreadsheetmodeling job short of tracking the federal government. There are also more than 100 built-in math, trig, and statistical functions. Formulas can work on any range or block of cells, even across pages. ProCalc has its own command language, and it can import Lotus files. Several types of charts can be generated from specified cells.

Error tracking is an important concern for any spreadsheet, especially one as potentially data-dense as Pro-Calc. The program has two audit modes: Trace, which highlights all formulas that apply to the current cell, and Map, which shows a compressed view of the current page with each cell pictured as a symbol that tells you what kind of data it contains. Unfortunately, while in an audit mode, you can't print an error report or have ProCalc change a range of cells.



Expand your spreadsheet consciousness with ProCalc, which allows you to view a spreadsheet as a multisided cube.

ProCalc is certainly a solid implementation—at a good price. If you routinely need to manipulate many related data sets and your company doesn't force you to use Lotus 1-2-3, take a serious look at ProCalc.

STEVEN ANZOVIN

IBM PC and compatibles, 512K RAM, hard drive—\$89

PARSONS TECHNOLOGY One Parsons Dr. Hiawatha, IA 52233 (319) 395-9626

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## **JUSTWRITE 1.0**

Until recently, it would've been easier to convince Bill Gates to sweep floors at IBM than it would've been to find an inexpensive Windows-compatible word processor. Luckily, word processor price wars have been raging, with major titles like Microsoft's Word for Windows (WinWord) being discounted from an appalling \$495.00 to a more palatable \$129.95. The catch? To get these low prices, you must be "upgrading" from another word processor.

If you can get the \$129

price on WinWord, Ami Pro, or another high-end package, by all means do so. But if you're not on the upgrade track or if you're looking for a Windows word processor that won't bury you in a lot of fancy features you can't use, you might want to take a gander at Symantec's JustWrite.

Amazingly, JustWrite looks and acts a lot like WinWord. It features a toolbar and ruler similar to WinWord's ribbon and ruler, and while Just-Write lacks macro capabilities, it does include a full-featured spelling checker and thesaurus. The spelling checker boasts a 100,000-word dictionary, making it only slightly smaller than the 130,000-word dictionary included with WinWord.

JustWrite's toolbar icons provide access to many textformatting functions, including font and font size, text color, text attributes (bold, italic, underline, and strike through), superscript and subscript, justification, line spacing, and paragraph spacing. Any of these icons can be added to or deleted from the toolbar, customizing it to match your needs perfectly.

JustWrite can handle many document layouts, including single- and multiple-column (up to eight columns), as well as documents that mix graphics and text. To help with the page-layout chores, you can create a style library containing frequently applied styles for text elements like titles, subheads, and body text. In addition, you can create section libraries, which define the format of a specific portion of a document, and document libraries, which store document formats.

Moreover, JustWrite has the ability to import and export several text formats, including WordPerfect and Win-Word. To handle these types of documents, you don't need to use a special import function. JustWrite imports them automatically.

Fairly sophisticated documents can be created with JustWrite, using text, table, and graphic frames. Text frames allow you to create horizontal or vertical text banners and other special text elements, while graphic frames allow you to import several types of graphics files, including PCX, TIF, and Microsoft Paint files. Graphics also can be copied from Windows' clipboard. You can scale, crop, or move the imported graphics as desired. You can add borders and backgrounds to any type of frame.

Especially nice are the table frames, which present you with a spreadsheet-like entry form, complete with column heads, row heads, and cells. You can easily change column and row sizes with your mouse, and you can insert whatever additional rows and columns you need.

Your text can be viewed in "proof" or "detailed"

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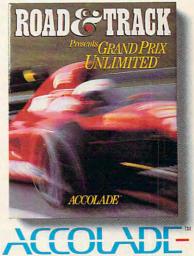




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mode, the latter of which displays invisible characters. such as carriage returns, spaces, and tabs. You can also view your document in several sizes, including normal, enlarged, reduced, and full page. The full-page view is the closest JustWrite comes to a print-preview mode. Unfortunately, on my system, I was unable to get the fullpage representation to resemble closely the final output. The screen always showed the body text about 25 percent too narrow, with a deceptively wide right margin. (Documents printed fine.) Although Symantec's technical support was excellent (the technicians tried to help me fix the problem over the phone; when that didn't work, they sent out a new set of disks), I was never able to get this feature to work properly.

JustWrite supports Windows' Dynamic Data Exchange (DDE), so you can insert data from other applications, such as a spreadsheet chart, and be assured of the data's staying updated. In addition, JustWrite can handle mail merges, using ASCII, Q & A 3.0, or dBASE III/IV files as the source for the name and address data. It also can easily handle your outlining chores with its built-in outliner. You can even use JustWrite to create a table of contents or an index.

JustWrite isn't perfect. The spelling checker, for instance, takes an annoyingly long time to suggest spellings for suspect words. Win-Word is more than twice as fast. Also, you can get a word count only by doing a complete spelling check, which will disappoint professional writers who need to keep close tabs on the size of their documents.

JustWrite's documentation comprises three volumes: a 200-page user's manual, a 290-page reference manual, and a 10-page quick-reference guide. Each volume is well organized and generally well written. Few users will have difficulty installing or using the product.

In spite of a few minor flaws, JustWrite is an excellent choice for a first Windows word processor. While professional writers may want to look elsewhere, general users will find almost everything they need to produce attractive and well-designed documents. With a street price of \$140 to \$160, it's hard to go wrong with JustWrite.

IBM PC and compatibles (80286 or faster), 2MB RAM, hard drive, Windows 3.0—\$199

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Circle Reader Service Number 363

## ACERANYWARE 1120NX

With the recent flood of notebook computers, it's harder than ever to find a genuinely unique notebook. The Acer-AnyWare 1120NX isn't dramatically different, but it does have a number of small, well-planned features that make it stand out from the crowd.

The first thing you notice is the AnyWare's large VGA screen; it's a full ten inches measured diagonally. The screen isn't as bright as many I've seen, but the size more than makes up for any lack of intensity.

The AnyWare comes with a 20-MHz 386SX processor

(which is pretty much the norm these days for a notebook computer); a sturdy case; and a choice of 20MB, 40MB, or 60MB hard drive. The hard drives are especially fast; the average seek time for the 60MB drive we tested was just under 14 milliseconds. The unit uses two batteries which change over automatically, giving it a combined battery life of more than three hours. The twin battery system has the added benefit of letting you trim the AnyWare's 7.4 pounds by 12 ounces when you carry a single battery.

The unit really shines in the area of expandability. Besides the usual VGA, serial, and parallel ports, it has ports for a second serial device, an external floppy drive, an external keyboard/keypad, and a threeslot expansion chassis. While the unit comes with just 1MB of RAM, you can bring it up to 5MB with userinstallable DRAM cards. You can upgrade the BIOS with a similar user-installable card.

No matter how well a company designs a laptop, it's even better when you can set it up just the way you want it. The AnyWare has the best setup program I've seen. You can configure the second serial port for an external serial device, for a built-in modem, or as a nonworking port in order to extend the life of your batteries. You can set the unit to boot from C:, to boot from A:, or to automatically look for A: and then C:. You can even create two sets of power-saving options to shut down the LCD backlight and hard drive and activate the doze and sleep modes. It's easy to switch between your favorite power-saving battery configuration and an optimized AC-power setup.

On the downside, I didn't care for the lazy-L arrangement of the cursor keys (I prefer the traditional upsidedown T pattern), the right-hand Shift key is too small and therefore too easy to miss, and the unit is a tad on the heavy side.

The many small advantages to the AcerAnyWare 1120NX, when taken together, add up to a very attractive notebook computer.

DAVID ENGLISH

AcerAnyWare 1120NX with 3MB RAM, 60MB hard drive, and 2400bps modem—\$3,395

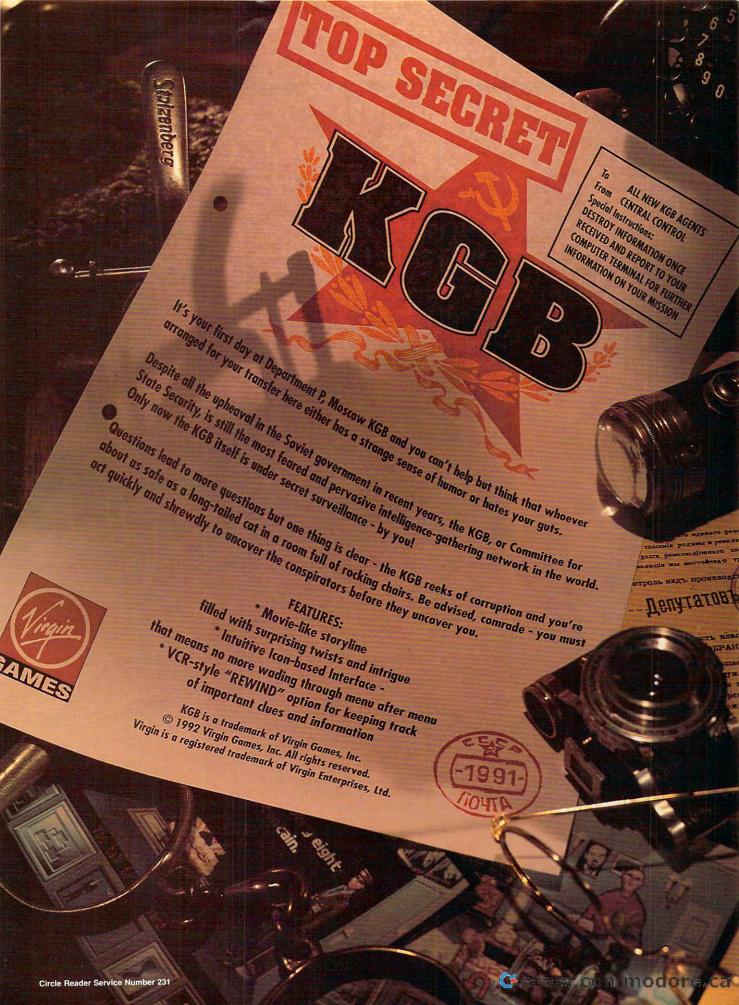
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## SOFTWARE BRIDGE

Moving text between word processing packages consumes time and sometimes seems next to impossible because of embedded controls, wildly different print and layout settings, and proprietary languages. At such times, a good document converter proves vital. Perhaps the best known of such converters, Systems Compatibility's Software Bridge, now goes where no word processing conversion package has gone before, adding translation facilities for 12 spreadsheet and nine database formats (including Excel, Lotus 1-2-3, Quattro Pro, dBASE, and FoxBase).

Function keys handle the transfer of rows, columns, and isolated data. I tried Software Bridge on 13 programs that managed the change-over successfully. Note that these new conversions are strictly one-way—into word processing formats. While



some other programs bidirectionally translate between a much broader range of software, they require considerably more input and knowledge from the user.

Little of this is necessary for Software Bridge, whose primary asset remains its ease of use as it hides translation complexity from the user. Identical font mapping during conversions occurs automatically where formats permit, and the program supports substitute fonts. If you want to see your files before translating them, just indicate their directory; as you scroll through the available file list on the left, they're displayed automatically in their native formats on the right. You can process one file or several, though you're limited to a single format conversion (WordPerfect 5.1 to XyWrite, for instance) per round.

If you need to perform format conversions, Systems Compatibility has a bridge for you. Supporting 60 formats in all, Software Bridge comes strongly recommended. BARRY BRENESAL

IBM PC and compatibles, 390K RAM, two disk drives—\$149

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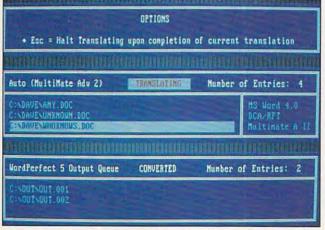
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## **QUICKAUTHOR**

An application development environment for nonprogrammers? You bet. That's the promise of QuickAuthor. With it, you can create stand-alone applications like tutorials, software demos, online help systems, and hypertext systems.

QuickAuthor does have a few limitations. Its applications can use only characterbased displays, and they receive all input from the keyboard. But until the GUI revolution, almost every DOS program shared these properties. QuickAuthor has only one significant limitation. It can only display information, not process it. You can't write a sort routine using QuickAuthor, for example. full-featured editor, which can create, modify, and store any type of character-mode screen, whether you design or copy it.

Next, you must specify how to move between screens. Essentially, you tell QuickAuthor, "If you're at screen X and the user press-



Software Bridge, which can translate many spreadsheets and database formats, moves info from spreadsheets to word processors.

Still, it has myriad uses.

For instance, how about implementing an online employee handbook? Maintaining it on a local area network would make it continuously available to all users, and it could be updated without huge printing costs.

QuickAuthor makes designing applications a snap. There are two steps: creating the screens that the user will see when running the application and telling QuickAuthor how to move between them. Applications may contain up to 800 screens, so there are few jobs too large for QuickAuthor to handle.

QuickAuthor contains two screen-design utilities. First, it includes a screen-capture utility, which copies any character-mode screen displayed in another program, such as in a word processor or spreadsheet. Second, it includes a es key Y, display screen Z." When finished, simply save the application as an EXE file. It will not require QuickAuthor or any other support files to run, and you may freely distribute it, paying no royalties of any kind. Use of images from other software, however, is an issue to be resolved between you and the copyright holders.

QuickAuthor's power, simplicity, and almost unlimited number of uses make it an excellent program. The program can be a valuable addition to any user's set of tools.

IBM PC and compatibles, 640K RAM-\$129

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## AVERY PERSONAL LABEL PRINTER

The Avery Personal Label Printer is a secretary's dream. If you're not actually a secretary but you only function as one for your family or some charitable organization, you'll still love this machine.

In my experience, professional-looking printed labels are almost more trouble than they're worth. Setting up those labels (which almost always come off inside the printer) and getting them to print at the right place (before you use up all you have) add up to one big headache. If I only have one label to print, it's often handwritten. Save a headache, sacrifice an impression. But at last there is a low-cost solution to this dilemma: the Avery Personal Label Printer! This little machine (only six inches tall and four inches wide), along with its accompanying software, takes the hassle out of labels. It takes only 31/2 seconds to produce laser-printed labels with a 137-dpi resolution. That makes for goodlooking labels! It's so easy to use that you couldn't get it to jam even if you tried to operate it before that first jolt of morning java. You stick the labels on the spindle, drop the spindle in the machine, and stick the end of the labels in the only possible place to put it. The machine feeds itself. There are only two buttons: power and form

Another groundbreaking simplification by the folks at Avery is the software included in this package: Label Pro and Personal Label Printer. Label Pro lets you design labels and store the formats to use time and time again.

## **GET REAL!**







## MicroLeague Baseball4









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## **REVIEWS**

It's just detailed enough to give you all the choices you need (scalable fonts, the ability to add PCX clip art or other graphics, and templates for all types of Avery labels) and simple enough to use within ten minutes of booting it up. Personal Label Printer is a hot-key program that lets you print a label from wherever you are in your computer files. Let's say you're typing a letter in WordPerfect or XyWrite and you want to print a label. Just hit the hot key to activate the program, highlight the address, and print. To add icing to the cake, both of these programs give you the option of printing a postal bar code or code 39 on your label.

This is a first-class printer, and it does a first-class job. Paper-shuffling of-fice work is time-consuming enough; anything that makes it simpler rates high in my book. The world needs more simple ideas that work well; it's the simplicity of this machine and these programs that makes me a fan.

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## **CONAN THE CIMMERIAN**

Thirsting for vengeance? Perhaps you should try venting your spleen with Conan the Cimmerian, an adventure game in which you assume the role of a fantasy hero.

When the game begins, Conan, your alter ego and the game's namesake, is a young blacksmith. He finds his town overrun by the evil forces of Thoth Amon, high priest of the snake god Set. Conan's village is raided, and his wife is brutally killed. Conan seeks vengeance: the death of the evil high priest.

Virgin has brought Robert E. Howard's popular hero to the microcomputer with this new adaptation of the game engine used in Excalibur. The four levels of play include a top view world map, an oblique top view city map, a dungeon map, and interior side view scenes. The top view world map and the side view interior scenes are similar to the earlier Virgin efforts of Spirit and Vengeance of Excalibur.

Mouse, keyboard, and joystick work smoothly to control Conan's movement and combat, except when Conan gets stuck on buildings or on the inhabitants who walk the street. When Conan contacts inhabitants, an interior scene pops

up for conversation or combat. Conversation is brief and is terminated quickly unless you bribe for more information. Conan needs to break into homes and steal gold to buy training and equipment. Thievery gets Conan thrown into jail, where all his hard-earned gold—but no equipment—is taken.

Combat and exploration are in realtime, and many of the inhabitants are tougher and faster than Conan. The world of Conan is a very lethal place. As Conan, you'll need all your wits and reflexes in order to survive. You'll need to take notes on conversations and map your surroundings (the game has no automapping). In order to compensate for the difficulty of the game, Conan is reincarnated automatically when he dies.

Whether you're simply a fan of Conan, an adventure gamer who appreciates arcade action, or a bloodthirsty brute looking for a socially acceptable outlet for your aggression, Conan the Cimmerian could be the game for you.

IBM PC and compatibles; 640K RAM; EGA, MCGA, VGA, or Tandy; 10-MHz processor recommended; hard drive recommended; Microsoft-compatible mouse recommended; joystick optional—\$49.99

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## HOWTEK PERSONAL COLOR SCANNER

I'm not an expert desktop publisher, a great computer artist, or even a seasoned scanner user. But this flatbed scanner made me look like all three. After I spent several days with it, the sky opened up, and creating professional-quality scanned color images became second nature to me.

The scanner fit on my desk with room to spare. It measures about  $12 \times 20$  inches. A long cable was provided to connect the scanner to the card installed in my computer. Although the card has jumper settings so you can work around equipment conflicts, I didn't need to. Everything worked properly when I first fired it up.

I had my choice of eight software packages and chose Tempra Pro, since I'd used it before. I'm not sure if my results would've differed with a different program, but Tempra Pro worked well. It was fairly easy to figure out without the manual. That's good, because when I did read the manual for advice on the finer points I found it to be poorly written and incomplete. For example, it gave information about how

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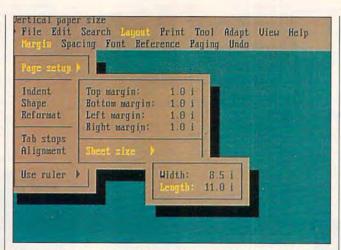
to add more light to an image but not why you might want to make such a change. Nor were there any tips on how you could maximize Tempra to get the best picture. That's not the Howtek folks' fault. The manual concerning the hardware was complete, clear, and easy to read.

There aren't many adjustments you can make. That's good for someone like me. The areas I focused on included the color saturation for red, green, and blue; overall light exposure; scan area; and sharpness. Soon I got a feel for which settings were best for different kinds of images. I found it easier and easier to get close on the first scan.

Tempra saves in just about every kind of file format you can imagine, but I was only interested in PCX and GIF. The saved files loaded easily into other programs, a welcome situation after the file-incompatibility problems I've had with some software.

I scanned about 50 official NASA photos and transparencies, among other things. Not only did the scanner work remarkably well with transparencies, but the quality was astounding in 640 × 480 VGA with 256 colors. I went down to 320 × 200 VGA with 256 colors to see how it did. Considering the low resolution, it wasn't bad.

All of these images can be found on COMPUTE/NET on GEnie and America Online. If you want to see for yourself what this scanner can do, log on to GEnie or America Online and use the keyword COMPUTE to find COMPUTE/NET. Then, call up a directory of the COMPUTE's Art Gallery section of our software library. Download several images and use



Improved menus are one of many reasons why PC-Write Standard Level 2.0 remains a wonder of a word-processing package.

VPIC or another program to view them; you'll be surprised at what you see.

If I had the budget to buy this scanner, I would. If you're looking for a quality piece of equipment for professional results, look to the Howtek Personal Color Scanner.

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## PC-WRITE STANDARD LEVEL 2.0

In an era in which WordPerfect straddles the world like the Colossus at Rhodes, you might wonder why other word-processing companies even make the effort. To its credit, Quicksoft has steadily made the effort since 1983, maintaining PC-Write's position as probably the best piece of word-processing shareware available. Loyal users of PC-Write can now celebrate Quicksoft's re-

lease of PC-Write Standard Level 2.0, a word processor that preserves most of its earlier incarnations' familiar features while adding enough new goodies to make this one definitely worth checking out.

PC-Write Standard is a shareware product rich in the features that most people expect in a retail wordprocessing package: easyto-learn editing commands, automatic spell checking, plentiful help screens, easily changed document format. a variety of fonts and effects, word counting, automatic pagination, and the like. You'll also appreciate such attractions as automatic placement and numbering of footnotes and endnotes, as well as file merging for personalized form letters, invoices, and mailing labels. Veteran users of PC-Write are already familiar with these features and will find that the essential commands haven't changed in Standard Level 2.0. But they'll be delighted by its addition of pull-down menus which duplicateand in some cases speed up-the familiar PC-Write keystroke commands. Such

things as margins, spacing, and fonts (a lot of the old Alt-G commands that required recourse to the manual or the help screens) are now quickly altered via the menus. In fact, one of PC-Write's strongest features is its ease of adaptability. Although during installation you're asked to choose which of the three levels you'd like to use (Core, Basic, or Standard), the levels can be changed at any time. Within each level, you can readily choose or reject individual features to configure PC-Write to your particular needs.

Quicksoft knows PC-Write isn't the only word processor you'll deal with. Older versions of PC-Write allowed you to convert files to and from WordStar format; in PC-Write Standard Level 2.0, conversion to and from WordPerfect is available, as is conversion from PC-Write's own earlier versions or any other AS-CII file or word processor that supports IBM's Document Content Architecture. The company wants to make sure that you know how to use the program: Besides the PC-Write Tutorial printed out during the installation process, an online tutorial is available, along with a large number of detailed help screens. Registered users of PC-Write will receive the booklet Getting Started, a primer in PC-Write's basic functions, as well as the Reference Manual, which describes how to use all of the program's features. (Warning: Beware of a frustrationcausing misprint in step 3 of "Merging" on page 78; the S doesn't belong in the sequence.) Also available to registered users is Quicksoft's helpful technical support line. As a further inducement to do the right thing and register your copy. Quick-

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soft offers registered users a disk containing Roget's Thesaurus (not available in the shareware release), a serviceable online reference that can be accessed from the PC-Write menu.

Though PC-Write Standard Level 2.0 is available at some retail software and computer shops, the shareware concept has helped make it what it is: a wonder of a word-processing package that can be registered for only \$129 and takes up only 1.5MB on a hard drive. For a greater wonder, it's one you can try out for free.

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## RELISYS TEFAX RA-2125

On the one hand, it looks like a fax machine, rings like a fax machine, and allows you to transmit and receive physical copies of documents and graphic images like a fax machine. On the other hand, it lets you receive faxes on your hard drive and print them on your computer's printer, modify faxes you're sending or receiving on your monitor screen, and create your own fax documents by typing them yourself or by importing text or graphic images from other programs. So what is it? A fax machine or a fax/modem board with accompanying software?

It's both. With the TEFAX RA-2125. Relisvs has captured the best of two worlds. You get the convenience of a full-featured fax machine, eliminating the need to buy a scanner and a fax/ modem board that must be installed inside your PC. But you don't lose the flexibility in editing and printing faxes that a fax/modem board provides. Plus it's easy to install, with the machine connecting to your PC's serial port via a cable included in the package.

Although the TEFAX RA-2125 doesn't completely eliminate physical bulk the way a fax/modem board does, it's still a relatively compact machine. It's also powerful. Even if you don't use the AutoFax software, the TEFAX RA-2125 can still store 100 quick-dial phone numbers and 10 one-button numbers, transmit and receive ready-to-go faxes, send faxes automatically at specified times, poll one or more other machines for faxes needed, and copy documents instantly.

Entering a phone list and other information can be awfully time-consuming on the TEFAX RA-2125, but the AutoFax

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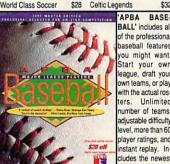
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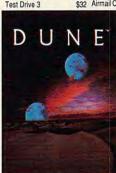
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software helps-in this area as well as others. While not quite as clear and user-friendly as some fax/modem software—there are many different layers, with varying complementary features accessible only at certain levels-AutoFax is a relatively straightforward, efficient communications tool. You need a mouse to take full advantage of its editing capabilities, though.

By choosing items in a series of submenus of a main menu that always stays at the top of the AutoFax screen, you can create your own fax phone book, make a cover sheet, and profoundly alter documents or graphics files by changing their size, position, or contents. AutoFax allows you to print out faxes on either your computer's printer or the fax machine itself and to receive incoming faxes on the machine, your computer's hard drive, or both. You view the faxes on a rectangular box that pops up in the middle of

the screen. Since the box is wider horizontally than vertically, it can be hard getting a clear idea of what a fax looks like as a whole without making a printout, even after using a helpful scaling function to reduce or enlarge it. The manuals for both the hardware and software offer clear guidance, though the booklet for the TEFAX RA-2125 lacks an index and the AutoFax manual has no troubleshooting guide.

If you need more than either a fax machine or a fax/ modem board has to offer. the Relisys TEFAX RA-2125 may be what you're looking for. It puts both technologies together in one concentrated, versatile package.

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The SCAN: ALIGN unit is a plastic scanning "table" measuring about 20 inches long and 10 inches wide. The base table has a grid imprinted on it for aligning the material to be scanned. The document to be scanned is placed under a clear acetate sheet covering the grid table. A second sheet of rigid plastic with the center removed acts as the scanner "track" and is hinged to the bottom plastic table with the acetate sheet sandwiched in between.

Plastic templates which accommodate more than 25 of the most popular hand scanners are provided. These templates glide along the track like a sled between two rails. The scanner fits into the opening of the appropriate template, which keeps it aligned. The result is a truly ingenious solution that dramatically increases the accuracy of hand scanning.

Using SCAN:ALIGN could not be simpler. The text or art to be scanned is placed on the table and aligned using the handy silkscreened grid markings. Next, the protective acetate sheet is placed over the material to protect it and keep it from shifting position. The track is lowered over the acetate, and the correct scanner template is placed between the two side rails of the track. Then the scanner is placed into the template's receiver opening, and you're ready to scan-that's all there is to it.

I found SCAN: ALIGN to be a terrific aid when scanning text material for OCR (Optical Character Recognition) purposes. Additionally,

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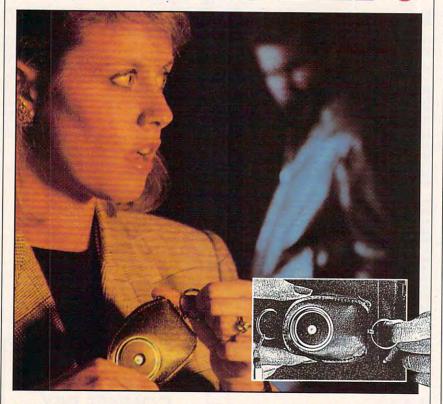
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it greatly simplifies doing two-pass scans where the left and right halves of the page must be scanned individually and then "zipped" together. The alignment grid of the SCAN:ALIGN unit makes this a simple operation by providing guides for the left and right edges of the page which precisely center the "overlap" zones of the page. The result is OCR accuracy rivaling that of expensive flatbed scanners.

Scanning photos and line art is also much faster and easier with SCAN: ALIGN, since it makes it possible to do straight, accurate scans the first time. Cleanup of errant pixels is also greatly reduced, so you'll save lots of time in prepping your scanned art for use in desktop publishing or other applications.

SCAN:ALIGN is a must-have accessory for anyone who uses a hand scanner. It's a great tool that actually lives up to its manufacturer's hype.

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They may sound like new brands of malt liquor, but The Maximizer and Maximizer Lite are actually very similar variations on the theme of powerful contact-management software. As you might expect, Maximizer Lite is a stripped-down version of The Maximizer, though the two programs operate identically up to a point.

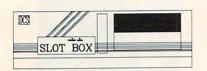
At its most basic level, contact-management software serves as a meta-Rolodex for your PC, with some word processing, electronic communications, and automated calendar functions frequently tossed in for good measure. In addition to keeping track of names and addresses for your clients or business contacts, The Maximizer also allows you to keep up with their birthdays and hobbies, the dates you last talked to them, and how soon you need to make contact again. If you have a Hayes-compatible modem, it dials their numbers for you. The Maximizer prints out letters—individually or personalized in bulk-to people you need to stay in touch with, and it makes a note of both the date and subject of every letter you send. The program has a pop-up calculator, an elementary ledger program, and a feature called MaxMerge for people who need to move their databases around, as from a desktop PC to a

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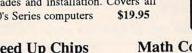






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laptop. All of its features work well, offering no unpleasant surprises either in setup or execution.

This is highly specialized software, geared toward people who have ongoing, complex relationships with many clients. The Maximizer does so much that it's hard to keep up with it all-and hard to remember which sublevel of a sublevel holds a given tidbit of information once you remember to look for it. Navigating The Maximizer necessitates wandering through a maze of choice-filled menus, each of which opens onto another choice-filled menu. You can do a lot with the program. but in the process you have to remember a lot of not-always-obvious keystrokes and

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The Maximizer and Maximizer Lite are variations on a powerful—and complex—contact-management software theme.

consult help screens, a quick reference guide, or the manual quite a bit. With so many options, the macro feature offers little relief unless you're using The Maximizer for a very narrow range of uses.

Complexity almost invariably goes hand in hand with greater power. But Maximizer Lite, which reduces the complexity to a modest ex-

tent, retains a surprising amount of The Maximizer's considerable power. The main losses are the personal records feature available in The Maximizer, which includes the income and expense ledger and a diary feature for keeping track of notes. But PC owners without a hard drive gain the ability to run the program on two floppies, and Maximizer Lite also comes with a fine program to print out client information in the form of a phone book, on labels, or on actual Rolodex cards.

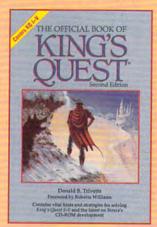
Tastes great? Less filling? Let's just say that each has its own attributes, along with a few drawbacks. If you need the kind of features the Maximizer programs offer.

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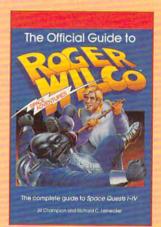


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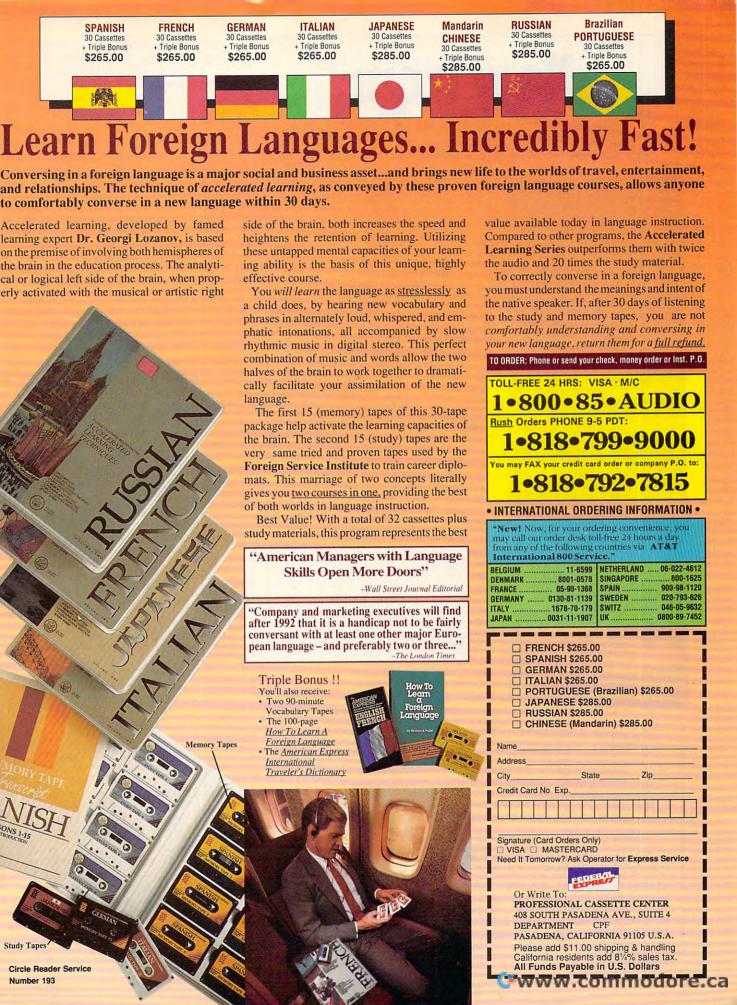
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there's plenty of potential in either as long as you're willing to take the time and effort necessary to tap into it.

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## ON THE GOFAX

It sounds strange: faxing documents using neither a fax machine nor a fax/modem board, just a modem. But if you've got the necessary hardware, On the GoFAX makes faxing documents a snap anywhere you can connect your modem to a phone line, whether it's your office or a hotel room.

Though designed for use on the road from a laptop or notebook computer, the program could even serve as a send-only substitute for a fax machine or fax/modem board from your desktop PC. The cost of faxing those pages, though, would add up to the cost of a send-and-receive board in a hurry. At current rates, it costs \$3 to fax one page and \$2 for each page thereafter. Local fax stations probably run a bit cheaper. Still, On the GoFAX might come in very handy at odd hours or in unfamiliar places, and your call to the service bureau that does the actual faxing is toll-free.

After a setup procedure in which you assign a credit card number (a password safeguards against fax-charge theft), On the GoFAX presents a menu. Changing the standard information that goes out on each of your fax pages won't pose major difficulties, and creating fax documents with the rudimentary text editor doesn't demand much finesse.

This virtual facsimile machine can also transmit text files in ASCII from your own word processing program, graphics files, and multiple versions of the same file to different recipients. My only real complaint is with the annoying screen blips and silly sound effects that accompany incorrect keystrokes and the conclusions of various GoFAX procedures.

Whether On the GoFAX looks like a bargain largely depends on how desperately you need to fax something at any given moment. For everyday use, the service seems prohibitively expensive, but the software itself does not. As an insurance policy for those times when you may need late-night or on-the-

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## DISCXCHANGE

Daunted by the prospect of installing a hard drive? Interpreter simplifies the process with DiscXchange, an externally mounted hard drive complete with software that assigns drive letters and does your formatting for you.

The unit has several interesting features. It hooks up to your computer through the standard IBM parallel (printer) port. The disks aren't built in but are contained within roughly 51/4-inch square x 1/2-inch thick removable cartridges. You can change 44MB or 88MB cartridges as easily as you might change floppy disks. Though it requires a 120-volt power outlet, the unit itself is easily transportable. weighing seven pounds and measuring 6½ × 2½ × 14 inches. It even has a carrying handle.

The DiscXchange driver software automatically assigns device letters which fall beyond those of the computer system to which the unit is connected. The driver software is completely transparent—use these drives like any other drives in your system, because all the DOS commands and routines apply. Disk access is reasonably fast-as much as 127 KBps, with an average seek time of 20 ms. Add to this self-diagnostics, built-in defect management, and automatic error correction, and



Let the software do the hard part for you with DiscXchange, an externally mounted hard drive that's fast and easy to use.

you have a unit that's a real contender!

Unfortunately, getting started can be a problem. I used an XT-compatible desktop clone on my first attempt to install DiscXchange. The software provided (in both 51/4- and 31/2-inch low-density floppy disk formats) contains a TSR routine, DX44, which automatically assigns drive letters to DiscXchange that follow those of the host computer's resident drives. My XT has the equivalent of six drives, A-F, two of which are hard drive partitions. When the DX44 program was first run, a message appeared indicating that a communications problem existed, something possibly related to my parallel port. But the DiscXchange active light came on during all this, causing me to suspect that the real problem was an unformatted hard disk cartridge.

Because of this suspicion, I loaded another file from the installation disk, SQPREP, to do formatting. (There are two low-density installation disks provided for both 3½- and 5¼-inch disk drives.) A message ap-

peared on the screen asking for the non-SCSI drive count. It wasn't asking how many hard drives I had, but whether my partitions would count as one or two hard drives. To play it safe, I decided to use my XT-compatible laptop, which has two floppy drives and no hard drives. After loading the installation program and then the formatting file SQPREP. I chose the No Non-SCSI Drives option and followed the default selections. The 88MB cartridge was correctly formatted with three partitions-two of 32MB and one of 24MB. The drive letters became C, D, and E, as was appropriate for my two-drive unit.

Reattaching DiscXchange to my desktop, I loaded the driver software. Magic! Not only was DiscXchange recognized and accessible, but the drive letters were automatically assigned after the letters already in use. I now had a G, an H, and an I drive—just what I was supposed to have. Because operation of the DX44 driver is completely transparent to the user, copying files to DiscXchange and running soft-

ware is a completely natural process with no hitches at all.

I'd love to have a Disc-Xchange unit to keep. It's fast, easy to use, reliable, and convenient.

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# THE SECRET CODES OF C.Y.P.H.E.R.: OPERATION WILDLIFE

I thought it strange that an undercover agent drove a pickup truck. Now, after he's abandoned me in front of a dilapidated feed store on this deserted street, I'm wondering whether he's a double agent. No matter. All I can do is go into the store. With a little luck I'll find another agent who'll take me to headquarters. Inside, the woman behind the counter gives me a mean stare, then nods toward some shelves filled with jars and boxes. I swallow hard and step toward the shelves. They slide apart, revealing a narrow hallway. My heart races. I remember the pickup truck and fight my instinct to ditch this dive. I've begun this mission, and I have to see it through. I brace myself and step into the hallway. Ahead I see flashing lights. Gadzooks! It's the sign-in computer for Operation Wildlife!

This is where Tanager Software leaves you in its new educational game, The Secret Codes of C.Y.P.H.E.R.: Operation Wildlife. You're a secret



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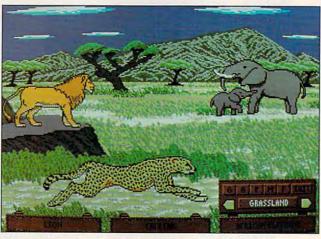
agent, and your mission is to decipher messages for clients. Along the way, you learn about mammals as you collect pieces of code. The fun part is unscrambling the code, especially if you use an alternate alphabet. I like decoding in American Sign Language, but you may find Braille, Morse code, semaphore, or Greek more fun-and English more manageable.

A lot of thought and planning went into Operation Wildlife, evident in its terrific artwork and tiny details. It's delightful: You use a code name, doorknobs turn. sound effects are catchy and appropriate, and mammals are positioned in their correct habitats. A bonus feature lets you send messages to other players, so you can carry on conversations with friends who've signed into the game. Your message is encoded, and your friend has to unscramble it. It's fun to leave silly and sometimes cryptic notes.

You select your client from an extensive list detailing each client's bio. It includes Ruth the Snoop, a gossip columnist who seeks exclusives: Dr. Celeste lal, an astronomer who's secretly studying a quadrant of the galaxy; Heidi N. Tzeeck, an animal tracker who's looking for a lost wolf; and Murray Sackum, a coach whose team is a shoo-in for the Super Bowl. This motley crowd's bound to have someone who piques your interest.

You learn the names of Indian tribes, constellations. trees, and a host of other subiects that serve as the street names where you meet contacts. Successfully identify a mammal from your contacts' clues, and you receive a bit of coded message. Collect all the pieces, and you're ready to decipher.

KAREN LEE SIEPAK



This wildlife park in The Secret Codes of C.Y.P.H.E.R.: Operation Wildlife features 87 mammals in their natural habitats.

As you play, you also learn all sorts of informationhabitat, range, size, winter color, and so on-about a seemingly endless number of mammals. And don't think this game is just for kids: It includes a tapir, a sugar glider, and other animals most people haven't seen or heard much about. Need help? Tap FunCyclopedia, located on your watch. It's just what you'd guess: an abbreviated encyclopedia full of fun facts about mammals.

Unscramble the puzzle, and your client replies with a message, which in turn elicits a response that you have to collect and decipher. So it goes until you've received all the transmissions and the case is closed.

Although it'd be great to see the animals animated. there's little to complain about in Operation Wildlife. It's a fun way to spend a rainy day and a great way to learn about animals. I'd tell you more, but I think I see Eagle behind that cypress on your right, and I've been waiting for her for an hour . . . something about a scandal involving Mike Robe and the park's water supply.

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## THE LOST **ADMIRAL**

The Lost Admiral really sizzles in fulfilling its claim to be "the strategy and tactics game of the decade." It makes no claims to realism, but it's still impressive.

The beauty of the game is in its strategy. Every ship has its advantage and its disadvantage, which makes for a very balanced game. The carriers have no planes, and the submerged stealth submarines can be seen by PT boats and destroyers. Carriers can reveal the location of the enemy. Transports can't harm PT boats, subs, or other combat vessels, and they must be in a port for a full turn to accumulate points and win the game. Even if you destroy the entire enemy fleet, you still lose if your transports aren't docked.

The artificial intelligence algorithms take into account limited or unlimited fuel and ammo, movement and combat weather effects, and the ability to randomize or set home port cities.

The Lost Admiral has a variety of options for the campaign and 11 difficulty levels. Nine basic scenarios, as well as one randomized scenario, provide enough variety and consistency for many hours of play.

Unfortunately, the game lacks a scenario editor for allowing the player to set parameters of intelligence and play conditions. Also, you can't save the game in the middle of a battle and return to try alternative solutions. The game has no replay or VCR function to review your errors and triumphs.

You may be put off by the game's lack of realism, but I feel that this increases the emphasis on strategy and the balance of the game. The game's best attributes are its fun and playability.

The Lost Admiral is no hard-core war game, nor is it a simulator. The game designer claims that the game is more of a cross between chess and a traditional war game. This is an abstract strategy game. The overall result is that The Lost Admiral is fun to play and contains enough optional features to keep most war gamers and other gamers happy playing the game for years.

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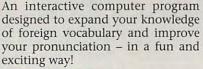


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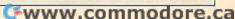
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# DESKTOP PUBLISHING BY DESIGN, VENTURA PUBLISHER EDITION

I bought this book, for about \$25, a year ago in a previous edition for PageMaker. Even though I didn't have PageMaker, I gladly bought the book because I discovered, after checking every bookstore in town, that it was the only book on design that I could find.

Design is in the neglected corner of desktop publishing. Perhaps it's intentionally neglected because, with all the technological advances in desktop publishing, about the only way to tell a professional from an amateur publisher is by his or her grasp of design concepts. Like an alchemist from the Middle Ages, a designer's most precious possessions are the secrets left out of procedural notebooks. After all, where would we be if anyone could turn dross into gold?

One answer is that we would be surrounded by gold, which is not the way I would describe the situation in desktop publishing today. There's a lot of dross around, and precious little gold. The only thing that's changed since "Lasercrud" (an article in a desktop publishing magazine decrying the terrible look of homemade documents) is that a lot more people have laser printers and an even smaller proportion have any idea how to use them. Hence, more crud.

The fact is that the only way to really learn design is by doing it and by learning to look at designs critically. Desktop Publishing by Design takes the approach of

providing dozens of pictures of exemplary design, completely documented with explanations of why the designs work and how to generalize the ideas you see illustrated. Then there is a section on Ventura Publisher in which you are led through the creation of the layout for various kinds of publications.

Although there are subtle differences in the two editions of Desktop Publishing by Design, the principal difference between the two is the 103-page section on Ventura Publisher projects. If you're already very familiar with Ventura and, like me, you bought the original edition of the book to learn design, there is no overpowering reason to buy the new edition. Furthermore, the new edition only talks about the GEM version of Ventura. Windows isn't even mentioned. For this reason, the book works better as a text on design than as an introduction to Ventura Publisher, even if you're completely new to Ventura Publisher for Windows or the Macintosh version.

Something else is missing, too. I love to read Ad Week's sister publication, Marketing Week, because it takes a critical look at real advertising (in print and on television). I have learned much from its discussion of unsuccessful ads (poor integration of graphics with text is the most common failing, with illegible or unreadable text following close behind). I wish the authors of this book had brought in a section-even a brief one-on layouts that don't work and lavouts that almost work. I would have enjoyed watching a makeover in progress. After all, if you're a beginning designer, you'll most often find yourself fixing up your own mistakes, trying to get disparate parts of layouts to work (or at least live) together. A section on makeovers would have been more useful than yet another introduction to Ventura Publisher.

All this aside, however, Desktop Publishing by Design is an unparalleled introduction to the field that will be useful to any beginning designer or desktop publisher. ROBERT BIXBY

Authors: Ronnie Shushan, Don Wright, and Ricardo Birmele 345 pages—\$24.95

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The plot sickens as your alter ego, a gumby (the English worker lampooned by Monty Python), loses four pieces of his brain, which merrily hop away. You pursue the brain pieces as a gumby, a fish with a human head, a foot that behaves like a pogo stick, and a bird. In a trip through a landscape inspired by trouper Terry Gilliam, you collect eggs, sausage, beans, and Spam. You're not completely de-

fenseless. You can pilot your gumby around exploding kittens and upper-class twits or throw fish at them to uncover the objects mentioned above and destroy cheese, which also removes points from your score.

Your score starts at 99,999,999 points, and you lose points as you play the game. For every 10,000,000 lost points, you get another life. Throwing fish at silly places also causes you to lose points. If you lose enough points, you'll obtain nine lives, which will regenerate indefinitely, making your gumby invincible.

There's no save-game feature, and non-IBM versions have on-disk copy protection that may damage the disk if you attempt to copy it. Having to identify smelly cheeses from the documentation is an additional and appropriate copy-protection scheme.

The Official Hungarian Phrase Bokk [sic] comes with the game and is composed of 44 pages of hilarious Monty Python-like humor, some of which is copied from the original show. The book is much better than the game itself.

The game is quite difficult, with nothing distinctive beyond the Monty Python theme. It makes me wonder why there's no infinite lives switch for us Monty Python fans over 30 who wish to wax nostalgic but who don't have the arcade reflexes of a 12-year-old.

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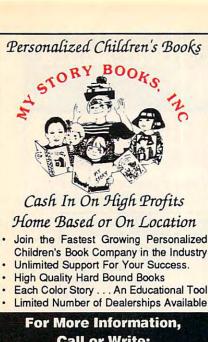


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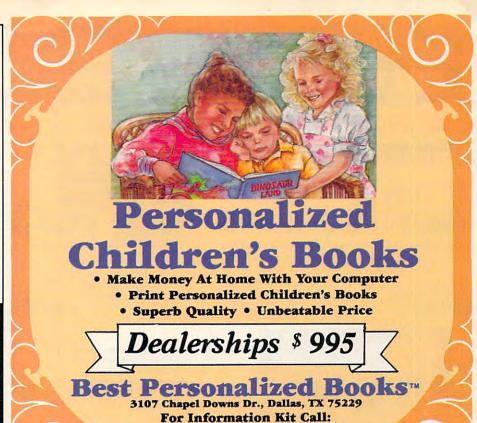
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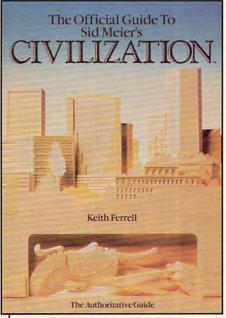
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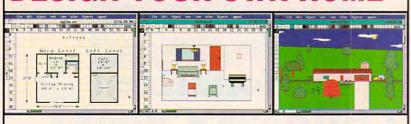
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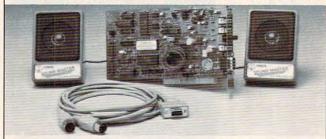
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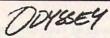
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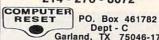
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Advantages of the electronic Bill Plus system encompass everything from tracking all your employees' phone usage patterns to detecting fraud on the telephone bill. Paying the bill, however, is still up to the customer.

**Great New BODs** 

Books on disk (BODs), a relatively new concept that so far has been the exclusive domain of CD-ROM owners. have made the jump to Macintosh format, thanks to Voyager Software. The publisher recently released electronic versions of the New York Times bestseller Jurassic Park, by Michael Crichton; The Complete Annotated Alice, by Martin Gardner; and Hitchhiker's Guide to the Galaxy, a fourvolume series by Douglas Adams. Titles in progress include Baddash, by Susan Faludi, and Gone to Soldiers, by Marge Piercy.

More than mere text, BODs let you see and hear what you're reading through pictures and sound effects. Voyager eventually plans to publish PC versions of BODs. In the meantime, be on the lookout for a Voyager toolkit for publishers and authors who want to create their own electronic books.

Speaking of books on disk, the Bureau of Electronic Publishing, which publishes BOD titles for CD-ROM, announced its "Top Drawer" compilation of the ten best-selling CD-ROMs for the last

quarter of 1991. Beginning with the top seller, they are Grolier's Electronic Encyclopedia (Grolier Electronic Publishing), Magazine Rack (Information Access), U.S. History on CD-ROM (Bureau Development), Mammals (IBM/National Geographic), Microsoft Bookshelf (Microsoft), Birds of America (CMC Research), Monarch Notes (Simon & Schuster/BDI), World Atlas (Software Toolworks), Refer-Library (Software Toolworks), and Bible Library (Ellis Enterprises). The list is based on end-user dealer and distributor sales compiled by the Bureau of Electronic Publishing.

In the Chips

Watch for emerging beefedup 386-chip clones with onboard math coprocessors that will narrow the gap between the 386 and the 486.

**Coming Soon** 

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Reach Out and Train Someone

The folks who claim to be "the right choice" in long-distance calling could also be the right choice for software training. AT&T, in the software-training business for seven years now, has expanded its Professional Development Centers to 19 cities across the country.

These PDCs offer intensive, concept-based training for both business and home users of major software products: Windows, Word for Windows,

dows, PageMaker, Excel, Symphony, and Quattro Pro, to name a few (and there are a slew of others, as well as introductory PC courses available). Plans are to expand the PDCs into every major U.S. city by 1993. Anyone can obtain information and register for classes at any Professional Development Center location by calling (800) 858-7434, ext. 7000.

Requiem for Michelangelo

March 6, birthday of the brilliant Renaissance man Michelangelo, came and went this year without much destruction in the United States. Thanks to the mass media's coverage of the Michelangelo virus that was set to strike and the diligent practice of safe computing (that's not just a buzzword), most computer users in the States who might have been vulnerable to the attack were able to protect their computers from the dreaded virus before it was able to wreak havoc.

AntiVirusPlus, CLEAN-UP, Flu-Shot+, PC-cillin, Virex-PC, VIRUSCAN, and Vi-Spy are just a sampling of the scads of antivirus "inoculators" available that helped render Michelangelo nothing more than another infectious also-ran.

And Finally . . .

Speaking of safe practices, Online Access, a magazine for online service subscribers, reports that "electronic sex" is a growing network phenomenon. "Consenting adults are using their PCs to explore alternate lifestyles with complete anonymity, becoming intimate with total strangers in their own homes, having relationships without commitment, and even finding real mates." Check out the August issue of COMPUTE for more information on meeting compatible people online.

Meeting significant others online, dodging Michelangelo, learning the ropes from AT&T, opening superstores, watching for superchips, and more

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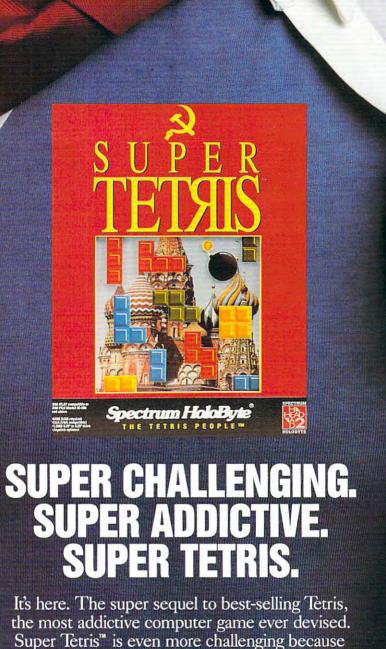
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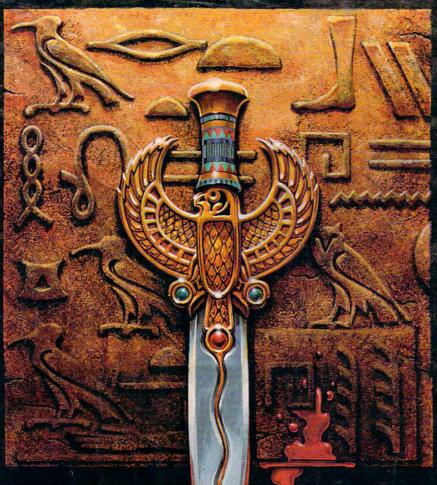
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