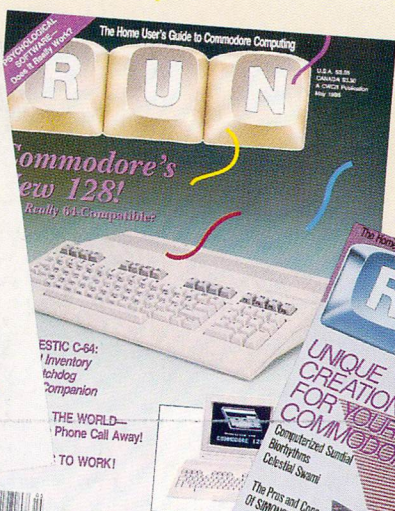
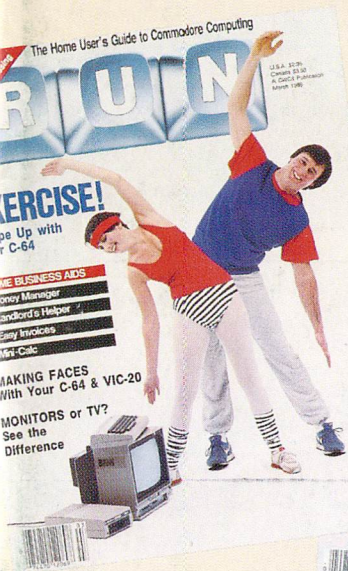


Summer Edition 1985

RE RUN

The Best Programs From RUN

For the C-64, C-128 and Plus/4



PLUS:
Two New Program Releases!



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Introduction

Welcome to the Summer edition of ReRUN. The Summer ReRUN holds the most popular programs from the March, April and May issues of *RUN* magazine as well as exceptional programs from previous issues.

These thirteen programs should keep you busy on those summer evenings after your long, hot days at work (or at the beach). All of them will work on the C-64 and the new C-128 (in C-64 mode); several will work on the Plus/4. (Titles in capitals are the filenames you must type in to load the programs.)

RUN's Spring issue included many fine C-64 business-application programs, which brought encouraging response from C-64 owners who have been trying to use their computers for serious applications. Summer ReRUN offers you three programs that will help with your business needs.

First, Landlord's Helper (LANDLORD) is an aid to real estate investors that helps keep track of your expenses and income while providing a printed analysis of your investments. For those of you who run your own businesses, Easy Invoices (INVOICES) will be

a welcome addition. This program prints professional-looking invoices with matching shipping labels.

We are also including home applications to help keep your finances in line. MONEY MANAGER received an enthusiastic response from our readers. With this program, you can use your computer as a loan and investment consultant to guide you in making decisions about future investment values and also payment amounts on bank loans.

Bargain Hunter's Delight (BARGAIN HUNTER) is just the program you need if you're one of the thousands of consumers who try to save money on shopping costs through redeeming coupons. Clipping and saving the coupons is time-consuming enough without having to try to remember which ones you have, what products they're for and when they expire. This program takes the brain strain out of coupon shopping.

On a lighter note, we are including a summer sports program that was a big hit last year in our July issue. PLAY BALL will add even more excitement

i



to your softball or baseball games this season. The program lets you keep track of your entire team's statistics, and gives you printouts to hand around, if you're not too embarrassed.

Summer may be the time for play, but we don't want you to forget what you learned in school. Teacher's Pet (TEACHER) is a great program for students to use this summer to keep their math skills in tune. This is one of the most practical educational programs we've seen, as it gives printed worksheets of math problems (you select the difficulty level) that your child can practice on without using the computer.

Spelling Challenge (SPELLING) can be a big incentive for those of you who are trying to improve your spelling skills. Sev-

eral players can participate in this computer-controlled spelling game, which relies on artificial intelligence to select commonly misspelled words.

Not to be too studious, we offer two games that many of you will recognize. NUMBER PUZZLE is the C-64 version of the Fifteen Puzzle, a challenging game that tests your ability to rearrange 15 scrambled numbers into their correct numerical order. For you arcade game players, we have Blockbuster (BLOCKBUST), which will remind you a great deal of Break Out. Using your joystick as a paddle, you try to break as many blocks out of the screen as you can.

Neither have we forgotten programmers in this issue of ReRUN. Renumberer (RENUM-

BER) is an absolute necessity when you've created a tightly lined program. It will take the drudgery and time out of renumbering your programs. SOUND SAMPLER will really perk up your ears, and your dog's, too, giving you 17 amusing and out-of-this-world sounds to add to your own programs.

Graph Maker 64 (GRAPH-MAKER) lets you create colorful vertical bar graphs, complete with your own labels and titles. You can save your graphs to tape or disk, print them out and also load them into other programs.

Last, but certainly not least, we bring you—for the first time in any ReRUN issue—the famous 64 Joystick Artist (JOYSTICK ARTIST). Published last year, this high-resolution color graphics

program lets you use your artistic talents to the full.

We received tremendous response from readers about the 64 Joystick Artist last summer, not only because it was the best drawing program they had ever seen in a Commodore magazine, but also because it had four pages of data statements, with hundreds of numbers to type. This is one of ReRUN's big strengths; it gives you programs of excellent quality that are often very time-consuming to enter by hand.

There you have it for this Summer ReRUN issue. Have fun, and don't get sunburned playing ball.

Margaret Morabito
Technical Editor
RUN. magazine

How To Load

DISK:

To load any of the programs, type:

LOAD "program-name",8

then press the RETURN key.

The disk drive should whirl while the screen prints SEARCHING FOR (program name). The screen should then print LOADING and then finally READY, with the flashing cursor beneath. Type RUN and press the RETURN key. The program will then begin.

CASSETTE:

Insert the cassette tape into the Datassette recorder, with the proper side facing up. Make sure that the tape is rewound all the way to the beginning. Type:

LOAD "program name"

then press the RETURN key. The screen will display PRESS PLAY ON TAPE. You should then push the play button on your Datassette recorder.

When the program has been found, the screen will display FOUND (program name). On some Commodore computers, you may then have to press the C=(Commodore symbol) key to load the program. On other Commodore machines, the program will load automatically. Check your owner's manual for specific loading procedures.

When the program has finished loading, you will see the READY prompt and the flashing cursor beneath. Type RUN and press the RETURN key to start the program.

NOTES:

You should use the entire program name exactly as listed to avoid loading programs that have similar titles.

Before loading a program ALWAYS refer to the article in the booklet for special instructions.

DIRECTORY

DISK

1 LANDLORD
6 INVOICES
10 MONEY MANAGER
12 BARGAIN HUNTER
14 PLAY BALL
18 TEACHER
21 SPELLING
24 NUMBER PUZZLE
26 BLOCKBUST LDR*
26 BLOCKBUST
29 RENUMBER
31 SOUND SAMPLER
33 GRAPHMAKER
33 GRAPH LOAD 1
33 GRAPH LOAD 2
37 JOYSTICK ARTIST

CASSETTE

10 MONEY MANAGER
12 BARGAIN HUNTER
14 PLAY BALL
18 TEACHER
24 NUMBER PUZZLE
26 BLOCKBUST LDR*
26 BLOCKBUST
31 SOUND SAMPLER

* Load and Run BLOCKBUST LDR first.
Then Load and Run BLOCKBUST.

Landlord's Helper

Here's a program that lets you keep track of your real-estate expenses and income while providing a realistic analysis of your investments.

By Wayne Arnett

RUN It Right

*C-64; Plus/4; C-128 (in C-64 mode)
Printer; disk only*

Most owners of rental property become expert painters and fair plumbers. The hardest skill to learn, however, is figuring out why the operating account always needs more money. Investing in real estate is within the reach of most working people and can be an important step toward financial security.

WHAT THE PROGRAM DOES

The main purpose of Silent Partner is to report and summarize the pertinent facts about your property's operation. The printout is similar to the monthly statement a rental-management company would provide. It shows all sources of income (including the "deposits by owner" cate-

gory), each expense by type and amount and the resulting totals.

Each expense is broken down as a percentage of total expenses and a percentage of rental income. This helps you spot problems that might not be obvious from glancing through the checkbook ledger. If repairs are averaging 50% of income, it's time to consider selling the house while it's still standing.

The program also does some basic investment analysis. It averages cash flow and, armed with purchase price and down payment, computes gross-rent multiplier and return on equity. Over a period of time, the results of these calculations reveal the fiscal facts about the performance of your investment.

Although the program is not designed as a checkbook balancer, the printout should run a close parallel to your banking records. If you pay attention to beginning balances each month

- 1 — ENTER DATA**
- 2 — READ FROM FILES**
- 3 — EXIT PROGRAM**

ENTER YOUR CHOICE-?

and include bank charges under miscellaneous expense, Silent Partner will get along fine with the bank.

Before printing, you can save each month's entries on a disk file. Each sequential file is automatically named by recombining the month with the first two characters of the property's address.

For example, the file containing July's entries for 912 Austin Street would be saved as "91 JULY." This way, records for more than one property can be kept on the same disk.

After collecting files for a few months, several can be read into

memory and totaled for a quarterly or year-end summary. This printout gives you a good perspective of long-term operation by smoothing out the effects of unusual or temporary occurrences, such as a vacancy. The year-end printout is helpful in projecting future cash flow or in comparing several properties, and is especially handy at tax time.

Since most mortgage companies impound real-estate tax and insurance installments along with the monthly loan payment, the program's loan category is PITI (principal, interest, taxes and insurance). When the mortgage

company sends you an interest-paid notice at the end of the year, pencil in the breakdown on the year-end printout.

Don't overlook Silent Partner when considering the purchase of new or additional rental property. Estimate income and expense, enter asking price and down payment, and let the computer forecast the bottom line. The program can help evaluate other "what if" situations, too. Maybe you are renting a house for \$500, utilities included. How would overall return be affected by offering the property at \$425 with the tenant paying the electric bill? Run the program with modified figures and compare the results.

USER'S MANUAL

When the program is run, the menu presents you with two choices: enter data or read from files. When selecting the former, you supply the property's address and the month. Then each category of income and expense is displayed, prompting you for the amount. If there is no entry for a particular item, just hit the return key and the program will enter a 0.

When all the prompts have been answered, you have a chance to review the entries and correct any mistakes before continuing. After you've approved the facts and fig-

ures, the entries are saved as a file. The program is then ready to print the monthly summary.

If you select the Read From Files option, you supply the month (or the first and last months for a multimonth summary) and the first two characters of the desired property's address. The beginning balance will be picked off the first month as it's read in, and any security deposit liability is taken from the last month. The other categories are totaled for the printout.

The top and bottom function keys are used throughout the program. The f1 key returns you to the menu, and f7 causes something to happen, like starting the printer or sending a file to disk.

Silent Partner works on the Plus/4 if you make a minor addition to line 220:

```
220 F1$=CHR$(133) :  
    F7$=CHR$(136) : KEY1,  
    F1$ : KEY7,F7$
```

Also, since KEY is a reserved word on the Plus/4, replace the variable KEY with FLAG in lines 470, 870, 1990 and 2400.

FIT TO YOUR NEEDS

If my choice of categories doesn't fit your situation, it's easy to modify the arrays. For example, replacing condo fees with pool chemicals requires just one substitution in the Data line.

SUMMARY STATEMENT: JANUARY TO JUNE 5605 CENTRAL DRIVE

NOTES:

NEW TENANT (JOHNSON) SINCE JANUARY—REPAIR INCLUDES SHOWER DOOR

INCOME AND EXPENSE

BEGINNING BALANCE	_____	181.42
OWNER DEPOSIT(S)	_____	10.00
RENTAL INCOME	_____	2550.00
OTHER INCOME	_____	17.50
TOTAL RENT & OTHER	_____	<u>2567.50</u>
LOAN PMT (PITI)	_____	1608.00
OTHER LOAN PMTS	_____	150.00
UTILITIES & WATER	_____	145.94
LANDSCAPE	_____	57.04
CONDO FEE	_____	0.00
REPAIR & MAINT	_____	147.83
ADVERTISING	_____	25.54
MISC EXPENSE	_____	27.00
TOTAL EXPENSE	_____	<u>2161.35</u>
OWNER WITHDRAWAL(S)	_____	(550.00)
ENDING BALANCE	_____	<u>47.57</u>
SEC DEP LIABILITY	_____	(100.00)
OPERATING CASH	_____	(52.43)
CASH FLOW THIS PERIOD	_____	406.15

EXPENSE ANALYSIS

EXPENSES:	DOLLAR AMOUNT	% TOTAL EXP.	% RENTAL INCOME
LOAN PMT (PITI)	1608.00	74.4	63.1
OTHER LOAN PMTS	150.00	6.9	5.9
UTILITIES & WATER	145.94	6.8	5.7
LANDSCAPE	57.04	2.6	2.2
CONDO FEE	00.00	0.0	0.0
REPAIR & MAINT	147.83	6.8	5.8
ADVERTISING	25.54	1.2	1.0
MISC EXPENSE	27.00	1.2	1.1
TOTAL EXPENSE	2161.35	100.0	84.8

INVESTMENT ANALYSIS

PURCHASE PRICE: \$55000.00

DOWN PAYMENT: \$7500.00

GROSS RENT MULTIPLIER = 10.78 AVERAGE OR PRESENT CASH FLOW:
\$67.69

RETURN AS AN ANNUALIZED PERCENTAGE OF DOWN PAYMENT: 10.8%
MONTHLY RENT NEEDED TO BREAK EVEN BASED ON CURRENT/AVE
EXPENSES: \$360.23


Table 1. Sample printout of Silent Partner program.

Separating taxes and insurance from the mortgage payment can be done the same way. If my printout lacks something you consider vital, such as capitalization rate or depreciation, it shouldn't be too difficult to add the calculation and have it printed.

Datasette owners can modify the Open lines at the beginning of the file read/write modules. No other changes should be necessary. I use the program with a Commodore MPS-801 printer; if your printer is non-Commodore, some brief trial and error may be

needed to get the printout just right.

While Silent Partner won't rain-proof a roof or keep the plumbing in good order, it will give you an indication of whether a rental should send cash flowing into or out of your wallet, and some of the reasons why.

This program helps you balance the books and evaluate the performance of your invested dollars. It's flexible, easy to work with and may be the source of useful information in your financial planning. 

Easy Invoices

Invoices are a critical part of almost every business; this program provides the answer to every businessperson's invoice-printing problems.

By Edward S. Wozniak

RUN It Right

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

Printer; disk only

An invoice is the most important piece of paper that is generated by a business. It establishes a record of cash flow, accounts receivable, inventory and so on.

Via your computer and printer, this program will print a professional, ready-made invoice for your customers. The original program appeared in a book entitled *Small Business Programs for the Commodore 64*, by S. Roberts, published by Elcomp Publishing, Inc. I was given permission by Elcomp's owner, Mr. Hofacker, to modify and use the program in this article.

To print out my invoices, I use a Commodore 1525E printer (10 characters per inch). However, with modifications to this program, you should be able to

use any printer. You may also change the program's parameters for any layout of your choosing. Note that the program does all the calculating, right down to the invoice total, and also prints a shipping label.

The program is user-friendly and will print sections of the invoice as data is entered. You must enter the date, the first invoice number (which the program will automatically increment with each new invoice), the account number, terms and so on. When you are requested to input the items sold, enter only the item number. The program will search the Data statements (lines 2010, 2020, 2030, 2040 and 2050) for the item numbers, matching description and unit price.

After the last item is printed on the invoice—for final input—type 0 and press the return key. When the invoice is completed, the program will do all the nec-



essary calculations—add up the items, prices, shipping costs and sales tax—and deduct the discount (if you so desire). The invoice will be printed with a shipping label.

PROGRAM LINE INFORMATION

Your products or services should be assigned item numbers tied to a description, with unit prices in Data statements at the end of the program. In this example, refer to lines 2010, 2020, 2030, 2040 and 2050. If you have more items to list, then continue by adding more Data statements. The final Data line must read, for example,

2050 DATA 0,0,0

for the program to run properly.

Once you have established your item numbers in the program, you must then save your corrected invoice program on a formatted disk with a new name. This will be the disk that you will load to do your invoicing until you change items or pricing.

Discounts are contained in lines 700 to 730. You can alter these to suit your needs. S1 refers to the units shipped to the customer. For example, line 710: IF (S1>0) AND (S1<30) THEN D=.25

means that if you had replied yes to the discount prompt—the quantity shipped was 25—the

computer would execute line 710. Since 25 items were shipped and the quantity 25 was greater than 0 but less than 30, a 25% discount would be extended to the customer. Line 720 is 33⅓%; line 730 is 40%.

Shipping costs are contained in lines 740 to 790. You can also alter these to suit your needs. The same quantity shipped (S1) determines the shipping costs, and you can change it in the same manner as in the above paragraph.

In the example invoice (see Table 1), shipping cost was automatically calculated based on the number (S1) of items shipped. The program also asks a question as to the dollar amount that should be charged for shipping costs (if the shipping costs will exceed the built-in program factors). Just type the dollar amount of the actual shipping costs that should be included in the invoice.

When inputting date information, abbreviate those months that exceed four letters (JAN, FEB, MAR, etc.). Also, don't type a comma after the day of the month; for example, type the date as SEP 20 1984.

For additional copies of the invoice, I would suggest that you obtain fanfold (tractor-feed) computer paper that will give you an original and two copies. The additional copies are obtained by paper that doesn't require car-

ELCOMP PUBLISHING INC.
2174 W. FOOTHILL BLVD. #E
UPLAND, CA. 91786
714-623-8314

SEPT. 20 1984

ACCOUNT #: 1456

INVOICE #: 1

SOLD TO:
EDWARD S. WOZNAK
1705 PEACOCK BLVD.
OCEANSIDE CA 92056

SHIP TO:
EDWARD S. WOZNAK
1705 PEACOCK BLVD.
OCEANSIDE CA 92056

YOUR ORDER 999	TERMS 30 DAYS NET	SHIPPED VIA UNITED PARCEL	DATE SHIPPED SEPT. 20 1984	
ORDER	SHIP	DESCRIPTION	PRICE	TOTAL
12	12	100 PRODUCT NO. 1	2.25	27.00
25	25	200 PRODUCT NO. 2	1.50	37.50
9	9	300 PRODUCT NO. 3	3.75	33.75
37	37	400 PRODUCT NO. 4	2.50	92.50

0 %DISCOUNT = - 0.00

THANK YOU FOR YOUR ORDER

NET AM'T	SALES TAX	FREIGHT	INVOICE TOTAL
190.75	11.45	2.00	204.20

FROM: —

REMARKS: —

ELCOMP PUBLISHING INC.
2174 W. FOOTHILL BLVD. #E
UPLAND, CA 91789

TO: —

EDWARD S. WOZNAK
1705 PEACOCK BLVD.
OCEANSIDE CA 92056

Table 1. Example invoice (includes 6% sales tax on net amount, excluding freight).

bon. This will give you all the required copies—original to customer, second copy for your receivables file, and the third copy for your packing slip. Remember, there are shipping labels for you when the invoice is printed.

Your company's name, address, and so on are entered in lines 530 to 555 and lines 1300 to 1320.

This program has a decimal-alignment subroutine in lines 1410 through 1570. Every business program must print dollars and cents. This subroutine aligns the decimal and adds 0 or .00 to the calculation.

If at some later date you do have preprinted invoices, this program can be tailored to print through your printer and fill in


the proper spaces of your invoice. Just change the space, tab and lines to fit your own invoice in this program.

The application of sales tax will vary by state. I would urge you to contact your local state sales-tax office. The program calculates the tax on the cost of the freight and includes it in the sales tax. Line 1060 contains the sales-tax calculation on the freight.

$$1060 \text{ M1} = (T - D1 + V) * TR$$

This line *includes* sales tax on freight.

$$1060 \text{ M1} = (T - D1) * TR$$

This line *excludes* sales tax on freight. Tax is calculated on the net amount (total amount less discount, if any). 

Money Manager

Everybody can use a little advice when it comes to loans and investments. This program turns your Commodore into a computer consultant.

By Robert W. Baker

RUN It Right

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

Disk or tape

In the August 1978 issue of *Kilobaud* magazine, there's an interesting financial-calculator program for the old 8K PET ("FINANC: A Home/Small-Business Financial Package," by Les Palenik). I've used this program quite a lot and found it extremely helpful on more than one occasion. I decided to resurrect this program for the new group of Commodore 64 users.

During the many years I've used this program, I've been cleaning up and condensing it somewhat. I deleted the depreciation calculations, since they didn't seem appropriate for the home user, and I then combined the remaining functions into one large function menu, instead of having a number of smaller menus. I also cleaned up the

print formatting and overall program flow. My version is about half the size of the original program, with about one-third the number of lines.

When you start the program, you'll see a large menu showing the various calculations that the program can perform (Figure 1).

Simply enter the number of the desired function. From then on, the program will prompt you for any necessary information. The computed results will be displayed with all values rounded to the nearest cent. You'll then be given an option to perform another calculation of the same type, using different values.

If you don't choose another calculation, you'll be returned to the main menu, where you may select another function or press 9 to terminate the program. To keep things simple, the program does not do any input validation, nor does it protect against input errors.

FINANCE CALCULATOR

INVESTMENT CALCULATIONS


- 1 — FUTURE VALUE OF ONE-TIME INVESTMENT
- 2 — FUTURE VALUE OF REGULAR DEPOSITS
- 3 — REGULAR DEPOSITS REQUIRED
TO CREATE A DESIRED TOTAL VALUE

LOAN CALCULATIONS

- 4 — REGULAR PAYMENT ON A LOAN
- 5 — LAST PAYMENT ON A LOAN
- 6 — TERM OF A LOAN
- 7 — REMAINING BALANCE ON A LOAN
- 8 — COST OF BORROWING
- 9 — END OF PROGRAM

Figure 1. Money Manager Start-Up Menu.

Several input prompts request a time period in years and months. When answering these prompts, you must enter two numbers separated by a comma. If you accidentally enter only one

value, the computer will display two question marks and let you enter the second value. If anything seems to get out of whack, try stopping the program and running it again. 

Bargain Hunter's Delight

Clipping and saving coupons is only half the battle of bargain shopping. You must keep track of your coupons and know how to quickly access them. This program helps you do just that.

By Robert A. Wallace

RUN It Right

*C-64; C-128 (in C-64 mode)
Printer (optional); disk or tape*

You just ran out of laundry detergent. You'll have to go to the store. Before you go, though, you rummage through a drawer stuffed with coupons. After 15 minutes of frantic shuffling—nothing. You could have sworn you had a coupon for detergent. Didn't you see one just the other day, as you were picking through this very pile for an ice-cream coupon?

From now on, there will be no second-guessing. Coupon Organizer is a complete system for recording your coupons; it even tells you the value of your collection.

Menu options include: review complete file, search by brand

or product, compute total value, dump to printer, add new coupons, purge redeemed coupons and locate and purge expired coupons. Updated files can be saved to tape or disk.

The program displays coupon information on a randomly generated multicolor facsimile coupon, complete with dashed lines.

To use Coupon Organizer, just follow the self-explanatory prompts. When you enter a new coupon, a data line is created at the end of the program. When you purge a redeemed or expired coupon, the data is replaced by a dummy line, which is ignored during subsequent searches.

Later entries will fill in the dummy lines with coupon information; if none is found, a new line

FILE NUMBER:1


NONE	NONE
SAMPLE COUPON	
EXAMPLE ONLY	
EXP. DATE: NONE	
NONE	NONE

PRESS C TO CONTINUE

PRESS M FOR MENU

is created. When you complete the update, you can save the program, along with the newly created files, using option 7.

When you save an updated file, the entire program, with Data statements, is saved under the title of Coupon Organizer.

So clean out that drawer—leave the paper clips and rubber bands, but throw out the bottle caps and pencil stubs—and file your coupons (a recipe box works nicely); then enter the data in Coupon Organizer. 

Play Ball!

For all you softball nuts, here's a program that will help you keep track of your stats easily, accurately and neatly.

By Paul Howe

RUN It Right

*C-64; C-128 (in C-64 mode)
Printer (optional); disk or tape*

Every summer, millions of us aging adolescents dig out the gloves, bats and balls and head for the parks and playgrounds, to try to recapture our "glory days" on the baseball diamond. We don't run as fast, hit as hard or react as quickly as we used to, but the attempt brings back memories, and the satisfaction of a well-stroked base hit or perfect throw is just as great as ever.

If you're like me, you've even gone so far as to join a team in a softball league or some other league organized for ball players who want to have some fun and rekindle those old memories. And if your team is like mine, everyone proclaims that "It's not whether you win or lose..." while at the same time, one of the most frequently heard re-

marks at any practice or game is "Where's the stat sheet?"

Sure, fun and teamwork *are* important, but those individual stats are paramount. What ball-player in any league doesn't love to see his statistics in print (unless, of course, he's in a slump)?

Softball Stats will enable you to keep track of all your team members' offensive statistics without the drudgery of the mathematical calculations that drive so many scorekeepers batty. And, if you have a printer, you can produce a professional-looking printout that will impress your teammates not only with their own unmatched talents, but with your computing abilities.

Each week, you just load the previous totals and add the new individual stats. The program will figure the new individual totals and the new team totals, and then will display the new stats sorted by any category (i.e., at

bats, hits, runs, runs batted in, walks or batting average). You can then save the new totals and request a hardcopy, again sorted by any category.

HOW TO USE SOFTBALL STATS

When Softball Stats is run, a menu is displayed, offering the following options.

1. Load Previous Stats
2. Add New Data
3. Sort and Display Stats
4. Save New Totals
5. Add Players
6. Print Stats
7. Quit Program

The first time you use the program, you must enter the players' names by choosing option 5. As written, the maximum number of players is 20, but that can be expanded by simply changing the DIM statements in line 10. Also, due to limitations of the 40-column screen, the program limits name length to eight characters each. When you have finished entering all the players names, enter END at the prompt, and you are returned to the menu.

Normally, the options would be chosen in the order in which they appear on the menu, with the exception of Add Players, which I don't use much after setting up the file on the first run. As the program is written, however, it doesn't make any difference

what order you follow.

You can add players in mid-season, for example, either before or after loading the previous totals, or you can load the totals, then re-sort and display them either before or after you add the new data. Or you can get a new hardcopy of the previous stats by simply loading them and having them printed. However, there is one caveat. New data can only be added one time per run, as the second set of Input statements will overwrite the first.

You can make two file copies on separate disks or tapes during any run. You can't make a backup copy of a file by loading, then immediately saving; instead, you must first sort, display, print or add data.

To see how to use the program, we'll go through a sample run in mid-season. When the menu appears, enter 1 to read the data you've accumulated so far. You are asked whether you're using tape or disk, and you enter D for disk. Then you are asked for the number of the last game for which you recorded data. If you respond with 3, the disk drive whirs, and soon the screen displays a list of the players' names, their stats and the team totals through game 3, sorted as they were when you saved them. Hit a key to return to the menu.

If you then choose Add New

Data, the program will print a player's name and prompt you to input the number of at bats, hits, runs, RBIs and walks. After the numbers for all players are entered, a table of the new data is displayed and you're asked to double-check for accuracy. If there was an Input error, simply hit E, and enter the name of the player (or players) on which there were mistakes, and you'll be prompted to reenter that data.

Now the computer does its main work. It updates each player's totals to reflect the new data and refigures the batting averages and the team's totals. Now, if you choose Sort and Display Stats, a submenu appears, asking by

which category you wish to sort. If you enter 6 for Average, a table will appear on screen, listing the players and their stats in descending order of batting average.

After you inspect the new totals, you can sort them by another category, save them and/or print them out. You may, of course, print more than one hardcopy, sorted in different ways.

If at some point you find there has been a scorekeeping change and you must adjust a player's stats after they've been saved, you may reload the file and input negative numbers to subtract a hit, a time at bat, and so on.

There is one problem with this

SOFTBALL STATS THROUGH GAME #4

NAME	AB	H	R	RBI	BB	AVG
HAROLD	14	9	5	5	4	.643
RAHN	7	4	2	0	2	.571
CARLOS	6	3	3	3	3	.500
PAUL	17	8	4	4	2	.471
GARY	11	5	2	2	2	.455
ROBERT	7	3	3	2	2	.429
RON	10	4	0	0	0	.400
PERRY	5	2	2	1	3	.400
TOM	19	7	3	2	2	.368
JOHN	14	5	2	1	1	.357
JUAN	9	3	1	1	1	.333
CHUCK	12	4	0	2	1	.333
STEVE	11	3	2	2	2	.273
TOTALS	142	60	29	25	25	.423

Figure 1. Softball stats through game 4.

method if you use a disk drive. As written, the program uses the game number as part of the filename, so that, if needed, any week's stats can be found and loaded later in the season.

For example, if you load the stats through game 7, change a few totals and try to resave as game 7, you'll get a File Exists error. This could be overcome by using a Save With Replace (I haven't had trouble with this DOS command, though I've read that some people have) or by saving the corrected file to a different disk. The simplest fix may be to adjust the stats of the player to be changed the next time you run the program for the whole team.

The statistical categories used in this program are arbitrary and fit my team well (for example, we don't hit home runs, so I don't have a category for them). If you wish to change a category, it's

fairly simple. If you want to keep track of home runs rather than runs scored, simply replace R in lines 8260 and 10010 with HR and replace RUNS in lines 8530 and 9050 with HOMERS. *Caution:* do not change At Bats, Hits or Average in this manner, as these categories are interdependent in program calculations. You may add categories, but it will be a little more complicated.

When you use a disk drive, Softball Stats works best with 18 or fewer players, due to the 25-line screen size and the necessity of displaying category headings and team totals. With cassette, it is best to have 16 players or fewer, since there are extra prompt lines on screen. Certain Print statements could be removed to increase player capacity.

Good luck to you in using Softball Stats, and to your team this summer and in summers to come. ☐

Teacher's Pet

This educational program generates worksheets that parents and teachers can use to help students practice their basic arithmetic skills.

By Frank Colosimo

RUN It Right

*C-64; Plus/4; C-16; C-128 (in C-64 mode)
Printer; disk or tape*

This program produces math worksheets with one- to three-digit addition or subtraction problems or one- or two-digit multiplication problems. Six rows of seven problems each are placed on a standard 8½- x 11-inch sheet of paper. The answers are printed near the bottom of the sheet in six closely spaced rows.

For addition and subtraction, you must specify whether you want carrying or borrowing in the problems. Numbers are generated randomly, but for single-digit problems, you may specify the maximum number to appear in the problems. These options have been selected to allow worksheets to be produced with varying levels of difficulty for kindergarten through grade three.

EQUIPMENT REQUIREMENTS

The program works with the Commodore 64, the Plus/4 and the C-16. I developed the program using a Star Gemini 10X printer with Tymax's The Connection interface in the Commodore 1525 Emulation mode. It also works with the Commodore 1525, 1526, the Smith-Corona TP-1 (daisywheel) and the Epson MX-80. Although double-width printing is not supported on a daisywheel printer, acceptable worksheets are produced.

Since it is impossible to test a program like this on all printers, I used features that would ensure compatibility with a variety of equipment.

If you do not have a Commodore printer (or another printer that simulates one), try the program anyway. If it does not work, the suggestions given be-

low should provide the information you need to get it working properly.

FOR NON-COMMODORE PRINTERS

If the program is not producing nicely formatted worksheets on your printer, you may need to make changes in lines 30, 50 and 60.

Line 30 contains the Open statement. Modify this if your interface requires a non-zero secondary address to simulate a Commodore printer (for example: OPEN 1,4,2).

Lines 50 and 60 contain the commands to turn double-width characters on and off. This produces characters of ideal size for young people to work with. Use the appropriate values for your printer, as found in the printer manual.

For the Gemini 10X, with a standard serial-to-parallel interface where there is no emulation of the Commodore printer, use CHR\$(14) for UN\$ (double-width on) and CHR\$(20) for OFF\$ (double-width off). If your machine does not support double-width characters, you may need

NAME: _____

MATH WORKSHEET

87	59	88	36	52	64	73
+ 11	+ 10	+ 11	+ 62	+ 25	+ 33	+ 16
---	---	---	---	---	---	---

37	63	46	48	29	97	66
+ 11	+ 24	+ 31	+ 11	+ 10	+ 1	+ 13
---	---	---	---	---	---	---

to use null values (UN\$ = "" and OFF\$ = "").

With these null values, the worksheet will not be spaced as nicely across the paper, but will be completely usable. The rest of the program shouldn't require any modification if your printer is working properly with your computer.

HOW TO USE IT


There are five screen prompts you must answer before producing a worksheet:

1. *Operation*—Select addition, subtraction or multiplication.
2. *Number of digits*—Select 1–

3 for addition or subtraction or 1 or 2 for multiplication.

3. *Carrying/borrowing*—For addition or subtraction, you must specify whether you desire carrying or borrowing in the problems.

4. *Highest digit*—For single-digit problems, this prompt will appear. Select the largest number that you want in the problem digits.

5. *Answers*—If you want answers printed on the bottom of the worksheet, enter Y in response to this question. The answers are positioned so that they can be easily torn off (or folded over, if you trust your student). 

Spelling Challenge

You've got to be on your toes to meet this spelling challenge. Using artificial intelligence techniques, this program will try to trap you into making common spelling mistakes.

By Michael Broussard

RUN It Right

*C-64; C-128 (in C-64 mode)
Disk only*

You can play Spelling Challenge alone or with up to ten players.

In this game, a word that may or may not be correctly spelled is displayed on the screen. If the word is misspelled, you must type in the correct spelling. When playing by yourself, the object of the game is to spell as many words correctly as possible. In competition, the winner is the first player to correctly spell a specified number of words.

Spelling Challenge is different from most spelling games in that it uses artificial intelligence techniques. The program's Data statements provide the word list. With a few exceptions, which will be explained later, these words are all spelled correctly.

The program randomly chooses a word from its list and displays it on the screen. It analyzes a correctly spelled word and transforms it into a misspelled word before displaying it. This occurs 75 percent of the time. In the other cases, the program will attempt to trick you with a word that is already correctly spelled. In any event, you must decide whether the word is correctly spelled and then type in the correct spelling if it is not.

The program's process of transforming correctly spelled words into tricky misspellings is not a random one. This is where the artificial intelligence comes in.

It is easy to transform the word "horse" into a misspelled word by transposing two adjacent letters (for example, hrose). But this is not the sort of spelling error people usually make.

Spelling Challenge analyzes

SCORE: 0 OUT OF 1 (0%)

TEST WORD

BASOON

GUESS THE CORRECT SPELLING:

? BASOON

SORRY, THE CORRECT SPELLING IS:

BASSOON

*** PRESS ANY KEY TO CONTINUE ***

words, looking for patterns of letters that typically cause spelling errors, and transforming them accordingly. For example, when analyzing the correctly spelled word "weird," the program transforms it into the misspelled word "wierd."

PREPARING TO PLAY

When you run the program, the screen first clears, then prints a heading. Next, it reads spelling words from the Data statements, sorting them into different levels of difficulty. The screen is cleared again, and the program prompts you for the number of players, at which time you may enter any

value from 1 to 10.

The program then asks you questions pertaining to the level of play. The Data statements are divided into three levels of difficulty, with the easiest words in level 1. The program tells you how many words and levels it contains and then prompts you to select the levels from which both the easiest and hardest words will be chosen.

Once you select the difficulty levels of the words, the program asks you how many words you want to be tested on. If you are playing alone, this is the number of words on your spelling test. In competition, this is the number

of words you must spell correctly in order to win.

PLAYING THE GAME

Now the game gets underway. A word is displayed in two windows—one near the top of the screen and a second near the middle. You correct the spelling in the second window by typing over the word, and then press the return key. (If you think the word is already spelled correctly, just press the return key without changing the word.)

The program then displays the correct spelling in a third window at the bottom of the screen. It tells you whether you spelled it correctly and adjusts your score accordingly. If there are multiple competitors, a player's turn continues until he or she misses a word.

Not until all the words have been used will you be tested on the same word twice. If you do manage to get through all the words during a single game, the program will automatically start reusing the words, but in a new random order.

If you are playing alone, the game ends when you have been tested on the number of words specified at the beginning. In competition, the game continues until one player has correctly spelled the specified number of words.

Keep a dictionary handy. If you take the time to look up words you don't know, you will be learning more than correct spelling.

That's all there is to it! You now know enough about the game to play and enjoy it. ☐

The Number Puzzle

This puzzle might appear simple, but it offers you a real challenge.

By Zoltan Szepesi

RUN It Right

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

Disk or tape

The Fifteen Puzzle was invented in 1878 by an Englishman named Sam Lloyd. It evoked as much excitement during the last quarter of the nineteenth century as the Rubik's Cube does now.

The Fifteen Puzzle and the Rubik's Cube are very similar in principle, and both games are extremely addictive; however, it is much easier to solve the Fifteen Puzzle than the Rubik's Cube.

The idea of the game is very simple. The numbers from 1 to 15 are randomly placed in 16 squares, with one square empty. The object is to arrange the numbers in numerical order, as in Figure 1. A number that is adjacent to the empty square can be moved into that square, thus leaving its own place empty for another number to move in.

There are almost 21 trillion, or precisely $16! = 16 \times 15 \times 14 \times 13 \times 12 \times 11 \times 10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$ possible starting positions for the Fifteen Puzzle. Mathematicians have proved that half of these positions cannot be solved. According to D.D. Spencer's *Game Playing with Computers*, mathematicians derived a simple rule for checking whether or not a given setup can be solved.

From the first to the fifteenth position, count how many numbers are of lower value than the number in the starting position (count the empty space as 16), then add them together. Also, add 1 to the sum if the empty square is in one of the following positions: 2, 4, 5, 7, 10, 12, 13, 15. If the sum is even, then the puzzle can be solved; if it is odd, then it cannot be solved.

The difficulty in solving the Fifteen Puzzle depends on the particular order of the numbers. With some practice, you will learn

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	

Figure 1. Gameboard of Fifteen Puzzle.

how to succeed faster and in fewer steps.

When my wife and I began playing this game, our average number of moves for our first 13

games was 145, with a minimum of 75 and a maximum of 208. Our solving time ranged from 5½ to 19 minutes, with an average of 10. Our scores have improved with practice. ☐

Block Busters

With a paddle and a ball, the object of this game is to “bust” as many blocks as possible without letting the ball slip past you.

By Michael Longtin

RUN It Right

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

Disk or tape; joystick

Block Busters is a one-player game that uses color, sound and the fast action of machine language. The secret is to keep your eye on the ball—not on how many blocks it breaks.

There are 255 skill levels from which to choose. Level 255 is extraordinarily slow, and level 1 is impossibly fast. The best level for a beginner is probably 35.

The game begins with 95 blocks at the top of the screen. You have five balls. Move the paddle left and right with the joystick, which you must plug into port 2. Try to keep the paddle under the ball as much as possible.

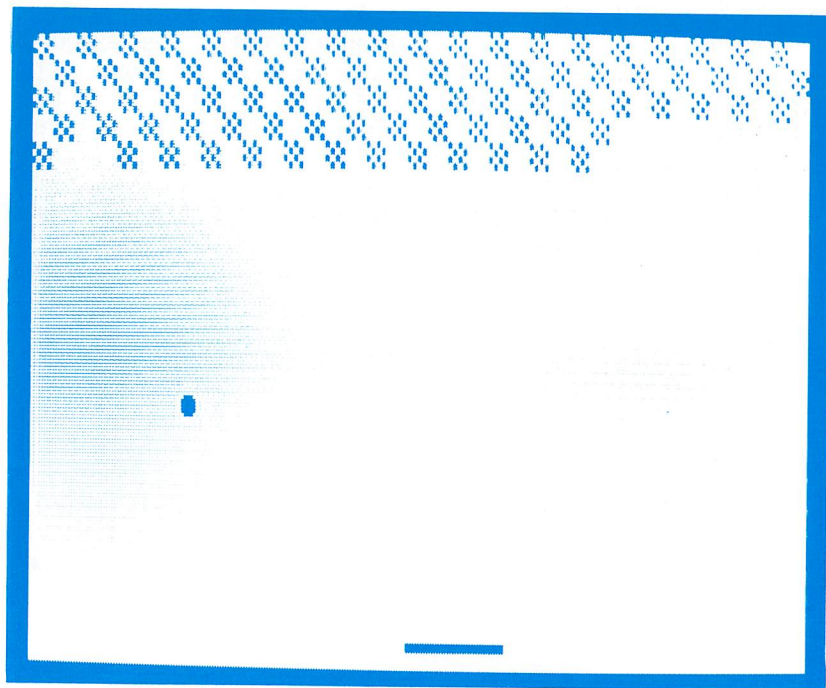
When you clear the screen, you move to the next fastest level and a full new screen. When you lose five balls, your final score is displayed—you receive one point for

each block you bust—and you are asked if you want to play again.

A PAUSE FEATURE

Have you ever wanted a pause feature in your program, to prevent you from having to keep checking for input? Well, here's your answer, a short machine language subroutine that checks the keyboard. If the shift-lock key is pressed in the down position, program execution halts until the shift-lock key is in the up position. You need only type in the following short program and run it. This program Pokes the machine language Pause routine into memory.

```
10 INPUT "STARTING  
   ADDRESS";A:IN = A + 13  
20 FOR I = 0 TO 25:READ  
   N:POKE I + A,N:NEXT I  
30 POKE A + 7,IN/256:POKE  
   A + 2,IN - INT(IN/256)*256  
40 PRINT "TO ACTIVATE, TYPE  
   'SYS';A;" " "
```



```

50 DATA 120,169,0,141,20,
   3,169,0,141,21,3,88,96
60 DATA 32,159,255,173,141,
   2,201,1,240,246,76,49,234

```

This routine is completely relocatable, which means it can be put anywhere in memory. When the program asks for the starting address, enter the address of the memory location where you want the Pause routine to be stored. A good place for it is in the machine language buffer at 49152.

When the program ends, it tells you how to activate the Pause

routine. Put these instructions at the beginning of your program. Do not activate it when you're in Edit mode; it won't work then, because when you press the shift key (to move the cursor or clear the screen), the cursor stops. To deactivate the Pause routine, type SYS 8 or press the run/stop and restore keys.

For those interested, here is a listing of the machine code Pause routine in assembler syntax:

```

1000 START SEI ;DISABLE
      ALL INTERRUPTS


```

```

1010 LDA #<PROG
      ;CHANGE
1020 STA 788 ;INTERRUPT
1030 LDA #>PROG ;VECTOR
1040 STA 789
1050 CLI ;ENABLE ALL
      INTERRUPTS
1060 RTS ;RETURN TO BASIC
1070 PROG JSR SCNKEY
      ;SCAN KEYBOARD
1080 LDA $028D ;SHIFT
      FLAG
1090 CMP #$01 ;SHIFT
      PRESSED?
1100 BEQ PROG
      ;NO - CHECK AGAIN
1110 JMP $EA31 ;YES - JUMP
      TO NORMAL INTERRUPT
      ROUTINE

```

As you can see, this routine is interrupt-driven. It is executed every $\frac{1}{60}$ th of a second along with the regular Interrupt routine, which updates the software clock, handles the cursor flash, keeps the cassette motor on if the play button is pressed and reads the keyboard.

The first part of the program changes the location of the interrupt routine to point to PROG. PROG scans the keyboard (which updates the shift flag) and checks the shift flag (which will contain a 1 if the shift key is pressed). If the shift key is pressed, the program rechecks. If it is not pressed, then it transfers control to the normal Interrupt routine (at \$EA31). 

Renumberer— A Remedy for Poor Planning

Here's a handy utility program that will take the drudgery out of renumbering your program's lines.

By Alejandro A. Kapauan

RUN It Right

*C-64; C-128 (in C-64 mode)
Disk only*

Renumbering a program can be a time-consuming and tedious task, especially if your program contains several On...Goto and On...Gosub statements.

The disk-based Basic File Renumber program will read in a Basic program and rewrite the new, renumbered program. Unlike the renumbered commands of some programmer's aids, Basic File Renumber will automatically adjust all line numbers following statements such as Gosub, Goto and If...Then.

Besides renumbering, Basic File Renumber can also generate

a cross-reference of line numbers for your renumbered programs. This cross-reference provides a list of line numbers that are mentioned in other lines and shows where they occur.

You also might want to use Basic File Renumber to change the line numbers of existing programs or program modules so that you can easily merge them with your own programs.

USING THE UTILITY

To use Basic File Renumber, load it into your computer and run it. Insert into your disk drive the disk that contains the program you wish to renumber. The program will ask you for the name of the input file and the name you wish to give the re-

numbered file. It will then ask you for the starting line number and the increment by which to renumber the program. You will also be asked if you want a cross-reference of the program.


The file will be scanned in a first pass to determine what line numbers it contains. On a second pass, it will renumber your program's lines. The second pass will be slower because each line must be decoded to determine if it contains line-number references that need to be changed. Also, there will be both reading and writing to the disk, which slows down the operation of the program.

When renumbering is complete, and you have chosen the Cross-Reference option, you will

be prompted by the question:
CROSSREF(S/P/Q) ?

Press S if you want to display the cross-reference table on the screen, P if you want it printed on the printer or Q if you want to quit.

After the table is printed, you will be asked the question again. That way, you can print or display the table as often as you wish. Each line in the table consists of a line number and a list of line numbers that refer to it. An asterisk before a number indicates that the reference is in the form of a GOSUB or ON...GOSUB statement.

To check your renumbered program, load it into your computer and list it. 

Sound Sampler

This program gives you 17 amusing, captivating or out-of-this-world sounds that you can add to your own programs.

By Bruce Bartlett

RUN It Right

*C-64; C-128 (in C-64 mode)
Disk or tape*

Sound Effects Sampler is a menu-driven program that demonstrates the amazing sound capabilities of the Commodore 64. The menu provides a list of sound effects with a letter beside each one. To hear the desired sound effect, press the appropriate key.

The letter of your choice lights up to indicate which effect is playing; otherwise the letter is light blue.

You can add these sound effects to your own programs by typing in the appropriate subroutines and initializing statements. There are 17 subroutines with titles at lines 100, 200, 300, and so on. Lines 10 and 20 should also be included; they clear the sound chip and define the sound parameters.

INSIDE THE SUBROUTINES

Now I'll briefly describe what's happening in each sound subroutine. I won't mention the ADSR settings, since they are self-explanatory. In the last program line of each sound effect, the voice is turned off. If the Filter mode, or resonance, has been used, it is also turned off. Then the program goes back to line 50 to reset the selected letter to blue and get a new keystroke.

Echoing UFO Takeoff enables ring modulation, sets the Voice-2 frequency for ring modulation and sweeps FU and FL up in frequency.

Pulsing UFO Takeoff alternates rapidly between a triangle waveform and a noise waveform as it sweeps upward in frequency.

Crystal Goblet enables the Voice-2 triangle wave, enables synchronization and sweeps up and down in frequency four times.

Alien Planet sets the Voice-2 frequencies, enables ring mod-

ulation and sweeps up and down in frequency four times.

Computer Computing enables synchronization, sets the Voice-2 frequencies and plays 50 random-frequency tones.

Chipmunk Fight enables ring modulation and plays 150 random-frequency tone bursts of Voice 1 and Voice 2.

Beating Rising Buzzer sets the Voice-2 upper frequency, sets the Voice-1 frequencies, enables ring modulation and sweeps the Voice-2 lower frequency slowly upward.

Seasick enables ring modulation and sweeps the Voice-2 lower frequency up and down four times.

Rubber Band sets the Voice-1 lower and upper frequencies, sets the Voice-2 upper frequency, enables synchronization and sweeps the Voice-2 lower frequency upward in frequency.

Chime sets the Voice-2 frequencies, sets the Voice-1 upper frequency and turns on a ring-modulated tone with ADSR set to sound like a chime.

Spinning Falling Wheel enables the bandpass filter, sets resonance to maximum, turns on the sawtooth waveform and sweeps Voice 1 and the filter-

cutoff upper frequency *down* in frequency at an accelerating rate (by increasing the step size). Whew!


Bwee turns on the triangle waveform and sweeps a gentle tone upward between two random frequencies, 30 times.

Cosmic Rays turns on the sawtooth waveform and sweeps Voice 1 down in frequency between two random frequencies, 15 times.

Pulse Sweep sets the Voice-1 frequency, turns on the pulse waveform, sets the pulse width and tone and sweeps the pulse width from long to short to long, three times.

Ow sets Voice 1 to a random frequency, sets resonance to maximum, enables the bandpass filter and sweeps down the bandpass-filter upper frequency. All this is repeated ten times.

Warbling turns on the triangle waveform, sweeps upward rapidly in frequency 30 times, then sweeps upward less rapidly, 20 times.

Deedle Deedle turns on the sawtooth waveform and alternates between two frequencies; first slowly (duration D is long), then rapidly (D is short), then slowly (D is long). 

Graph Maker 64

This program allows you to create and save colorful vertical bar graphs, and to print them if you wish. It also includes two routines that let you load your graphs into other programs.

By Doug Smoak

RUN It Right

*C-64; C-128 (in C-64 mode)
Printer (optional); disk only*

Graph Maker draws vertical bar graphs on your screen, then allows you to add titles and text and to edit the screen. You can then save your graph to disk and print out a hardcopy. Once saved, you can reload the screens to edit or print out again.

Also, I have included two routines you can add to your own programs to load previously prepared graphs for presentations.

SETTING UP THE GRAPH

When you run the program, you'll be prompted for bar parameters of the graph. You must first give the maximum vertical scale. This should be at least the size of the highest value to be graphed.

Occasionally, you might have

one value that greatly exceeds the rest of the bars. To avoid a disproportionate graph, you should enter a value closer to the second highest bar. In this case, the largest bar will still appear, reaching to the top of the screen. You can then use the Text mode to enter that highest bar's actual value.

You will find that using whole numbers for the maximum graph value will yield a more attractive display. If your values are more than three digits, then only the left-most three digits will be displayed. This is necessary to maintain as much space for the bars as possible.

If you have very high values, it is probably better to break them into percentages and then use 100 as your maximum value; or you can divide them by 100, 1000 and so on, and, in Text mode, add a note like "in hundreds." The best way to learn

is just to experiment with the program for a while.

The second prompt will request the number of vertical bars you want on the screen. You may have from two to 36. I chose 36 as the maximum because it is more evenly divisible by the most likely charted items, such as 12 months (up to three years' worth). Here again, you'll receive the best results by experimenting to get a feel for how it works.

Next, you will be prompted to label each of the bars and told how many characters each title can possess. If you want only numbers beneath each bar, just hit the return key, and Graph Maker will automatically enter the number for that bar as its title.

After having set the maximum bar height, the number of bars and their labels, the final step will be to enter the values for each bar. You will be prompted for the value to be graphed, with the title after the number, such as:

BAR #1, JAN

These values must be entered carefully to avoid having to redo all of the input.

After all the data has been entered, the graphing begins, taking only a few seconds for even a 36-bar chart. Then, at the bottom of the screen, you will see a flashing prompt showing the options available: Text, Save, Abort, Load and Print.

If you hit A for Abort, the program will rerun from the beginning and wipe out what has been done up to that point.

THE PROGRAM'S OPTIONS

Text mode will give you a flashing cursor that you can move about the screen to add titles or notes or to edit bar titles. Just use the cursor controls to move about and then type in your desired characters. If you want a reversed character, you must first type it in normally; then go back and press the return key over each character you want highlighted.

To change colors in Text mode, just do it as you normally would, by simultaneously pressing the CTRL and color keys or the Commodore and color keys. When you have finished with Text mode, you escape to Command mode by pushing the pound key (£). Then you will again get the flashing prompt.

If you hit S for Save, the flashing prompt will be replaced with a prompt for a filename. To abort this option, hit the return key without entering a name. After entering the filename, the drive should come on and *two* saves will be made. Why two?

The first file is the screen memory, saved right off the screen as a program file. The second (saved as filename.C) is the screen-color memory, saved

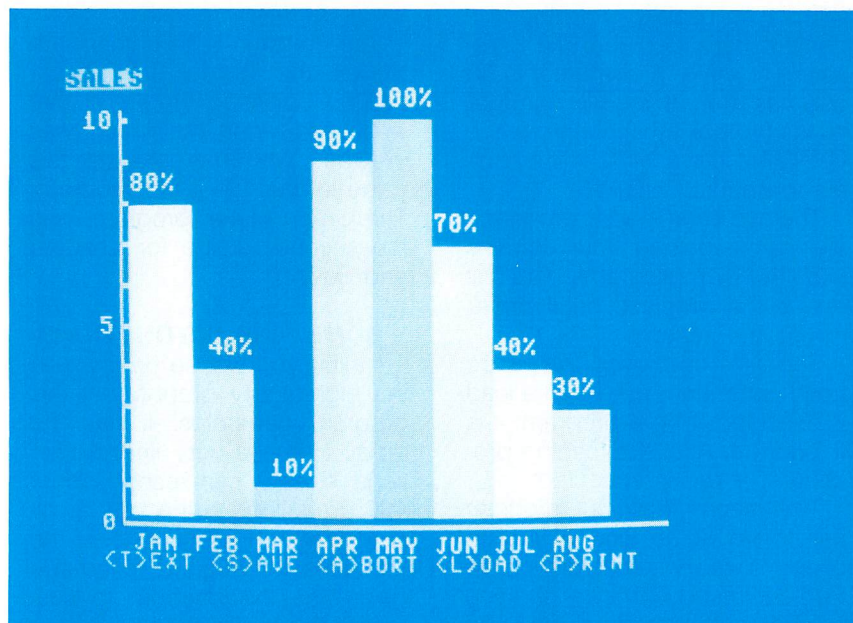


Figure 1. Sample of Graph Maker hardcopy.

right out of memory as a second program file. This means that for every graph, there are two files of four blocks each on the disk. The color file has the same name as the screen file, except ".C" is added to it.

When you hit L for Load, you will again be prompted for your filename. You enter only the filename for the screen file; the program itself will then look for the color file with the same name. You could use this option to make rough drafts, saving them and then later reloading to add

text before resaving final versions. To abort the Load option, just hit the return key without entering a name.

Don't save graphs under the same name, or you'll get a disk error. In the case of any Load or Save errors, you will get a flashing message on the bottom line of the screen and an opportunity to redo the procedure.

If you choose P for a printout of the screen, you must have a printer/interface combination that will support the 64's keyboard graphics; otherwise the printout

will not be usable. Note that the printout uses double-width characters to make a chart that is 80 columns wide. If you want smaller charts (40 columns), then change CHR\$(14) in line 1470 (in the printout routine) to CHR\$(15).

The two short loader programs allow you to load your screens into your own programs. The first one is the simplest, but I prefer to use the second.

The first one uses the Basic Load command, but when a load is executed from a program, it is a load/run. After the loading procedure, a run is executed.

This means that your program has to set some kind of flag to check to see whether or not the Run command is the first one you typed in or the one from the Load routine. If it is from the Load routine, is it from the screen file or the color file? This gets complicated.

The second loader uses the Kernal Load routine, doing all the necessary preparation for it in Basic. This routine does not execute a run, so no flags are necessary, and program flow is

easier to keep up with.

The Pokes in both of them are to set the border and background colors to the value that was used when the graph was created. You may change this value in line 10 of the program. The Graph Maker program uses the second routine for Loading and Saving.

SOME FINE DISTINCTIONS

I think you will be happy with the high-quality graphs that this program generates. It has the ability to make very fine distinctions, since it can resolve about 160 gradations in the vertical direction, which is one pixel of the 64's screen. Also, the Text mode gives you the freedom to customize the final result to suit your needs and wishes.

While Graph Maker is an excellent program for business needs, you can also use it for comparative analysis of nonbusiness applications, such as utility bills, grades at school, commodities pricing and even ages of family members. ☐

64 Joystick Artist

Let your creative talents flow! With this program, you can use the joystick and the great C-64 color graphics to draw, paint or doodle to your heart's content.

By Michael Platt

RUN It Right

*C-64; C-128 (in C-64 mode)
Joystick; disk only*

The Commodore 64 computer has amazing color graphics capabilities. In the multi-color mode, you can have up to four different colors in an 8×8 pixel matrix. Unfortunately, due to the lack of built-in commands, you must use numerous Peeks and Pokes, and this makes your task cumbersome.

This program gives a solution to that problem. You can draw in various colors by moving the cursor around the screen with a joystick. In addition, your works of art can be saved on tape.

COLOR ME...VARIED

After you run the program, the border will be blue, the background black. You can change

these colors with the f5 and f7 keys.

Your joystick should be plugged into port 2. Your cursor, which you can move in any direction with the joystick, will be in the center of the screen. To draw, press the fire-button.

In the upper-left corner is the status area. The left box displays a 1, 2 or 3 to indicate the current Drawing mode or an E to indicate the Erase mode. The box on the right displays the color the cursor will draw. Between these two boxes will be displayed either one or two dots to indicate a single or double drawing cursor.

In an 8×8 matrix of pixels, you may have only one color for each Drawing mode. To have four different colors, including the background color, you'll have to use all three Drawing modes. You select the Draw or Erase

mode with the f3 key.

The cursor can draw in 16 colors: black, white, red, cyan, purple, green, blue, yellow, orange, brown, light red, dark gray, medium gray, light gray, light green and light blue. You can select the cursor color with the f1 key.

KEYS TO COLOR

The cursor can also draw in single or double thickness. In the Single mode, the cursor draws with a 1×2 pixel area; in the Double mode, a 2×2 area. The asterisk key (*) toggles the cursor from single to double thickness.

The number keys 1 through 9 control the cursor speed. Key

number 1 is the fastest speed, 9 the slowest (used for detailed work). The shifted CLR/home key erases the entire screen.

Your favorite background and border colors can be saved in memory with the shifted pound key and recalled with just the pound key (£).

To obtain an unobstructed view of your picture, press the minus-sign key. This will remove the cursor and the status box from the screen. To bring them back, use the plus-sign key.

When you are finished drawing, you can save your pictures to disk with the f2 key and load them with the f4 key.

After you have been prompted

KEY	COMMAND
f1	CHANGE COLOR IN WHICH CURSOR DRAWS
f3	CHANGE DRAW MODE (1, 2, 3 OR E)
f5	CHANGE BORDER COLOR
f7	CHANGE BACKGROUND COLOR
f2	SAVE PICTURE TO DISK
f4	LOAD PICTURE FROM DISK
f6	SAVE PICTURE TO TAPE
f8	LOAD PICTURE FROM TAPE
1-9	SELECT SPEED OF CURSOR
MINUS	TURN SPRITES OFF (CURSOR AND STATUS BOX)
PLUS	TURN SPRITES ON
CLR HOME	CLEAR SCREEN
SHIFTED POUND	SAVE BORDER AND BACKGROUND COLORS
POUND	RECALL BORDER AND BACKGROUND COLORS
ASTERISK	SET SINGLE OR DOUBLE DRAWING CURSOR

Table 1. A summary of the command keys.




for the name of your file, enter it and hit the return key. To get out of the Save or Load mode, hit the return key, then the run/stop key; you'll be returned to the normal Draw mode.

When saving a file that's intended to replace an existing file of the same name, type "@0:" before the filename. See Table 1 for a summary of the command keys.

To enter the graphics program, type RUN and hit the return key. This will Poke the machine language program into high RAM locations \$C000-CFFF. Once this program is in memory, it is unnec-

essary to reload it.

If you want to get out of the program, hit the run/stop key and the restore key. As long as you don't Poke those high RAM locations, you may now run a Basic program without destroying the machine language code. However, a Basic program may be overwritten by the graphics program, so save it first. To reenter the graphics program, type SYS52992 and hit the return key.

Before exiting, save any picture you may have in memory, or it will be erased. 

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