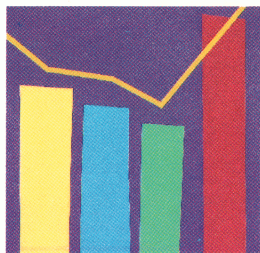
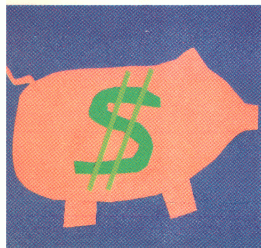


RUN **W·O·R·K·S**

7 of *RUN's* most
powerful programs
for Commodore 64
and 128 users.



GRAPHMAKER



MONEY MANAGER



RUN TERM



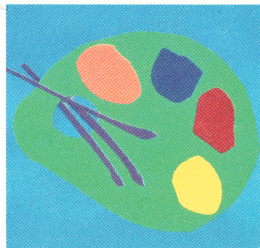
FORM MAKER



LABEL BASE



RUN SHELL



RUN PAINT

Introduction

Welcome to RUN Works, 1988

RUN has for several years offered valuable and useful software in its Productivity Pak series. Building on that reputation, we have developed *RUN Works*, a collection of powerful applications and utilities that will allow you to use your C-64 or C-128 in both a productive and creative manner.

RUN Works contains seven programs, five of which run on either the C-64 or C-128. The other two programs have separate versions for the two computers. All the programs were designed to take advantage of your computer in as many ways as possible. We think that no matter which system you use, you are going to love the programs in this package. Here are brief descriptions of all seven programs.

If you have ever wondered where your money goes each month, then *Money Manager* will interest you. Written by Rex Day, it is a personal budget and record-keeping program that will enable you to keep track of your income and expenses and perhaps also help you stay within your budget.

Do you have a need to produce address labels in quantity? Most people do at some point, and using a computer and printer to do the job is quick and efficient. To help make it easy, Bob Kodadek has written *Label Base*, a database designed especially for printing out your mailing labels.

Our studies have shown that nearly half of all Commodore users own modems. Because of that, we had Tom Brown create an enhanced version of his *RUN Term* for the C-128, with a brand-new version for the C-64. *RUN Term* is a user-friendly terminal program with advanced features, including 300/1200-baud support, auto-dialing from a user-created phonebook, ASCII capture of text in a variable-sized buffer, support of the 1700 series of RAM cartridges, Xmodem and Punter transfer protocols, and much more. When you want to get online, you can do so in style with *RUN Term*.

Also from Tom Brown is his popular *Form Writer* program, which

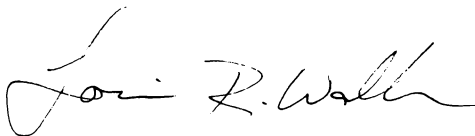
allows you to create custom forms that take advantage of whatever special features your printer supports. You can create blank forms and have the computer fill them in from the keyboard or from its own special database files.

RUN Shell, by John Ryan, is similar to (but an upgraded version of) the C-128 DOS Shell that's shipped with the 1571 disk drive. It's a menu-driven disk manager that makes all the features of your disk drive available at the press of a key. Erasing, renaming or copying files or disks couldn't be easier. And, unlike the original DOS Shell, RUN Shell supports all three of the standard CBM drives, the 1541, 1571 and 1581, and even the 1700 series of RAM cartridges. It works on both the C-64 and the C-128 (in 40- or 80-Column), and owners of the new 1581 will be happy to know it even allows you to create disk partitions (subdirectories).

Next, we offer RUN Paint, written by Robert Rockefeller. This is a full-featured paint and draw program. It supports a canvas larger than the screen (640 × 200 in C-64 mode; 640 × 800 in C-128 mode), has a user-friendly mouse/menu interface and allows you to draw in either High-Resolution *or* Multicolor mode. RUN Paint has more drawing options and tools than most commercial packages you find on your dealer's shelves. As a bonus, it will load and save in the two most popular graphic formats for Commodore computers: Doodle! and Koala. Professionals and amateurs alike will find this a fantastic tool for computer art.

Finally, if, like the ancient Chinese, you think one picture is worth a thousand words, you should delight in Graphmaker, an easy-to-use data-grapher that generates beautiful charts and graphs of your custom data sets.

That's the rundown on our RUN Works disk. Perhaps it can best be described as productivity software with a creative edge. We hope you enjoy it!

A handwritten signature in cursive script, reading "Lou Wallace". The signature is fluid and stylized, with a large initial "L" and a long, sweeping underline.

—Lou Wallace
Technical Manager
RUN Magazine

How To Load

LOADING FROM MENU

To get started, C-64 users should type LOAD "MENU 64",8 and press the return key. When you get the Ready prompt, the menu is loaded and you should type RUN to see a list of the programs on your disk. C-128 users need only press the shift and run-stop keys. When all the programs are displayed on the screen, you can run the one you select by pressing a single key.

LOADING FROM KEYBOARD

If you do not wish to use the menu program, follow these instructions.

C-64: To load a C-64 program written in Basic, type: LOAD "DISK FILE-NAME",8 and then press the return key. The drive will whirl while the screen prints LOADING and then READY, with a flashing cursor beneath. Type RUN and press the return key. The program will then start running. To load a C-64 program written in machine language (ML), type: LOAD "DISK FILENAME",8,1

C-128: All C-64 programs can be run on the C-128 as long as your computer is in C-64 mode. All C-128 programs are clearly labeled on the directory page. Your C-128 *must* be in C-128 mode to run these programs. To load a C-128 mode program, press the F2 key, type the disk filename and then press the return key. When the program has loaded, type RUN.

MAKING COPIES OF RUN WORKS FILES

Many programs on your RUN Works disk have routines that require a separate disk onto which the program writes or saves subfiles. To use these programs, you must first make a copy of the original program onto another disk that has enough free space on it to hold these newly written subfiles.

It's simple to make a copy of a Basic program. Just load it into your computer as outlined above, and then save the program back onto a separate disk that has plenty of free space for extra files.

Copying an ML program is not so simple. You cannot simply load and save an ML program; you'll need to use a disk-backup utility program, such as the one on your Commodore Test Demo disk.

Directory

PAGE	DOCUMENTATION	DISK FILENAME	FILE TYPE
		*MENU 128 _____	BASIC
		MENU 64 _____	BASIC
1	MONEY MANAGER	MONEY MANAGER _____	BASIC
4	LABEL BASE	LABEL BASE _____	BASIC
8	RUNTERM 128	*BOOT.RUNTERM 128 _____	BASIC
		*RUNTERM 128 _____	ML
		*WXMODEM.128 _____	ML
		*PUNTER.128 _____	ML
8	RUNTERM 64	RUNTERM 64 _____	ML
		WXMODEM.64 _____	ML
		CONFIGURE _____	ML
		TERM.C1 _____	ML
		CHANGE DEFAULTS _____	BASIC
16	FORM WRITER 128	*FORM WRITER 128 _____	BASIC
		*EDITOR.128 ML _____	ML
16	FORM WRITER 64	FORM WRITER 64 _____	BASIC
		EDITOR.64 ML _____	ML
23	RUN SHELL	RUN SHELL _____	ML
29	RUN PAINT	RUN PAINT _____	BASIC
		OB.BOOT RP _____	ML
		OB.RP _____	ML
		SYS.STUFF.H _____	ML
41	GRAPHMAKER	GRAPH MAKER _____	BASIC
		EMPLOY.WORK _____	SEQ
		EMPLOY.AGE _____	SEQ
		SAL.PD _____	SEQ

* C-128 mode only

Before you run a program, carefully read the documentation that pertains to it.

COVER ILLUSTRATED BY JAN MULLER

Money Manager

By Rex Day

MONEY MANAGER MAINTAINS and balances a checkbook, records payments by category and generates reports summarizing month-to-date, year-to-date and average monthly payments. The EZ Budget part of the program provides a simple but effective way to prepare monthly and yearly financial plans by comparing estimated expenses with anticipated income and then making adjustments. Later it compares actual income and expenses with the budget. Money Manager is easy to use, with menus and on-screen prompts, as well as Help messages that are available throughout.

CATEGORY CODES

The first time you run Money Manager, follow the prompts to select up to 38 category codes for your checkbook payments and budgets. I've supplied the following codes, which you can use or replace with your own. They are easy to remember, since each one consists of the first three letters of the category it designates:

hou	housing	gas	gasoline
uti	utilities	ent	entertainment
tel	telephone	res	restaurant
ins	insurance	clo	clothing
sav	savings	don	donation
cha	charge accounts	med	medical
cas	cash	equ	equipment
gro	groceries	xxx	(four blank categories)
aut	automobile	mis	miscellaneous

The program accepts codes up to four characters long, so you can add characters to mine to further identify categories or to identify tax-deductible payments. Codes you may not need can just remain and then later be replaced with others by using the new code in a transaction and by following the on-screen prompts to replace unused codes. Don't worry—the program does not print any unused codes in reports.

You can edit codes when you're first setting up the program and at the beginning of a year, but once you start entering transactions, all you can do is replace unused codes with new ones. The four xxx blanks are supplied specifically for this purpose.

PROGRAM OPTIONS

After you've established the category codes, the main menu appears, offering seven options: Add Transactions, View/Change Transactions, Print Check Register, Payment Analysis, EZ Budget, New Month and Quit.

Select the Add Transactions option to enter your checkbook activities, doing so in the order that they appear in your checkbook. As you enter each transaction, your new balance appears on the screen, and data is accumulated in preparation for monthly and year-to-date reports.

A minimal number of keyboard entries are needed for each checkbook transaction, since Money Manager automatically repeats the date until you change it, and it enters the month and year in new dates. It also skips the Deposit field when a payment is entered, and check numbers are incremented by one, so you don't have to enter the number unless it's out of sequence.

You can review and change transactions quickly by pressing the P key for the previous transaction or the N key for the next, or through the View/Change Transaction option in the main menu.

Money Manager makes it easy to split one check payment among two or more categories. Just enter the amount to be charged to the first code and then type S, for split, at the Help prompt. The check number, date and description are automatically placed in the next transaction, so that you have to enter only the amount for the category code.

You'll find this option particularly useful when you write checks for cash. You should be sure to keep either receipts or memos about your cash expenditures; then, at the end of the month, enter the total as a negative payment in the cash category, using a description such as "distribution of cash" and blanking out the check number. Then enter the amount for each category code, using the split-check technique.

The Print Check Register and Payment Analysis options print a list of checkbook transactions for the month to date and a report, like the sample below, listing month-to-date, year-to-date and average monthly payments by category.

PAYMENT ANALYSIS — 1988, Jan-Feb

CODE	AMOUNT	%	YEAR TO DATE	%	MONTHLY AVERAGE
hou	152.45	11	301.00	13	150.50
uti	141.13	10	276.94	12	138.47
tel	57.88	4	142.43	6	71.22
ins	166.84	12	201.28	9	100.64
.	..	.	..	.	..
.	..	.	..	.	..
.	..	.	..	.	..
mis	44.55	3	91.20	4	45.60
Totals	1441.71		2022.80		1011.40

For a complete listing of a month's activity, select the Check Register and Payment Analysis options after the last checkbook transaction has been entered for the month.

The New Month option is handy for switching months without restarting the program. Transactions are stored on disk by month, so an earlier month's activity can be recalled quickly for viewing or printing reports. Any correction to an earlier file must also be entered as a transaction in the current month, so your checkbook balance and year-to-date totals are properly updated.

EZ BUDGET

The menu for the budget portion of Money Manager offers six options: Prepare Budget, Revise Budget, Budget Analysis, New Month, Return to Main Menu and Quit. With Prepare Budget, you can establish budgets for as many months of the year as you wish, then later update them using Revise Budget. When you select one of these options, the category codes you have in Money Manager are listed on the screen, with instructions to enter or change the budgeted amounts.

You must also enter your estimated income (anticipated deposits to your checking account) for the month, to be compared to your estimated expenses. If the results of the comparison don't please you, you can make changes in your budget and immediately see their effects. Change the budget as much as you want until it's balanced and best meets your financial needs. If you go on to prepare a budget for another month, you can start from the one you've

already created, so you have to enter only the amounts that differ.

The Budget Analysis option prepares monthly and year-to-date reports, like the following, that compare your actual income and expenditures to your budget.

BUDGET ANALYSIS — Feb 88

CODE	BUDGET %		ACTUAL %		DIFF
hou	148.55	10	152.45	11	3.90
uti	132.66	9	141.13	10	8.47
tel	72.00	5	57.88	4	- 14.12
ins	160.14	11	166.84	12	6.70
		.	..	.	
.	..	.	..	.	
.	..	.	..	.	..
mis	40.50	3	44.55	3	4.05
Totals	1431.41		1441.71		10.30
Income	1465.00		1470.00		5.00
Balance	33.59		28.29		- 5.30

These reports will help you detect adverse spending trends and provide information for future financial planning and budget revision.

RUN it right: **C-64 or C-128, in 40- or 80-Column mode; printer**

Label Base

By Bob Kodadek

LABEL BASE IS AN INTEGRATED DATABASE program for maintaining names, addresses and telephone numbers, with built-in printing routines that let you instantly print both mailing labels, in any quantity, and a personalized telephone directory. Because the program is menu-driven and its files are memory-based, it's fast and easy to move around in, and, since the record format is predefined,

you can start inputting your data immediately.

What really sets Label Base apart from many other Basic programs of this type is its use of “pure” sequential files, which means that file data can be exchanged readily between Label Base and some popular programs, such as Superbase. You can even create or edit your files with a word processor that uses sequential files, such as RUN Script.

Best of all, Label Base will run on both a C-64 and a C-128 in either 40- or 80-Column mode with no modifications. If you’re using 80 columns, the program automatically takes advantage of the “wider” screen and runs in Fast mode.

CUSTOMIZING THE PROGRAM

Label Base is self-modifying, so the program can be used for both the C-64 and C-128. By default, it operates in Uppercase mode, but you can use lowercase by merely changing PS = 0 in line 40 to read PS = 7. This affects both screen and printer output. I believe that labels printed in uppercase have a better appearance and are easier to read; also, it’s easier and faster to enter data in this mode. However, since this is a matter of personal preference, I feel it’s important to have lowercase available.

Label Base is configured to print “one-across” mailing labels of the standard size, which measure $15/16$ of an inch wide by $3\frac{1}{2}$ inches long. If you’re using a wider label, you’ll need to adjust the amount of vertical space between labels by increasing variable LL in line 40 of the program.

After you’ve gotten the program working, type in a few sample records, then test for the proper spacing by printing them on a plain sheet of paper and placing the printout next to a strip of your labels for comparison. If the records are too close together, increase LL in line 40 and try again until you achieve the proper positioning of the text. After making this, or any other, change to the program, be sure to save the new version to disk.

USING LABEL BASE

When you run Label Base, it first determines which machine you’re using and the number of screen columns available, then appropriately introduces itself as Label Base 64 or Label Base 128 and displays the main menu. If it finds itself in the 80-Column RGBI mode of a C-128, it automatically switches the 8502 processor to 2 MHz and blanks out the composite video screen.

The main menu is shown in Figure 1. To select one of the functions, press the designated function key. At any point in the program, you may return to this main menu by pressing the return key.

The Load, Save, Directory and Alphabetize functions are self-explanatory. Of course, Load and Save actually mean read and write, since Label Base files are sequential.

Note that when it's writing files, the program adds the prefix .LB to each filename. This limits the maximum number of characters in a name to 13, but enables Label Base to distinguish its files from others on the same disk and display only those files when you ask for a directory. When you're reading or writing a file, don't enter the prefix, since the program does it for you. By entering no filename, you can abort a read or write operation without affecting the current file in memory. The error channel is read and reported after each disk operation. To erase the current file in memory and start a new one, press F1 and enter NEW as the filename.

The Enter Data function lets you add new records to a file directly from the main menu. The blank record, or template, is displayed, complete with field names and designated field lengths, so all you have to do is enter the required data into each field and press the return key. The custom input routine automatically limits the amount of data entered.

To correct an error in the current field, use the delete key. To leave a field blank, just press return and move on. After entering the last field, press the space bar to do another record, or press the return key for the main menu. If necessary, records may be further edited from the Select Records menu described below.

While the machine language input routine will accept most characters and punctuation except the quotation mark, it's important not to use commas or colons in your data. If you do, Basic's Input# command will ignore any data after the comma or colon when the file is later read back into memory. While the Get# command will read every byte of data, I found it far too slow for reading large sequential files.

Both the Select Records and Print Menu functions provide sub-menus to work from.

THE SELECT RECORDS MENU

Whenever you choose Select Records, the current record is displayed on the screen, along with a menu of "quick-key" commands. Control/P instantly prints the current record on as many labels as

you indicate; it can be aborted by pressing 0 and return. To find out what the one-letter, quick-key commands do, press ? to go to the Help screen, shown in Figure 2.

The first four one-letter commands instantly locate the First, Next, Previous or Last record in the current file. Key Field Match finds a record by last name, even if you don't remember the correct spelling of the entire name. In most instances, only the first one or two characters will do.

To do a Key Field search, press the K key, and, when prompted for the key field, enter the first portion of the last name and press return. The first record beginning with those characters will appear. Then use the Next Record command to quickly locate the record you want. For this to be effective, the file must be in alphabetical order, so, if necessary, return to the main menu and sort the file by pressing the F4 key.

The remaining commands on the Select Records menu let you add new records or delete, replace and edit the current record. When you're editing a record, each field is presented individually for modification. Edit uses Basic's own Input# routine to take data directly from the screen, so all the cursor control keys are functional. However, the Input routine doesn't limit the length of input, so be careful not to enter strings longer than Label Base will allow.

Unlike the C-128's Input# command, the C-64's won't accept an empty string (containing only spaces) from the screen or logical device #1. As a result, when using a C-64, you must represent an empty field with an asterisk on the screen, though it'll be stored as a space character. For this reason, I recommend Edit only for making minor changes to a record. Otherwise, use the Replace command to re-enter the entire contents of the record.

THE PRINT MENU

The Print menu lets you print the current record, all the records in your file or a phone directory of all the records. You'll be prompted for the number of labels you wish to print from each record, the default being 1. If, at this point, you decide not to print a label, enter 0 for the quantity and press return.

All the printing routines check for the presence of a printer with device number 4. If this printer isn't found, the command to print will simply be ignored.

The listings in the phone directory printout are formatted like those in a real phone directory and include no city, state or Zip

code. The paging feature in this print routine is based on the normal page length of 66 lines.

The number of files you can input using Label Base is unlimited. However, the maximum number of records per file is 250 for the C-64 and 350 for the C-128. This should be more than enough for the average home computer user.

Even if you're used to another program for printing your labels, try Label Base. It can print a small quantity of labels so fast that you can be finished before a larger database, such as Superbase 128, is done loading. And I'm sure you'll find many other interesting applications for this program. My daughter is already using it to manage a customer list and print labels for her daily paper route.

Figure 1. Main menu.

F1 — LOAD FILE
F3 — SAVE FILE
F5 — SELECT RECORDS
F7 — DIRECTORY
F2 — ENTER DATA
F4 — ALPHABETIZE
F6 — PRINT MENU

Figure 2. Select Records Help commands.

F — FIRST RECORD
N — NEXT RECORD
P — PREVIOUS RECORD
L — LAST RECORD
K — KEY FIELD MATCH
A — ADD RECORDS
D — DELETE RECORD
R — REPLACE RECORD
E — EDIT CURRENT RECORD

RUN it right: C-64 or C-128, in 40- or 80-Column mode; modem

RUN Term

By Tom Brown

THERE ARE TWO VERSIONS of RUN Term on this RUN Works disk. RUN Term 128 was originally published in the January 1988 issue of *RUN* and is updated here. RUN Term 64 is brand new and essentially identical in operation to RUN Term 128, the main differences being the use of the Commodore key to issue commands

(instead of the C-128's alt key), the lack of programmable function keys and, of course, the lack of an 80-column screen.

PRELIMINARIES

You'll find it convenient to power up RUN Term with default baud rate, echo and buffer settings customized to your system. To set this up, copy RUN Term to a work disk, then load and run the Change Defaults program, following the prompt to change each item or pressing the return key to keep the original setting. The Change Defaults program creates a file called Configure on a work disk in drive 8. Be sure to copy this file to your RUN Term work disk.

To activate the C-128 version, either use Menu 128 or enter RUN "BOOT.RUNTERM128". For the 64 version, either use Menu 64 or enter LOAD "RUNTERM 64",8 and RUN. If you intend to use the auto-dialer option, it's important to turn your modem *on* (if it has an on/off switch) and to have it off-line when activating RUN Term. Some modems, such as Hayes-compatibles, have a "reversed" carrier, which would confuse the dialer. If your modem doesn't have a carrier detect (such as early Commodore 1660s), you may not be able to use the auto-dialer.

When you activate RUN Term, there's a pause as the program loads itself into memory. Then the screen flickers momentarily, and prompts for the time appear. Pressing the return key at the first prompt (AM/PM) zeros the clock and exits to Terminal mode.

Next, the status line (see below) appears at the top of the screen, accompanied by a brief menu that lists the main program commands (see below).

Whenever the status line is visible, you're in Terminal mode, and the main commands are active. After you enter one of these commands to select a program option, the status line and menu disappear, and the other commands are no longer available until you get back to Terminal mode.

When you return to Terminal mode, the screen is usually just as you left it, the exception being after you've used Conference mode. In both the C-64 and C-128 versions, the screen is preserved after file transfers. Some commands don't change the screen at any time during execution.

THE STATUS LINE

The top line of the screen is called the status line, and it displays information on the program's internal settings. At the right end of

the line is the clock. If your modem can detect a carrier, you'll see a lowercase c to the left of the time. At the left end of the line the baud rate—either 300 or 1200—is displayed (see ↑ below). To the right of the baud rate a set of single letters indicates what RUN Term functions are activated. These letters can include b, e, w, j, t, d, s and r, and their meanings are as follows:

b—The text buffer is open to receive characters from the modem for later retrieval. (See B below.)

e—The Echo function is on. (See E below.)

w—The Buffer Wrap function is on. (See W below.)

j—Linefeeds from the modem will be printed to the screen. (See J below.)

t—ASCII translation during Xmodem file transfers is activated. (See * below.)

d—DLE screening during Xmodem file transfers is on. (See * below.)

s—Padding will be stripped from the end of files downloaded using any Xmodem option. (See * below.)

r—The RAM expander (1700, 1750 or 1764) buffer is open to receive characters from the modem. Note that this buffer is completely separate from the regular buffer. (See R below.)

When any of the above letters don't appear in the status line, those options aren't in use.

THE TRANSLATION TABLE

The default state for all keys in RUN Term is the same as in the VT100 program found on the 1670 demo disk, and RUN Term uses the same translation tables as VT100. However, RUN Term is not specifically designed to produce VT100 emulation. The extra keys needed in VT100 emulation are as follows:

Left curly bracket ({) = shifted plus

Right curly bracket (}) = shifted minus

Vertical bar (|) = Commodore key/minus

Tilde (~) = shifted up-arrow (↑)

Carat = up-arrow

Backslash (\) = British pound sign (£)

Accent mark = shifted commercial at sign (@)

Note that escape sequences are not supported by RUN Term, so the program may not operate properly on remote full-screen editors.

THE COMMANDS

To view RUN Term's main menu, press the F1 key on the C-64 or

the help key on the C-128. To send *any* of the commands in the menu to the terminal, hold down the Commodore key on the C-64 or the alt key on the C-128 as you press the desired command key. The following are the commands available:

A—Accesses Auto-dial mode. First you must specify your modem type, then the number of seconds you want to elapse between dial attempts. Finally, you can enter a number directly or use the phonebook.

The phonebook commands are straightforward: Load, Save and Edit. If you choose to edit with nothing in memory, a new, blank book is created for you. There's room for nine entries in a phonebook, with each including the name of the online service, its phone number and three strings that can be used to send a log-on sequence. If you're using the 1670/Hayes option, the first character of *every* phone number must be a *p* or a *t* (note the lowercase) to indicate pulse or tone dialing. With the 1650 or 1660 dialing option, an asterisk in the phone number will delay dialing for one second.

B—Toggles the text buffer open and closed. To find out where you are in the buffer, access the main menu, and below the list of commands you'll see the present address in the buffer write pointer, with the maximum possible pointer value in parentheses. The buffer size in the 64 version is about 28K, in the 128 version about 60K.

C—Selects Conference mode (also called CB mode), which facilitates multiuser connections on services such as PeopleLink and GENie. At the top of the screen, you'll see a row of 80 reverse-video spaces, where your characters will appear as you type. There's no cursor in this mode. Press control/X to erase the whole line if you want to start over, or use the delete key to erase individual characters as usual. Your line of text won't be sent until you hit the return key.

Characters received from the modem are printed at the bottom of the screen. I recommend that you instruct the online service *not* to echo your characters back while you're using this option.

The *only* way to exit Conference mode is with the stop key, because none of the command keys are available. However, settings such as buffer open/close, echo and baud rate that are selected in regular Terminal mode are active in Conference mode. In other words, open the buffer *before* entering Conference mode!

D—Downloads, or receives, a file from another computer. This option now works with the currently active disk drive. You have a choice of Punter protocol or one of three Xmodem protocols: Checksum, CRC and WXXmodem.

Don't worry if you don't know which Xmodem to use—Checksum is the standard, and RUN Term automatically switches from WXmodem to CRC and from CRC to Checksum if it doesn't connect properly using the protocol you've selected. WXmodem, which stands for Windowed Xmodem, is relatively new to Commodore users. Currently available only on PeopleLink, it transfers four Xmodem blocks at a time, so it's faster than Checksum or CRC.

Punter indicates that a block has transferred correctly by printing a hyphen to the screen, incorrectly by printing a colon. Xmodem clearly lists the number of blocks and the number of errors in the transfer as ASCII digits. In addition, upon completion of an Xmodem transfer, a status report is printed in reverse-video on the Terminal mode screen.

During any Xmodem transfer (up- or download), the file moves by on the 40-column screen. If you're using a C-128 in 80-Column mode and want to watch the file, switch to 40 columns by using the composite/RGB switch on your monitor.

Since Xmodem files must be transmitted in blocks of 128 bytes, you may have to add bytes to the last block to fill it out. This is called file padding and is done with either control/Zs or CHR\$(0)s (zero bytes). The Xmodem standard requires the transmitting program to make sure the byte used for padding is *different from* the last byte of the file. A few Xmodem programs (including RUN's RUNning Board BBS) fail to do this, so downloads from them using the Pad Stripping option may be garbled. To remedy this situation, turn off Pad Stripping by using the appropriate option from the Defaults submenu (see * below).

To abort Punter transfers, hold down the Commodore key. To abort Xmodem transfers, hold down the stop key.

E—Toggles the Echo mode—sometimes referred to as *half-duplex*—on and off. When Echo mode is off, you're in *full-duplex*. If you can't see what you're typing because the service you're connected to doesn't echo characters back to your computer (as with GENie, for example), turn on Echo mode.

F—Reads a sequential file. Use this command to send a file to the screen, printer or modem. The file is translated to ASCII when sent to the modem.

H—A modem, like a phone, can be “off the hook” or “on the hook.” This option is designed primarily for the 1650 and 1660 modems, and it's a toggle, because the pick-up command for the 1650 is the hang-up command for the 1660.

When you're using a 1670 or Hayes modem, the H command only hangs the modem up. It sends three plus signs, with a two-second pause before and after, which hang up the 1670 or put the Hayes-compatible into Command mode. Follow the H with the characters ATH (in ASCII uppercase) and a return to hang up the Hayes. These commands are harmless to a 1650 or 1660 modem.

To pick up on a 1670/Hayes modem, enter an uppercase ATD to access Originate mode (like dialing without a phone number) or an uppercase ATA to force the modem into Answer mode (not to be confused with Auto-Answer mode). If your Hayes-compatible won't accept the ATD command, use ATO to force the modem online in Originate mode.

J—Toggles linefeed printing. This option actually changes the input translation table. Some services always send CHR\$(10) (a linefeed) with each return, and if you have linefeed on, you'll end up with double-spaced text. I'd suggest that you turn linefeeds off, unless you specifically need them.

K—RUN Term 128 redefines only the help key and the shifted run-stop key, but, using Basic 7.0 commands in Direct mode, you can define a set of function keys for your own special use while online. This option, which is unavailable in the C-64 version, lets you load and save these keys easily.

L—Loads a sequential file into the text buffer, starting at the address held by the buffer write pointer. When the load is finished, the write pointer is updated, so you can append several other sequential files. To force the load into the start of the buffer, first zero the buffer (see Z below).

Remember that the Terminal mode screen is preserved, though invisible, during such functions as loading the buffer. If you have the main menu on the screen before the buffer load, you'll find the buffer write pointer unchanged when you are returned to Terminal mode. Press F1 (C-64) or the help key (C-128) to see the updated pointer.

R—Takes you to the RAM Expansion Unit (REU) menu. All three RAM expanders—the 1700, 1750 and 1764—are supported, but note that RUN Term doesn't know which you're using. Each REU is divided into several "banks" of memory that are each 64K in length and numbered starting at zero. You should know which banks are available.

The REU menu lets you turn the REU buffer on and off, manually set the REU bank and memory address write pointers, load a se-

quential file into the REU and save the contents of the REU to the screen, printer or disk. When saving REU memory, keep in mind the memory limitations of the word processor you'll be using. Each REU bank must be saved separately, and you can select the start and stop points for the save. Note, however, that these points will be rounded to even page boundaries before the save begins.

If you select the Save command by mistake, it can be aborted by answering the prompts with incorrect (or no) information. This is generally true for RUN Term.

S—Saves your choice of the entire standard buffer area or the area from the start of the buffer to the buffer write pointer. The first of these options is handy for use with the Buffer Wrap feature and the second for saving short pieces of data. Whichever area you select, it's sent to your choice of three devices: to disk, as a standard sequential file; to the printer (see F above); or to the modem (with ASCII translation).

T—Sets the on-screen clock. By pressing return at the AM/PM prompt, you can instantly zero the clock.

U—Uploads (sends) a file via Punter or one of two Xmodem protocols: Checksum or CRC. Due to hardware limitations in the C-128 and 64, WXmodem (see D, above) isn't available for uploading.

V—Lets you view the text buffer for viewing. The text is formatted on the screen, with a left arrow taking the place of a return. The following key commands are active in this option:

Cursor-down—Scrolls the buffer forward (advances through the text).

Cursor-up—Scrolls the buffer backward (toward the start).

Plus sign—Scrolls forward 256 characters.

Minus sign—Scrolls backward 256 characters.

Home—Moves to the start of the buffer.

Any other keypress exits to Terminal mode.

W—Toggles the Buffer Wrap function. Sometimes it's inconvenient to have a buffer close in the middle of a transmission. This option forces the buffer write pointer back to the start of the buffer to continue writing, without the buffer closing. Note that Buffer Wrap works only when you're saving the entire text buffer (see S above). If this option is turned off, the buffer closes when it's full.

Z—Zeroes (empties) the entire buffer, then fills it with CHR\$(13)s (returns). When you press Z, the Terminal mode screen doesn't change, but, in the C-128 version, the cursor vanishes, then reappears when the zeroing is done.

@—Presents the Disk Drive menu, as follows:

- 1—View the directory of the disk in the current drive.
- 2—Change the current drive device number. This specifies which drive you'll be using throughout RUN Term.
- 3—Read the current drive's error channel. Use this option when the drive's error light flashes.
- 4—Sends a disk command. When you're prompted for a command string, input a dollar sign to read the directory. Pattern matching is possible here, as in the C-128's machine language monitor and the C-64's DOS Wedge. Disk commands are sent the same way as with the DOS Wedge, except you can omit @ as the first character.

*—Changes several system defaults. Select the proper menu options to change foreground and background colors, Punter protocol block size and parity, stop bits, word length and delete key values. However, *don't* change the above parameters unless you know what you're doing, and keep in mind that changing the delete key value alters the input and output translation tables. RUN Term's default delete key value is CHR\$(20), while some computers you call may use CHR\$(127) or CHR\$(8).

You can also opt for three Xmodem features through the Defaults menu. One is ASCII translation, which makes text files more readable if they were written on another computer using true ASCII. The second is DLE screening. Long-distance services, such as PC Pursuit, use the same Xmodem commands for their own operation as you use for file transfers. If the other computer has DLE screening available, then turn this option on. The third Xmodem option is to strip file padding at the end of downloads. This option defaults to "on" (indicated by a letter s on the status line), because some programs won't work unless this extra padding is removed. Turn the option off, and any bytes added to the end of the file during transfer to your computer are left intact.

↑—Toggles between 300 and 1200 baud. Don't select 1200 baud unless you have a 1200 baud modem! Also, don't change baud rates while online. Modems that support 1200 baud, such as the 1670, set their own baud rate when you enter the ATD command to dial, and that setting can't be changed until you hang up!

1, 2 and 3—These number keys each send one of the three phonebook strings to the modem, with translation to ASCII. Note that you must have dialed with the Phonebook option and that the selected phonebook must still be in memory, so don't load another

while you're still online. These three keys are deliberately sent slowly, due to problems I've had at 1200 baud with some services.

F3 or Escape—Commodore/F3 on the C-64 or alt/esc(ape) on the C-128 returns you to Basic. Don't hit run-stop/restore! To re-enter RUN Term, insert the RUN Term disk in drive 8 and then type in RUN.

RUN it right: **C-64; C-128, in 40-Column mode**

Form Writer

By Tom Brown

IF YOUR FAMILY, small business or club runs on a limited budget, you can save money by using Form Writer on the C-64 or 128 (in 40-Column mode) to create single-page forms for many purposes—letters, invoices, questionnaires, membership records, and so on. The program allows you to print custom-designed forms, containing fields that you can fill in by using the keyboard or the program's document-oriented database.

Each form contains 50 lines, each with 80 characters, and you can prefix any line with one of nine print codes, allowing condensed, italic or double-sized type. Because these codes are defined in the Basic portion of the program, you can easily customize them. There's even provision to send up to ten nonprintable characters to the printer, so you can send special printer codes within lines.

FIRST STEPS

Be sure to run the C-128 version in 40-Column mode. When the program is activated, it first prompts you to enter the month and day, to be used when there's a date field in your document. Next, the program checks the disk drive, so all future disk operations default to that drive. You can easily change the drive by using the Disk Drive option on the main menu.

CREATING AND EDITING BLANK FORMS

After the preliminaries, you're ready to create a blank form. On

this form, you'll place the text, which won't change from document to document, and the form fields, which will.

At the main menu, select option 1, the Form Editor. It will take you to the Form/Field menu, where you should select option 1 again, to create a new form. This selection erases any old form in memory. If, instead of creating a new form, you want to edit the one currently in memory, choose option 2 at the Form/Field menu.

The editor functions within a 40-column window on an 80-column by 50-line page. Using the cursor keys, you can move this window to cover any area on the page.

Whenever you enter the editor, you'll find the blinking cursor in the first column on the first line. At the bottom of the screen there's a status line that shows the position of the cursor in the 80-column form (not in the 40-column window). Both lines and columns are numbered starting at zero. As you type characters or use the cursor keys, the status line updates automatically. You'll find this handy for keeping tabs on the cursor's location when it's traveling a distance on the page and seems to vanish. Forms can scroll horizontally in the window as far as the 80th column (column number 79), which represents the edge of the paper.

As you're working, press the return key to advance the cursor to the beginning of the next line. To move the cursor right several spaces, press the tab key on the C-128 or control/I on the C-64. The insert and delete keys operate in the normal fashion, but affect the entire 80-column line, not just the 40 columns in the window. *Don't* use the insert key when the cursor is in the first column of any line. Also, the home key sends the cursor to the top of the form, not the top of the window.

To erase the screen on the C-128, press the alt key along with clear-screen (shift/home). On the C-64, clear-screen doesn't work at all; you must go back to the Form/Field menu and select option 1 (create a new form).

To exit the editor, use the escape key on the C-128 or the F1 key on the C-64.

CREATING FIELDS

To create a field anywhere on your form, define its start and end positions by pressing the up-arrow key where the first and last characters will be. Unpaired up-arrows are ignored. The program allows a maximum of 256 fields on a page, but memory limitations will undoubtedly lower that number, particularly with the C-64.

Use the left-arrow character to direct Form Writer to follow one of the special printer code sequences in line 60 of the program. The program defaults to printing “hello” when it encounters this character, but, if you change line 60, it will print whatever you wish, within limits. The printer code cannot include more than ten characters, nor can it contain any zeroes. A CHR\$(0) is required at the end. The CHR\$(0) is not sent to the printer, but is used by Form Writer to locate the end of the printer code.

Only one code sequence can be used at a time in a document, but it can appear as many times as you wish. Don’t confuse these codes with the commands for changing printer fonts that go at the beginning of lines (see Printing, below).

When you exit the editor, it asks if you want to define the fields you’ve just created. If you’re not satisfied with them yet, select option 2 in the Form/Field menu to edit the form currently in memory. Skip that option’s erase-form step and go directly to the editor to make your changes. When you exit option 2, you can define the fields you passed over before.

If you opt to leave the editor without creating any fields, you go directly back to the Form/Field menu.

DEFINING FIELDS

Once you have entered your fields into the form, the program proceeds through them from top to bottom and left to right on the page, displaying the number of each field (starting at zero), its line and column position and its length, and you must give each field a name. For those fields you’ll be filling yourself, as opposed to those the computer will fill, this name should be meaningful, such as Last Name or Address.

After you’ve named the field, you must specify the type of data it will hold, using the following list of ten possibilities:

Alphanumeric: Any printable character, including numbers, but the field cannot be used for calculations.

Sum1, Sum2 and Sum3: Numeric values, which will be added into three subtotals.

Total1, Total2 and Total3: Numeric values—these fields hold the subtotals of the three Sum fields listed above.

Grand Total: Numeric value—the total of the Total fields above. If you wish to subtract any Total field from the others in reaching the Grand Total, enter negative values in the appropriate Sum fields.

Keyboard: Data typed in by the user at the time of printing.

Date: The date you type in when you run Form Writer.

Data to fill Alphanumeric, Sum and Keyboard fields is entered by the user. Data for all the other types of fields is entered automatically by the computer when you print your document.

Be aware that you can't use the editor to preview a filled-out document before printing. Prior to printing, the blank form is copied to another area of memory (with the original left intact) where its fields are filled. The editor cannot view that area.

Should you want to abort defining fields—if, for example, you gave the last field the wrong name or type—press return at any field-name prompt to exit to the Form/Field menu.

CREATING THE DATABASE

After you've defined all your fields, Form Writer presents the name of each one and asks in what order you want the program to prompt you to fill them in, because it's seldom convenient to do so in the same order the program numbers them. For example, the form may have a person's last name listed before his or her first name, but the reverse order would be easier to key in. There's no error-checking here. If you enter the same priority for two or more fields, only the lowest-numbered field with that priority will be used; the database will skip over the others. Be careful to designate each priority only once, and you'll have no difficulty.

When this step is done, enter a name for your database. The name can be no longer than 15 characters, because the program prefixes it with a slash mark. The slash mark distinguishes database files from document files. Don't enter this slash mark yourself when reading the database back; the program will do it for you.

SAVING AND LOADING THE FORM

Don't forget to save your form after you've edited it! Also, note that you can use a form with several different databases, but you must be sure to have the correct form loaded into memory before defining fields or printing a document. Saving and loading are done from the Form/Field menu.

USING THE DATABASE

Once you've designed your blank form, defined its fields and saved your database to disk, you're ready to use the Database option in the main menu to view, add, change or delete the user-entered Alphanumeric or Sum fields. If you don't have a database open at

this point, the program forces you to open one in order to reach the Database menu. From that menu, you can easily change databases with the Open Database option. The name of the currently open database is listed on the Database menu screen.

To Form Writer, the database is an outline, or template, of the length and type of each field in your blank form. Each record in the database is referred to as a document. Rather than use relative files, which would be slow and awkward in this application, each document is stored in a sequential file. These files are very small and can be easily copied (using appropriate software) to backup disks or transmitted via modem. They also give you the advantage of giving a name to each document, rather than dealing with it only as a record number.

Deleting a document involves nothing more than scratching its sequential file. The program pauses and tells you to hit "any key to continue," after listing the Files Scratched message. The Edit Document option displays the same message, since it deletes the old document before saving the new one.

DISK DRIVE HELP

It's virtually impossible to remember the filenames for a whole collection of databases, documents and forms, so you need to have access to your disk directory as you're using Form Writer. When you're in the middle of working on something, you can view the directory by entering a dollar sign as the filename at many filename prompts. Then, after you're done, the program returns you to the same prompt.

At those times when you're free to go to the main menu, you can view the directory through the Disk Drive option, which provides access to the disk drive error channel, as well. Drive commands are standard DOS Wedge commands, only you can omit the @ at the beginning. Entering a number higher than 7 instead of a disk command changes the default drive setting. Since the program defaults to the drive it was loaded from, you can use this option to change to another drive (or even the RAM DOS!) for your data storage.

PRINTING

When it comes time to print out your form, choose the Printer option in the main menu. If you haven't opened a database and loaded a form at this point, the program will ask you to do so. There

are also menu options to change the database and form.

You can print a form using a document from your database, or you can enter the information from the keyboard (but only information that would normally be stored in the database). There's another option for printing out a form with the fields left blank, so you can fill them in by hand. In this case, the fields are printed with dotted lines. Remember to leave enough vertical spacing in the blank form to give your penmanship room to breathe.

Before you print out your form, there's one last thing you might want to do: Call on some of your printer's special effects to create a more professional look. You can use Commodore graphics characters (if your printer or interface permits it), but perhaps you'd like to use italic, double-width or condensed characters. Select the Set Printer option from the Printer menu, then enter your printer codes. This is also where you can change the printer device numbers and secondary addresses.

Note that two printer files are opened for printing, one of which has a default secondary address of 7 for printing lowercase letters. This is the channel that each line of the form is sent through. The other channel is opened to secondary address 5, which, on most printer interfaces (such as the Cardco and Xetec), lets you send printer command codes without fear that the interface will think they're regular characters and translate them. You can change one or both secondary addresses, depending on your system and your needs.

Next, you get a chance to define a printer code to be sent at the start of each line. The default codes are for the Gemini 10X. All you have to do is change the code, plus the prompt on the line beside it, to match your system's capabilities. This code applies only to the line in question.

As you type in Form Writer, have your printer manual handy, because some of the Gemini 10X commands may not be available on your printer. On the Gemini 2, for example, the italic character set has been replaced with a near-letter-quality (NLQ) font. In most cases, however, all you need to do is change the codes that perform each task. If you own an Epson MX-80-compatible printer, you may find a minimum number of changes necessary. If yours is an exotic printer, you may have to perform major surgery to achieve special effects.

The printer commands are sent to the printer at the start of each line along the transparent secondary printer channel. Printer com-

mands you send using the left-arrow character embedded in your form, on the other hand, are sent along the text channel, so they may be translated by your interface into true ASCII. Keep that in mind when changing the Form Writer listing.

One warning about embedded code: If you send a string of printable characters, the line printed will be longer than 80 characters. This is of no concern when you're printing in Condensed mode, sending *non*printing control characters to activate a special effect or sending a code that prints a single printing character (such as a user-defined character).

As I mentioned earlier, the embedded codes are located in line 60 of the program. The ten codes you can elect to send at the start of a line are located in lines 1530–1630.

The program always prints 80 characters to a line, so, if you plan to use an enlarged character size, remember to make the line shorter! There's no way to make a line longer than 80 characters to take advantage of smaller character sizes. The default printer codes reset the printer at the start of each line, so any special formatting must be done for each line individually.

When you're done defining your specially formatted lines, press return at the Select Line prompt to go back to the Set Printer menu. I'd suggest that you *save* the printer codes you've defined, because printer codes are erased whenever you open a database.

You can use a pattern of printer codes with more than one database, just as you can use a database with more than one blank form (and vice versa). The Set Printer menu also lets you erase all printer codes in memory (as is done when you choose to set the codes) and load a set of codes you've previously defined. Saving printer codes also saves the printer device number and secondary address. Press return to go back to the Printer menu.

When you finally get around to printing your form, you can specify the number of lines to print, which is handy if the form is shorter than a full page. You can also print several copies without going back to the Printer menu.

Parts of the printing process are slow, particularly if you have a lot of fields to be generated. This is partially due to the fact that the field contents must be padded with spaces before being sent to the form. A little patience here goes a long way.

TECHNICAL NOTES

The C-64 version of Form Writer uses the area under the Basic

ROMs to hold the blank form, while the C-128 version uses the hires screen area. Built into the program are commands that undimension all arrays in memory (without losing any other variables!) whenever you open a database. In this way, smaller databases can have smaller arrays, and so take up less memory. Saving memory is unimportant on the C-128, but on the C-64 it eliminates a lot of needless delay due to garbage collection.

RUN it right: **C-64; C-128, in 40- or 80-Column mode**

RUN Shell

By John Ryan

WHEN COMMODORE INTRODUCED THE C-128 and the 1571 disk drive, they included a handy and versatile utility called the 1571 DOS (disk operating system) Shell, a 128-mode program that simplified disk and file handling. Unfortunately, C-64 owners were left out in the cold, so I wrote the 64 DOS Shell (*RUN*, November 1987) to bring them the same power and versatility offered to C-128 users. Now, with the introduction of the 1581 disk drive and RAM expansion modules, I've developed a DOS utility compatible with both computers and all three disk drives. Called RUN Shell, it's the newest and most powerful DOS shell to date.

RUN Shell is a file-maintenance and disk-archiving utility that runs in both 64 and 128 mode. It also supports both 40- and 80-column output; Burst mode; all three Commodore RAM expansion modules, to a limited degree; and partitioning and subdirectory access on the 1581 drive.

GETTING STARTED

If you intend to use a RAM expansion module, be sure it's installed before power-up. After you turn your system on, load RUN Shell with the commands LOAD "RUN SHELL",8,1 and SYS 4864.

The program can be loaded in either 64 or 128 mode, but don't try to load it in one mode and switch to another, because it configures itself to fit the particular machine. You may, however, toggle between 80- and 40-Column modes.

Although it's a stand-alone program, RUN Shell will operate with many machine language programs that don't occupy memory from \$1300 to \$5000. However, due to the way it configures itself under the Basic of both machines, it won't operate with many Basic programs. This limitation affects users of RAM expansion modules, but more on that later.

Almost all of the options available in RUN Shell bring to the shell window a directory from which you can select files to work on. To choose a file for some operation, use the cursor keys to move the directory arrow to your selection. Then highlight the filename by pressing the space bar. If you change your mind, just deselect the file with the F5 key. When you're finished highlighting all the files you want for any particular operation, you activate the operation by pressing the F7 key. In many cases (but not all), a Y/N prompt will ask you to verify your selection before pressing F7.

You can usually abort to the main menu by pressing the stop key. Remember this simple rule: If you can't abort with the stop key, there'll *always* be a Y/N prompt later to abort the operation.

There will be instances where RUN Shell expects a keypress from you to continue an operation (when swapping disks during a file copy, for example). The rule here is to press the space bar to continue or the stop key to abort to the main menu.

To exit RUN Shell, press the F1 key, and press it again to re-enter. C-64 owners must reinitialize the program after using the run/stop-restore combination by entering SYS 4864.

THE OPTIONS

Disk Setup—You can configure RUN Shell to operate under two different logical drives (logical meaning that device numbers and drives are handled internally with the shell program). As you'll see, these logical drives—drive A and drive B—can be set up for any combination of disk or RAM drives, as well as device numbers 8–11. To keep things straight, I'd suggest that you set the lower device number to drive A and the higher device number (including RAM drives) to drive B. You can configure RUN Shell for single-drive operation by setting both the A and B drives to the same device number. During program development, I kept my 1581 set to a literal device 8 and my two 1571s set to logical devices 9 and 10, thereby having swift access to three disk drives without dollar-sign typing!

Rename a File—With the Rename utility, you can rename all the

files in a directory. The directory is displayed in the shell window, and you select and highlight the filename you want to change by using the cursor keys and space bar as described above. When the highlight bar appears, enter a new filename that's no longer than 16 characters; then press return and continue the operation. When you're ready to activate all the new names for the directory, press the F7 key.

Scratch a File—This option operates much like Rename. Use the cursor keys and space bar to select and highlight filenames you wish to scratch. When all selections are made, press F7. The F5 key deselects a file if you change your mind after highlighting, and the stop key aborts to the verification prompt. Neither the Rename nor Scratch option works with RAM drives.

Format a Disk—Formatting is one of the most frequently used options in RUN Shell. First, the Format routine attempts to read a disk header from the selected drive. If an error occurs, it assumes the disk hasn't been formatted before and prompts for a header name and two-letter ID. If the disk has been formatted before, the header name appears in the input window. Then you can reformat with the same header name by pressing the return key or you can type in a new name, with or without a two-letter ID.

If the drive selected is a RAM device, you needn't enter a header name, but you do have to specify the type of device at the prompt. *All* modules must be formatted before being used as a logical drive or you'll get a RAM Disk Full error message.

Clean Up a Disk—This is a collect operation, and no verification is involved, so be sure the disk is in the proper drive.

Copy Files—Using this option, you can copy files between any two disk drives, except a RAM expander (see RAM below). Just highlight the files you want to copy and then press F7.

C-64 users are limited to copying files of 90 disk blocks or less, while C-128 users can go up to 180 blocks. Use the Disk Copy routines to copy disks with larger file sizes.

To copy files from a 1581 subdirectory, you must first open the subdirectory with the Directory routine. With a single 1581 drive, you can copy only 90/180 disk blocks at a time, because RUN Shell won't detect previously opened directories after each disk swap. (RAM expansion users have a way around this limitation.) The 1581 version of the File Copy function (and Disk Copy, for that matter) is a real speed demon, taking full advantage of the C-128's fast serial transfer. C-64 owners must still endure bit-by-bit disk access. You

should be aware that File Copy won't reproduce relative files.

Disk Copy—The Disk Copy option completely reproduces a disk. It works best with two drives, although it can be used with one. If you have a 1581, keep in mind that trying to single-copy 800K of data with a C-64 takes about 26 disk swaps (16 for the C-128), so use the File Copy routine when appropriate. It's very important that 1541/1571 users format the target disk either before entering the Disk Copy routine or while in the routine to ensure faithful data reproduction; 1581 users must format their disks beforehand.

To contrast C-64 and C-128 copying times, the C-64 option single-copies a 1581 disk in about 50 minutes and a 35-track disk in about 25 minutes. The C-128, with its Burst protocol, single-copies the same disks in about 12 minutes and a little over seven minutes, respectively. These times are slightly lower in dual-drive operation.

You can't copy from a 1581 drive to a 1541/71, because of the different formats involved.

Create Dir/RAM—These two options are for 1581 and RAM expansion module owners only. With Create Dir, you can create partitions and subdirectories on the 1581 disk drive more easily than with the utility supplied on the demo disk. Just select the starting track of your partition with the + or - key (pressing the space bar to lock in the selection); then use + or - to scroll through the size of directory desired, and RUN Shell will automatically make the calculations for creating the partition. Press the space bar again to lock in the block size, and answer the prompts as they appear.

To create a subdirectory from the partition, answer the formatting prompts as they come on-screen. You don't need to format a subdirectory within this option. You can format the partition by opening it within the Directory option and then using the Format option. Formatted partitions will always be 40 blocks less than your selected number in order to accommodate the partition directory.

Use this option only on new disks, as the partition routine overwrites any data already in the selected tracks of the disk.

You can create nested directories (directories within directories) as long as each encompasses at least three tracks and doesn't fall on the directory track (the first track of the directory) of the previous partition. Consider the following mock directory:

- Main subdirectory #1: tracks 1-20

- Subdirectory #2: tracks 2-5 (within main)

- Subdirectory #3: tracks 6-18 (within main)

Notice that all the directories are at least three tracks long (minus

nested subdirectories), and none starts on the first track of the other.

Once a directory is in place, you must access the “root” directory by pressing the stop key (see Directory, below), then reopen the directory in which you want to nest the new subdirectory before you access the Create Partition option. Play around with this option before attempting any serious partitioning, and refer to the 1581 user’s guide for more information on partitions and subdirectories.

RAM—This option for owners of RAM expansion modules is a supplement to Commodore’s RAMDOS utility, not a replacement. It includes three suboptions and requires that your RAM expander must be previously formatted.

The System to Expansion suboption lets you load disk files into the RAM drive. When RUN Shell asks you which logical drive to use, always select the logical RAM drive as the target (to load to) and a disk drive as the source (to load from). Then highlight the desired files and press F7 to initiate the load. *Don’t* attempt to load files containing more than 90 disk blocks on the C-64 or 180 blocks on the C-128, or you might corrupt the computer’s memory. You’ll notice that the number of blocks the drive has free corresponds to the bytes available in each RAM expansion module (less the overhead directory space that’s maintained in each module).

The second suboption loads files from the RAM drive into system memory. Here again, select whichever logical drive is assigned to the RAM drive. (This may sound confusing, but you’ll get the hang of it. With this suboption, you never load from a disk drive.)

Plan on this operation handling only sequential files and machine language programs. Since Basic is reconfigured to accommodate RUN Shell, many Basic programs won’t work properly with it.

With this option, you don’t have to load a word processor to examine a sequential file. Just load the file into the RAM drive, download it into system memory, then, using the cursor keys, scroll through it in the directory window. If you have a machine language file that doesn’t occupy the same memory area as RUN Shell (\$1300–\$5000), you can download it, then exit the shell and SYS to the program.

Machine language programmers might like to know that the Power Assembler can function when RUN Shell is active, since Basic memory is moved up to location \$5000. This may be true for other assembler systems, as well.

The third RAM suboption lets you “dump” all RAM directory files to disk and provides a handy way of copying files from one

subdirectory to another. Just open a subdirectory on your 1581 drive and select Disk to Expansion to load the files into memory. Then close the subdirectory (see Directory below), open the target subdirectory and select Expansion to Disk.

Select the logical RAM drive as the source and the logical disk drive as the target for this suboption. There's no need to select files here, since the entire RAM directory is dumped to disk.

This suboption will appeal to those who want to make multiple copies of disk files without a multitude of disk swaps, and it's handy for cataloging disks. Normally, grouping similar programs together on a single disk involves dozens of disk swaps and a big headache. With this RUN Shell feature, you can selectively load files from several dozen disks into the RAM drive, then dump them all to a single disk.

Disk Log—The Disk Log option reports the starting and ending addresses of a selected file, as well as the total number of bytes it contains. It handles only one filename at a time, and, with sequential files, only the total number of bytes is significant, since the starting and ending addresses reported are those used by RUN Shell.

Directory—This option displays a disk directory in the directory window, and, if the device is a 1581 drive, it lets you open a partition, as well. Anytime a partition is the active directory, you'll see a message to that effect. You can access the root directory whenever you want by pressing the stop key. Don't deselect a 1581 drive or change disks without first returning to the root directory.

ERRORS AND OTHER THINGS

As with any disk-intensive program, there's always the possibility that an important disk or file will get lost or corrupted—through either carelessness or distraction. RUN Shell is designed to avoid disasters like that through extensive error checking and verification, but, since I couldn't anticipate every user error that could occur, you should know about the following RUN Shell strengths and limitations.

All normal DOS errors are displayed in the message window during disk access (press the space bar to recover from the error), except during Disk Copy routines. If you attempt to copy a disk with track errors or a nonstandard GRC format (copy-protected), RUN Shell will just skip over the bad track, or worse, freeze up. The latter will occur especially when you're attempting to burst-copy commercial programs.

RUN Shell won't detect Device Not Present errors and will seem to lock up while trying to access a drive that hasn't been turned on. If this occurs, press the run-stop/restore combination, turn on the offending drive, then reinitialize the program.

Be sure you set up the logical drives according to the disk drives you actually have connected to your computer. If you have a 1541 and tell RUN Shell it's a 1581, you'll be in for an unpleasant surprise as the program tries to access track 41! If this, or something similar, happens, quickly turn off your drive or reset the computer! Likewise, don't attempt to set up a logical RAM device without a RAM expansion module connected.

All files in a RAM expansion device will remain intact unless you turn off your computer or reload RUN Shell, which resets important expansion directory pointers.

Pay close attention to which are the *source* and *target* disks during disk copies. There's nothing worse than staring at a Writing to Destination Disk message while you're holding the destination disk in your hand!

If you're a fan of using "flippies" (disks that have been double-notched to allow writing to both sides), be prepared to have occasional problems with the 64-mode Disk Copy routine. The routine attempts to read track 41 of the disk to determine whether the disk is single- or double-sided (35 or 70 tracks). Occasionally, RUN Shell will interpret a "floppy" track as a 1571 disk and attempt to copy 70 tracks of data. This won't hurt your drive; just press run-stop/restore if the drive seems to stop, then re-enter RUN Shell and clean up the target disk. You should find that all the copied files have been faithfully reproduced.

RUN it right: C-64 or C-128 in 40-Column mode; joystick or 1351 mouse

RUN Paint

By Robert Rockefeller

RUN PAINT IS A SOPHISTICATED, joystick-based paint program that lets C-64 and C-128 users create and print out bit-mapped graphics. It runs in 40-Column mode and uses both hi-res and

multicolor screens. An easy-to-use system of nested, pop-down menus makes it unnecessary to study and memorize sets of complicated commands or to continually refer to the documentation.

GETTING STARTED

This article will take you step by step through each of RUN Paint's functions. First, plug a joystick or 1351 mouse into port 2; then turn on the computer. To start RUN Paint in either 64 or 128 mode, just load the program and run it.

After half a minute or so, the screen clears and a flashing arrow appears in the center. The arrow is a pointer that you move around with the joystick or mouse to make menu selections and to draw on the screen.

RUN Paint expects a joystick in port 2. If you're using a 1351 mouse instead, press the F3 key at this point. Pressing F1 will reselect the joystick.

THE MENU SYSTEM

You can't draw anything until you select an option from a menu. To activate the menu system, move the pointer at least five pixels above the top of the screen border and press the fire-button. When the main menu appears, select one of the options thereon by moving the pointer onto it and pressing the fire-button. This operation is known as "clicking." Take care not to move the pointer off the menu until you're finished with it, because the menu will then disappear.

Clicking an option displays a submenu from which you can make further selections. Some of the submenu options perform an action, and some make yet another submenu pop down. Accessing some of RUN Paint's features requires descending through three levels of submenus.

Many of the program's menus include an option that's indented two spaces, possibly with an asterisk beside it. These are options you can click on and off. The asterisk means the option is currently turned on.

THE MAIN MENU

The main menu contains six options and four arrows. The latter are "scroll arrows" that you use to move the screen within the page buffer (see below). To observe these arrows in action, draw something on the screen. Here's how:

Activate the menu system by clicking on the Draw option in the

main menu; then, when a submenu appears, click the Freehand option. Note that making a selection may make the menu disappear.

Now, position the pointer on the arrow pointing right and press the fire-button. This will make the contents of the screen seem to scroll left, because the screen is being moved to the right through the page buffer. Releasing the fire-button stops the scrolling and makes the main menu reappear. There are arrows corresponding to the other three directions also, but the up and down arrows are nonfunctional on the C-64 because of insufficient memory.

Following is an explanation of the functions accessed through each of the six main menu options.

THE PEN SUBMENU

The two main drawing tools in RUN Paint are the pen and the brush, and the various options associated with them are controlled through the Pen submenu. There are six different pen styles, and an unlimited number of brush shapes and patterns are possible, since RUN Paint allows saving and loading of brushes and patterns. Brushes work by painting the part of the screen covered by the brush with the current pattern whenever the fire-button is pressed. Here's an example:

Activate the menu system, click on Pen, then move the pointer down to Use Brush and click on a brush for drawing. Next, move the cursor back onto the main menu and click on Draw, followed by Freehand. When you move the brush around while pressing the fire-button, the current brush pattern appears wherever the brush goes. RUN Paint lets you select from 11 different brushes and 35 different patterns at any one time.

Following are descriptions of the options in the Pen submenu:

Select Color lets you choose the color you want to draw with. When you click on a color, the border color changes to your choice to indicate the current drawing color.

Use Pen and **Use Brush**, which specify the pen or the brush for drawing, are mutually exclusive; if you select one, you deselect the other. An asterisk is always present beside the currently selected tool. The drawing modes in which you can select either pen or brush are Freehand, Lines, Rays, Spray, Ellipse and Box. Flood always uses the pen, regardless of which tool you've selected.

Affect Color. This is either on or off. When off, none of RUN Paint's graphics commands affect color memory. If you want Monochrome mode, just turn off Affect Color after activating the program.

Reflect On simultaneously creates up to three mirror images of an object as you're drawing it. Here's an example:

Enable the menu system, click on Pen, then on Set Reflect and on X in the Set Reflect submenu. Next, return to the Pen submenu and activate Reflect On. Now move back to the main menu and click on Draw, then on Freehand. As you move the pointer around while pressing the fire-button, you can verify that a mirror image is drawn, reflected in the x-axis. Try the other options in the Set Reflect submenu, namely Y and XY. (See Set Reflect and Move Mirror, below.)

Set Reflect displays a submenu of reflection modes you can choose from when Reflect On is enabled. X produces reflection on the x-axis, Y on the y-axis and XY in the opposing quadrant. (Also see Reflect On, above, and Move Mirror, below.)

Move Mirror is the option you use to position the reflective x and y axes anywhere you want on the screen.

Select Pen lets you choose one of six pens for drawing when the Use Pen option is on. The first option draws normal solid lines and the second draws double-width solid lines. The third to sixth options produce one of four styles of dotted lines. In Freehand mode, only solid lines can be used. The dotted lines work only in the Lines and Rays modes.

Select Brush lets you choose a brush shape to use when Use Brush is on. Just click on a brush.

Select Pattern lets you choose a pattern when Use Brush is on. Just click on any pattern.

THE DRAW SUBMENU

The Draw submenu is used more frequently than any of the others, since it contains most of the commands for placing graphics on the screen.

Alter Color changes colors on the screen. You'd use it, for example, if you drew a flower with white petals and then decided it would look better in red. Selecting Alter Color brings up a submenu containing two options: **Card** and **Screen**. Card restricts the color change to a single card (see Technical Notes, below), which you select with the pointer. Screen makes the color change affect the entire screen. After selecting one of these options, a third submenu pops down from which to select the new color. In our example, you'd select red.

Once you select a color, the menus disappear, the border color

changes to the color you selected and you're ready to initiate the color change. Position the tip of the pointer over the color you want to alter and press the fire-button. The border color changes to match the color of the pixel under the pointer. If this is indeed the color you wish to change, press the fire-button and the change takes place.

If nothing happens, you probably have the pointer positioned on a blank pixel. Move the pointer a little bit and try again. If the pointer is placed on the wrong color, you can abort the change by executing an Undo (see below) or by activating the menus, then moving the pointer off the menus back onto the screen to try again.

Wash lets you change the background color on a card-by-card basis in Hi-Res mode. When you select Wash, a menu pops down from which to choose the new color. After you select a color and the menus disappear, move the pointer onto a card and press the fire-button to change the background color of that card.

Flood fills an enclosed area with a solid color. Here also, a menu pops down from which to select the color you want, and the menus disappear after you choose. Then position the pointer over the area you want to fill and press the fire-button. You can abort a fill in progress by executing an Undo (see below).

Freehand makes a freehand drawing. Press the fire-button while moving the pointer to draw a line. (See the Pen submenu, above.)

Lines is the option used for drawing straight lines. Position the pointer where you want a line to start and press the fire-button; then move the pointer to the line-end position and press and hold down the fire-button until the line is completely drawn. (See the Pen submenu, above.)

Rays draws lines that radiate from a common origin. Move the pointer to the desired starting point and press the fire-button; then move the pointer to a line-end position and press the fire-button again to draw the line. Draw additional lines by moving the pointer to new end positions and pressing the fire-button again. As in the Lines option, you must hold the fire-button down until the line is complete. (See the Pen submenu, above.)

Spray produces a spray effect. When you select this option, a submenu pops down with three additional choices—Light, Medium and Heavy—which specify the intensity of the spray effect.

Spray uses either the pen or the brush and works on a timer. In Heavy mode, it plots a point or paints a brush shape every $\frac{2}{60}$ of a second. The corresponding times for Medium and Light modes are $\frac{5}{60}$ and $\frac{15}{60}$ of a second, respectively.

If Use Brush is on, you can get an airbrush effect by selecting a brush consisting of a grid of dots. (See Select Brush, above.)

Eraser mode erases the screen card by card.

Edit lets you modify either a section of the screen, the brushes, the patterns or the current character font. Selecting Edit displays a submenu. To modify a section of the screen, click on Pixel Edit. After your selection, the menus vanish and the pointer appears, surrounded by a flashing box. Position the box over the part of the screen you want to edit and press the fire-button. This enlarges the screen inside the box, copies it to the bottom of the display, and then brings a color menu to the center of the display, from which you select a new drawing color. The top of the display shows an unmagnified section of the screen, so you can see the effect of your edits.

You edit Pixels by positioning the pointer over them and pressing the fire-button. To erase a pixel, set the drawing color to the screen color. You can select a new area to edit by moving the pointer to the top of the screen and pressing the fire-button.

The Font, Brush and Pattern editing modes operate in a similar manner. After selecting one of them, the screen clears and the font, brushes or patterns are copied to the top of the screen. Select a character, brush or pattern for editing by clicking on it. The center of the screen shows a color bar containing two colors: blue and black. Select blue to erase pixels and black to set pixels. You select a different character, brush or pattern to edit by moving the pointer into the top area of the screen and pressing the fire-button.

Ellipse uses either the pen or the brush to draw ellipses. Click twice to set two opposing corners of a box, and an ellipse will be drawn within the box. (See Solid, below.)

Box uses either the pen or the brush to draw boxes. Click twice to set two diametrically opposite corners, and a rectangle appears. (See Solid, below.)

Solid determines how Ellipse and Box work. When this option is on, ellipses and boxes are drawn filled in. When it's off, they appear as outlines.

THE SHAPE SUBMENU

The Shape submenu contains commands for cutting and pasting or erasing rectangular areas of the screen, along with whatever is within those areas. It uses a special area of memory called the "shape buffer," where shapes you cut or copy from the screen are stored.

In Paste mode, the shape in the buffer is pasted on the screen. Note that it's impossible to paste a hi-res shape on a med-res (multicolor) screen, or vice-versa.

Cut duplicates a rectangular area and its contents from the screen to the shape buffer and erases it from the screen. Move the pointer to one corner of the shape and click, then to the opposite corner and click again.

Copy copies a shape on the screen into the shape buffer, but the shape remains on the screen. Execute this exactly as you would Cut.

Paste places a shape that's in the shape buffer onto the screen. In this mode, the pointer is surrounded by a box of the same size as the shape in the buffer. Move the box to where you want it located and click once. Note that it's impossible to paste a hi-res shape on a med-res (multicolor) screen, or vice-versa.

Erase eliminates the contents of a rectangular portion of the screen. Move the pointer to one corner of the rectangle and click, then move it to define the opposite corner and click again.

Flip X. When this option is on, the shape is pasted and flipped horizontally about the y-axis. **Flip Y** pastes the shape and flips it vertically about the x-axis.

RVS pastes the shape in reverse field. This option works well in Hi-Res, but not so well in Med-Res (Multicolor) mode.

Cover mode makes the shape completely cover the screen area where it's pasted. Normally, blank areas of the shape are not pasted.

THE TYPE SUBMENU

The Type submenu is used to place text on the screen. Type is essentially monochrome and uses the current color.

Font. Clicking this option selects a new character font and enables Type mode. After you click, a submenu will appear offering an additional three options. The first corresponds to the RAM font, which RUN Paint can load in via the Load submenu (see Disk, below). If this option is blank, a font hasn't been loaded yet. RUN Paint can use either standard Commodore 8-bit character sets or special RUN Paint fonts, which are 16 bits wide and 16 high.

Graphics, the second Type option, selects the built-in ROM character set that consists of the uppercase alphabet and special graphics characters.

Text, the third option, selects the ROM character set containing the upper- and lowercase alphabets and business graphics characters.

After clicking on an option, you can begin typing. A flashing box

shows where the next character will appear, and, when you press the fire-button, you can move this box anywhere you wish on the screen. Press the fire-button again after the box is positioned. The following are special features available while typing:

Cursor keys: Move the flashing box around.

Control/RVS On: A standard Commodore character set has 256 characters, numbered 0–255, but RUN Paint can use only 128 characters at a time. Simultaneously pressing the control and 9 keys selects characters 128–255 for typing.

Normally, characters 128–255 are just reversed images of characters 0–127, and Commodore uses them to provide a flashing cursor. RUN Paint doesn't need these reversed characters, so they can be replaced by another font, such as italics. This lets two 8-bit character sets reside in memory at once. RUN Paint does not provide the means for replacing the reversed characters.

Control/RVS Off: Simultaneously pressing the control and 0 keys selects characters 0–127 for typing.

Home: Moves the typing box to the home position.

Return: Moves the typing box to the start of the next line.

DEL: Pressing the insert-delete key deletes the character to the left of the cursor.

Now, getting back to the Type submenu:

Width displays a submenu with three options: Normal, Double and Quadruple. Click on the character width you want.

Height also produces a choice of Normal, Double and Quadruple. Click on the height you want.

The next five options, affecting how text is placed on the screen, are mutually exclusive; only one can be activated at a time.

Cover, the default mode, makes characters placed on the screen completely cover the area inside the typing box. In this mode, it's impossible to make a character blend in with the background.

RVS is similar to Cover, except that characters are reversed before being placed on the screen.

Or places characters on the screen using the logical Or operation, thus letting them blend in with the background.

And. When this option is selected, characters are placed on the screen using the logical And operation. To see how this works, paint the entire top of the screen with a pattern using a large brush, then select the Quadruple option and the And option on the Type submenu. Now choose one of the fonts, position the typing box on the pattern and begin typing.

XOr lets you place selected characters on the screen using the logical Exclusive-Or operation. This means the characters can blend in with the background.

THE DISK SUBMENU

The Disk submenu is used to save and load files to disk, as well as to issue disk commands and select the disk device number. RUN Paint filenames must not contain any spaces.

Load. This option on the Disk submenu can load a number of types of files, which are selected from a submenu. After you select a file type, RUN Paint displays a list of the files of that type available on the disk. Just move the pointer onto the filename you want and press the fire-button.

RUN Paint can load standard Commodore character sets, as well as files created with other programs, such as Koala Painter, Doodle! and Flexidraw. These files must be renamed to conform with RUN Paint format. (See Load Font, Monochrome, HiRes Screen and MedRes Screen, below.)

Use the **Font** option in the Load submenu to load a font. As mentioned above, RUN Paint can use standard Commodore character sets. However, the file must be renamed according to RUN Paint format before the program can load them. All RUN Paint font filenames must begin with the letters RPF and a period. For example, a character set named ITALICS would have to be renamed RPF.ITALICS. Remember, no spaces are allowed in a filename.

The **Page** option loads an entire page, **Shape** loads a shape, **Patterns** loads a set of patterns and **Brushes** loads a set of brushes.

Monochrome provides a way to load a straight 8K monochrome bit-map with no color. Flexidraw saves pictures in this format. Before you can load a Flexidraw picture into RUN Paint, you must rename it. For example, a Flexidraw file named JAGUAR would have to be renamed RPO.JAGUAR. Once again, there can't be any spaces in the filename.

After loading a monochrome bit-map, RUN Paint enters a special mode where you can copy a section of the screen to the shape buffer. If you go to a menu, the screen is copied to the page buffer. If you perform an Undo, the screen will go back to what it was before loading.

HiRes Screen loads high-resolution screens that include color, such as Doodle! picture files. As with Flexidraw files, Doodle! files must be renamed to RUN Paint format before they can be loaded.

A Doodle! file named DD.FIELD would be renamed RPH.FIELD.

Also as with Flexidraw files, after loading, RUN Paint enters a special mode enabling you to copy a section of the screen to the shape buffer. If you go to a menu, the screen is copied to the page buffer, and an Undo restores the screen as it was before loading.

MedRes Screen loads medium-resolution (multicolor) screens, such as Koala picture files. Like the other file types I've mentioned, Koala files must be renamed according to RUN Paint format before they can be loaded. A Koala file named APIC A FIELD would be renamed RPM.FIELD.

As with the previous two commands, RUN Paint enters a special mode where you can copy a section of the screen to the shape buffer. Going to a menu copies the screen to the page buffer, and an Undo restores the screen as it was before loading.

The **Utility** option enables RUN Paint to load in and execute user-defined, machine language utility programs that can give RUN Paint more capabilities. These must be assembled to run at address \$6C00, and their filenames must begin with the letters RPU and a period.

Save. This option on the Disk submenu displays a further submenu from which various types of files can be saved. After selecting a file type, enter the desired filename, omitting a prefix, since RUN Paint will install it automatically. For example, if you enter ITALICS as the name of a font, RUN Paint will save it as RPF.ITALICS. As before, don't include any spaces in the filename.

There are eight commands for saving files, representing eight different file types. **Font, Page, Shape, Patterns** and **Brushes** are self-explanatory. **Monochrome** saves the contents of the screen as a straight 8K monochrome bit-map with no color. **HiRes Screen** saves the contents of the screen as a Doodle!-compatible file. **MedRes Screen** saves the screen as a Koala-compatible file. After you enter the filename for a med-res screen, the text screen will fill with strange colors. Don't worry. This is just because the text screen and the med-res screen share the same color memory.

Other Disk submenu options are:

Command. Select this option from the Disk submenu to issue a command to the disk drive for formatting a disk or scratching or renaming a file.

Set Device lets you specify device 8 or 9 for saving and loading.

THE MODE SUBMENU

The Mode submenu is a catch-all for commands that don't fit in

anywhere else. It lets you set the screen and pointer color, print, select high or medium resolution, and more.

Cursor. This Mode submenu option displays a further submenu that offers three options: Solid, Flash and Card Restricted. **Flash**, the default, produces a flashing cursor. With **Solid**, you get a non-blinking cursor. You must also select the cursor color from a submenu. **Card Restricted** restricts cursor movement to coordinates that coincide with the upper-left corner of a card. This is often useful in Type mode and when pasting shapes.

Screen Color displays a submenu from which to alter the screen color. The color is actually changed for the entire page, not just the screen, and on the C-128 this takes a second or two. The change isn't finalized until the cursor is moved off the Screen Color submenu.

GoTo. This Mode submenu option lets you move around the page buffer quickly. On the C-64, three options are available in this submenu: Left, Middle and Right. On the C-128, you have an additional four options: Top, Bottom, Screen Up and Screen Down. As mentioned above, the page buffer is wider than the screen. In fact, it's 80 cards wide. Clicking on **Left** brings columns 0-39 of the page buffer to the screen. **Middle** and **Right** display columns 20-59 and 40-79, respectively. Clicking on **Top** moves the screen to the very top of the page buffer on the C-128. **Bottom** moves the screen to the bottom of the page buffer. **Screen Up** and **Screen Down** move up and down through the page buffer approximately half a screen at a time.

Clear Screen. This option in the Mode submenu predictably clears the screen. This action can be reversed with an Undo command.

Clear Page clears the entire page and cannot be undone.

Print. Various printout options are accessed through this submenu. They let you print part or all of a screen or page.

Screen prints just what is currently displayed. If the Define option (see below) is on, you can specify the number of screen lines to print. If Define is off, the full screen is printed.

Page prints the page buffer. Similar to printing a screen, if the Define option is on, you can specify the number of lines to print from the page. If Define is off, the full page is printed.

Rectangle defines a rectangular area of the screen to be printed. This area can be as large or as small as necessary. After the menus disappear, click once to define one corner of the rectangle, then move the pointer to define the diametrically opposite corner and

click again to start printing. It doesn't work with Prowriter.

RVS. If this is set to on, the printout will be in reverse field.

Disk. When Disk is on, the printer output will be sent to the disk. You must enter a disk filename before printing begins.

Define works with Screen and Page, but not Rectangle. As mentioned above, this option lets you define the number of lines to print from the screen. After you choose to print a screen, the menus disappear and a horizontal line appears. Move the line to define the bottom of the part of the screen you want printed and press the fire-button. The screen prints from the top down to the line.

You can also define the bottom line when you print a page, but printing takes place from the top of the page buffer down to the line. You can use Screen Up and Screen Down to position the screen in any part of the page buffer on the C-128.

Click on **Select Printer** to tell RUN Paint what type of printer you have. The program supports three printers and their compatibles: the Commodore 1515, the Epson and the C.Itoh Prowriter. If you have one of the printer interfaces that offer 1515 emulation, you should be able to use the 1515 printer driver, regardless of the type of printer you own.

Click twice on **Quit** to leave RUN Paint and return to Basic. On the second click, press the button for at least a second.

Use the **Device** option to tell RUN Paint whether you're using a joystick or a mouse.

HiRes and **MedRes** specify either High Resolution or Medium Resolution mode. Selecting one unselects the other.

THE UNDO FEATURE

I'll wrap things up with a look at RUN Paint's most useful feature: Undo. Undo is not selected through the menu system, so I'll illustrate it with an example. Draw something on the screen, then activate Undo by moving the pointer five pixels below the bottom border of the screen (as far down as it will go) and pressing the fire-button. The screen will clear, "undoing" the last function performed.

Each time you access the menus, the screen's contents are copied to the page buffer, and Undo works by copying the page buffer back to the screen. This means you can reverse any action performed since the last time the menus were accessed.

TECHNICAL NOTES

The VIC chip in the C-64 and C-128 organizes the graphics screen

into little rectangles called “cards.” The screen contains 25 rows of cards, with 40 cards per row. In Hi-Res mode, each card contains eight pixels horizontally and eight pixels vertically, and only two colors are possible per card: a foreground color and a background, or screen, color. If you try to add a third color to a card, the foreground color will change to the new color.

In Med-Res mode, also called Multicolor mode, three different foreground colors are possible per card, and the background color is the same for all cards. The luxury of having three foreground colors is paid for by decreased screen resolution. The pixels are twice as wide as in Hi-Res mode, and a card contains only four pixels horizontally by eight vertically.

THE PAGE BUFFER

RUN Paint uses the screen as a window atop a larger area, referred to as the “page buffer.” On the C-64, RUN Paint can handle drawings up to 640 pixels wide and 200 pixels high. With its larger memory, the C-128 can handle a full $8\frac{1}{2} \times 11$ -inch page, allowing drawings of up to 640 $\times$ 792 pixels.

RUN it right: C-64 or C-128, in 40- or 80-Column mode; printer optional

Graphmaker

By Robin Franzel

YOU CAN USE GRAPHMAKER 64/128 in either 40- or 80-Column mode to create attractive and informative bar graphs. If your printer outputs Commodore graphics characters, your graphs will be in “3-D”; if you use a daisywheel printer, or have trouble getting your printer to obey commands, your graphs will be made of standard printer characters.

Data for the bar graphs can be entered manually or through complex analysis of sequential database files. You can even edit the data that defines your graph, and graphs can be saved to and loaded from disk.

Note that some of the figures I refer to appear with this docu-

mentation, including one example of a bar graph printout. Other sample graphs are on disk. You can display those on your screen or print them out for reference as you're reading.

GETTING STARTED

To use Graphmaker on the C-64 or in 64 mode on the C-128, enter `LOAD "0:GRAPHMAKER",8` and `RUN`. These commands also work in 128 mode; enter just `RUN "GRAPHMAKER"`.

Figure 1. The main menu.

1. Create Graph
2. View Graph
3. Edit Graph
4. Save Graph
5. Load Graph
6. Print Graph
7. Printer Setup
8. End Program

Enter Selection (1-8) ? 1

The bottom of the title screen indicates whether you're using a C-64 or a C-128 and whether you're in 40- or 80-Column mode—a handy feature for C-128 users who often switch between 64 and 128 modes. After the title screen, the main menu, shown in Figure 1, appears. When you're just beginning to use Graphmaker, you can press return for the default choice, Create Graph; 7 for Printer Setup; or 8 to End. The other selections aren't available until after you've created a graph, so let's get started by pressing the return key.

CREATING A GRAPH

Refer to Figure 2 and Figure 3 for clarification as we proceed. Figure 2 shows the initial screen for creating a graph; it requests information from you. You may find it helpful to go through the exercise of re-creating the sample graph in Figure 3.

At the **title** prompt in the Figure 2 screen, you can input both lower- and uppercase letters, and the title will appear that way in printouts. However, the letters will all be uppercase when your graph is displayed on the screen.

Figure 2. Initial screen for creating a graph.

Create Graph

Press ← for Menu

Enter Title:

Enter Legend:

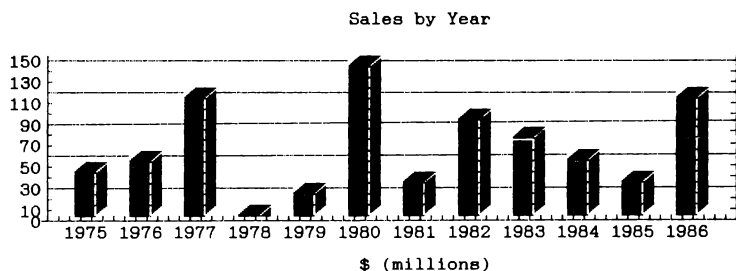
Number of Ranges (1-12):

Keyboard or Disk Input? (k/d)

Label for Range 1:

.
. .
.

Figure 3. Sales by year.



The **legend** is a line at the bottom of your graph that can be used for explanation, such as indicating your units of measurement. Again, both lower- and uppercase may be used.

The **number of ranges** tells Graphmaker how many bars to display in a particular graph. There are 12 bars in Figure 3.

The next prompt asks where Graphmaker will get the maximum values for each range—from keyboard input or from a disk file. If you intend to type them in, enter K; if the program should look for them in a database file on disk, enter D. For now, press K and return.

Next, you must enter a **label** for each range. These labels will run

along below the x-axis of the graph, truncated by the program, if necessary, to prevent overlapping. In general, the fewer bars in a graph, the more space that's available for labels. In a 40-column graph with six bars or an 80-column graph with 12 bars (see Printing below), the labels can be up to four characters long.

Finally, you'll be prompted for the maximum value in each range. For the graph in Figure 3, 12 numbers from 10000000 to 150000000 (no commas) must be entered. To make the graph look neater, I edited the numbers (see Edit Graph below) to run from 10 to 150, then indicated the conversion in the legend.

After you've answered all the prompts, the main menu will reappear, with a new default choice of 2, for View Graph. Before I describe that option, however, let's see what happens if you press D at the Keyboard/Disk Input prompt.

ANALYZING A DISK FILE

To learn how to analyze a database file, consider a database that contains statistical data on a fictitious company. The record for each employee includes the fields shown in Figure 4.

Many Commodore database and spreadsheet programs produce sequential data files that can be read into a word processor. Before you attempt to use a data file with Graphmaker, load it into a word processor so you can look at it.

Figure 4. Fields in sample employee record.

Field 1: Employee number

Field 2: Employee age

Field 3: Codes by type of work

1 Manual Labor

2 Secretarial

3 Supervisory

4 Analysts

5 Managerial

6 Executive

Field 4: Salary of Employee

Figure 5 shows a printout of the beginning of a data file on our fictitious company created by RapidData Software's DataOrg database. That program places fields holding the filename, the number of records, the number of fields per record and the name of each

data field at the beginning of the file, before the actual data. Graphmaker must be told to skip this housekeeping information. Figure 6 shows a DataOrg printout of the same database, including all the records.

Now that you know the layout of our database file, let's produce the following bar graphs:

- 1. Number of employees in each work category.
- 2. Distribution of employees by age group.
- 3. Salaries paid in each work category.

Figure 5. Printout of beginning of sample data file.	Figure 6. Printout of a portion of a sample database.
SAMPLE.DBF	NO . AGE TYPE SALARY
42	
4	1 52 6 125000
EMPL NUM	2 45 6 100000
EMPL AGE	3 38 5 65000
TYPE WORK	4 42 5 63500
SALARY	5 34 3 32750
1	6 36 3 33500
52	7 28 3 30250
6	8 38 3 38200
125000	9 42 5 55000
2	10 53 5 63500
45	11 47 2 23500
6	12 42 2 21500
100000	13 22 2 18200
3	14 18 2 16500
38	15 18 2 16500
5	
65000	

Graphmaker offers three types of database analysis in the Disk menu in Figure 7. With option 1, you can count occurrences based on comparisons of alpha/numeric data (we'll use this for our first graph). Option 2 lets you specify high and low values for your ranges using numeric analysis (the second graph). With option 3, you can

sum a numeric field based on an alphabetic comparison of a second field (the third graph).

Figure 7. The Disk menu.

Create Graph

1. User-Defined Ranges
Tally Field (Alpha/Numeric)
2. User-Defined Ranges
Tally Field (Numeric)
3. File-Defined Ranges
Sum Field
4. Return to Main Menu

Enter Selection (1-4)

ANALYSIS OPTION 1

To re-create a graph showing the number of employees in each work category (to see this, load the file "EMPLOY.WORK"), enter 6 for the number of ranges, since there are six types of work. Then press D at the Keyboard or Disk Input prompt and 1 for Tally Field.

The number to enter next, for **fields to skip**, depends on your file organization. To analyze the entire contents of your data file, you'd enter 0. For our example, enter 7 to skip the seven house-keeping fields of the file (see Figure 5 again). Anytime you've progressed this far and realize you don't know how many fields to skip, you can enter ← to return to the main menu.

To analyze the number of employees in each work category, enter 3 for **field number of data**, since Type of Work is the third field in each record.

The number of **fields per record** also depends on your file organization. Since each record in our example has four fields, enter 4 at this prompt.

The number of ranges was specified earlier, but now you must indicate what each of those ranges represents by entering its Type

of Work code: 1-6 (see Figure 4 again). You can use the graph editor later to change these codes to more meaningful labels.

Now Graphmaker will read your data file and create the graph; then it will display the main menu so you can view, edit, save or print the graph.

ANALYSIS OPTION 2

Next, we'll do the analysis of employees by age, which creates the graph you can view by loading "EMPLOY.AGE". Enter 4 for the number of ranges and D at the Keyboard or Disk Input prompt, then 2, for Numeric Tally, when the Disk menu (Figure 7) appears. Again, you'll be asked for the number of fields to skip, field number of data and number of fields per record. This time, the field number of data will be 2, for the Age field.

When the program prompts for the **low/high value for the range**, enter the minimum and maximum age in each group. If you enter a high value that's smaller than the corresponding low value, Graphmaker will alert you and let you re-enter the values. The labels for the ranges will be generated automatically, based on your input.

ANALYSIS OPTION 3

The final type of analysis we'll do sums up one field based on the contents of another. It produces a graph that shows how much money was paid in salaries to each type of worker (see this by loading "SAL.PD"). Enter 6 for the number of ranges, since there are six types of work for which salaries will be totaled. Then select 3 at the Disk menu (Figure 7) and enter the number of fields to skip.

With this analysis, the prompt for **field number of data** refers to the field you want to sum. Enter 4 for our example, since salary is the fourth field. **Field number for ranges** is again 3, Type of Work.

If you wanted to use an alphabetic field for selection of records to be included in summing a numeric field, you'd respond with A to the Alpha or Numeric prompt. For our example, we're using the numerically coded Type of Work field, so enter N.

Finally, as before, enter the number of fields per record and the ranges to be searched.

VIEWING YOUR GRAPH

Once you've created your graph, the default at the main menu becomes 2, for View Graph. Press return, and, if your computer is in 40-Column mode, the first six bars of the graph will appear. The

bars to the right are still there, but there isn't any room to display them. As I mentioned before, they'll appear in the printout (see Printing, below). In 80-Column mode, your entire graph will fit on the screen.

To make changes to your graph, press any key to access the main menu, and then select 3, Edit Graph.

EDITING YOUR GRAPH

In Edit mode, you can retype the title, legend, range labels and even the range values. When you're done, the main menu will reappear, offering you the option to proceed to another part of the program or to edit some more by pressing 3 again.

SAVING YOUR GRAPH

Once you've created your graph and edited it as desired, you'll probably want to save it to disk. Select 4 from the main menu, then enter a filename that's no more than 16 characters long. If you enter one that's too long, Graphmaker will automatically truncate it. Anytime the program encounters a problem with the disk drive, it will display an error message on the screen and return you to the main menu to try again.

LOADING YOUR GRAPH

To load a previously saved graph into Graphmaker, select 5 at the main menu and enter the filename. Here again, the program will report any disk errors.

PRINTING YOUR GRAPH

Printing a graph is as easy as pressing 6 at the main menu. If the printout doesn't look the way you expected, see the Printer Setup section below to correct it.

The printout of a graph that contains six or fewer bars will be one-half page wide; a graph that contains more than six bars will extend across a full page. You can expand a graph with six or fewer bars to make more room for range labels by adding enough "invisible" bars (no label and a range value of 0) to bring the total to seven.

PRINTER SETUP

Graphmaker uses Commodore graphics to print out the same three-dimensional graph you see on the screen. However, you can

also produce a printout with normal daisywheel characters. Just select 7 at the main menu and respond “no” at the CBM Dot Matrix Printer prompt.

You’ll be prompted to enter the secondary addresses that Graphmaker should use to open your text and graphics printer files. Normally, you’d select 7 for the text secondary address and 0 for graphics, but with a daisywheel printer, you must select 7 for both. If these secondary addresses don’t work with your printer, consult your printer or interface manual for other possibilities.

Finally, Graphmaker will ask for the number of printer control codes to send to the printer when the printer file is opened. If you don’t want to send any codes, overwrite the default with 0. The default settings will tell an Epson-compatible printer to print approximately 10 lines per inch (a $\frac{7}{12}$ -inch linefeed), so the lines barely touch. If these control characters aren’t correct for you, refer to your printer manual to determine how to adjust the linefeeds.

END PROGRAM

Selecting 8 at the main menu terminates execution of Graphmaker. If you have a graph in memory, the program will ask for verification that you want to exit—in case you forgot to save the graph or need to print it out. Then type N to return to the main menu, or Y to leave the program.

Even if you type Y, it’s not too late to save or print your graph. Just enter RUN 740, and the main menu will return, with your last graph still in memory.

RUN **W·O·R·K·S**

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