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DEC	HEX	BASIC	6502	ASCII	SCREEN DISPLAY SET 1	SET 2
0	0	END LINE	BRK		@	
1	1		ORA ($ZZ,X)		A	a
2	2				B	b
3	3				C	c
4	4				D	d
5	5		ORA $ZZ	white	E	e
6	6		ASL $ZZ		F	f
7	7				G	g
8	8		PHP	disables shft/Cmdr	H	h
9	9		ORA #$II	enables shft/Cmdr	I	i
10	A		ASL		J	j
11	B				K	k
12	C				L	l
13	D		ORA $NNNN	return	M	m
14	E		ASL $NNNN	lowercase	N	n
15	F				O	o
16	10		BPL $NN		P	p
17	11		ORA ($ZZ),Y	crsr down	Q	q
18	12			reverse on	R	r
19	13			clr/home	S	s
20	14			inst/del	T	t
21	15		ORA $ZZ,X		U	u
22	16		ASL $ZZ,X		V	v
23	17				W	w
24	18		CLC		X	x
25	19		ORA $NNNN,Y		Y	y
26	1A				Z	z
27	1B				[	
28	1C			red	£	
29	1D		ORA $NNNN,X	crsr right	]	
30	1E		ASL $NNNN,X	green	↑	
31	1F			blue	←	
32	20	SPACE	JSR $NNNN	space	space	
33	21	!	AND ($ZZ,X)	!	!	
34	22	"		"	"	
35	23	#		#	#	
36	24	$	BIT $ZZ	$	$	
37	25	%	AND $ZZ	%	%	
38	26	&	ROL $ZZ	&	&	
39	27	'		'	'	
40	28	(	PLP	(	(	
41	29	)	AND #$II	)	)	
42	2A	*	ROL	*	*	
43	2B	+		+	+	
44	2C	,	BIT $NNNN	,	,	
45	2D	-	AND $NNNN	-	-	
46	2E	.	ROL $NNNN	.	.	
47	2F	/		/	/	
48	30	0	BMI $NN	0	0	
49	31	1	AND ($ZZ),Y	1	1	
50	32	2		2	2	
51	33	3		3	3	
52	34	4		4	4	
53	35	5	AND $ZZ,X	5	5	
54	36	6	ROL $ZZ,X	6	6	
55	37	7		7	7	
56	38	8	SEC	8	8	
57	39	9	AND $NNNN,Y	9	9	
58	3A	:		:	:	
59	3B	;		;	;	
60	3C	<		<	<	
61	3D	=	AND $NNNN,X	=	=	
62	3E	>	ROL $NNNN,X	>	>	
63	3F	?		?	?	

DEC	HEX	BASIC	6502	ASCII	SCREEN DISPLAY SET 1	SET 2
64	40	@	RTI	@		
65	41	A	EOR ($ZZ,X)	A		A
66	42	B		B		B
67	43	C		C		C
68	44	D		D		D
69	45	E	EOR $ZZ	E		E
70	46	F	LSR $ZZ	F		F
71	47	G		G		G
72	48	H	PHA	H		H
73	49	I	EOR #$II	I		I
74	4A	J	LSR	J		J
75	4B	K		K		K
76	4C	L	JMP $NNNN	L		L
77	4D	M	EOR $NNNN	M		M
78	4E	N	LSR $NNNN	N		N
79	4F	O		O		O
80	50	P	BVC $NN	P		P
81	51	Q	EOR ($ZZ),Y	Q		Q
82	52	R		R		R
83	53	S		S		S
84	54	T		T		T
85	55	U	EOR $ZZ,X	U		U
86	56	V	LSR $ZZ,X	V		V
87	57	W		W		W
88	58	X	CLI	X		X
89	59	Y	EOR $NNNN,Y	Y		Y
90	5A	Z		Z		Z
91	5B	[		[		
92	5C	£		£		
93	5D	]	EOR $NNNN,X	]		
94	5E	↑	LSR $NNNN,X	↑		
95	5F	←		←		
96	60		RTS		space	
97	61		ADC ($ZZ,X)			
98	62					
99	63					
100	64					
101	65		ADC $ZZ			
102	66		ROR $ZZ			
103	67					
104	68		PLA			
105	69		ADC #$II			
106	6A		ROR			
107	6B					
108	6C		JMP ($NNNN)			
109	6D		ADC $NNNN			
110	6E		ROR $NNNN			
111	6F					
112	70		BVS $NN			
113	71		ADC ($ZZ),Y			
114	72					
115	73					
116	74					
117	75		ADC $ZZ,X			
118	76		ROR $ZZ,X			
119	77					
120	78		SEI			
121	79		ADC $NNNN,Y			
122	7A					
123	7B					
124	7C					
125	7D		ADC $NNNN,X			
126	7E		ROR $NNNN,X			
127	7F					

ADDITIONAL NOTES: **SCREEN CODES:** CODES 128-255 are reversed images of CODES 0-127.

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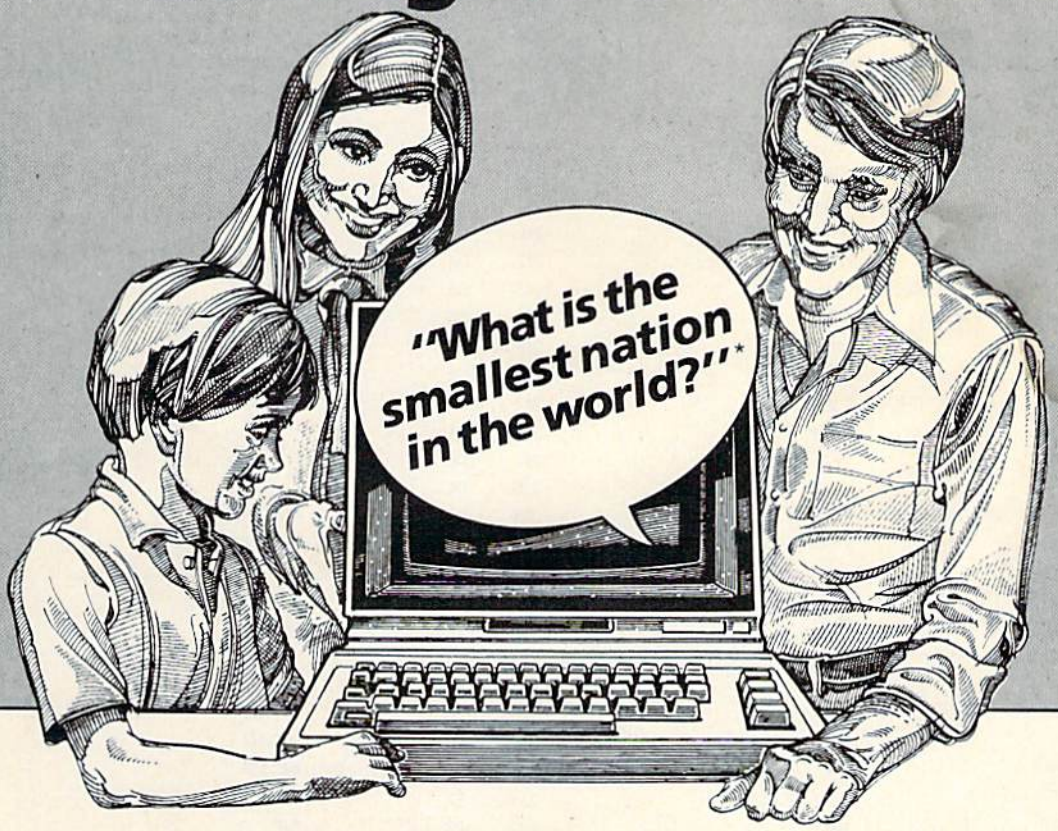

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*The answer is San Marino.

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DEC	HEX	BASIC	6502	ASCII
128	80	END		
129	81	FOR	STA ($ZZ,X)	orange
130	82	NEXT		
131	83	DATA		
132	84	INPUT#	STY $ZZ	
133	85	INPUT	STA $ZZ	F1
134	86	DIM	STX $ZZ	F3
135	87	READ		F5
136	88	LET	DEY	F7
137	89	GOTO		F2
138	8A	RUN	TXA	F4
139	8B	IF		F6
140	8C	RESTORE	STY $NNNN	F8
141	8D	GOSUB	STA $NNNN	shift/carriage return
142	8E	RETURN	STX $NNNN	uppercase
143	8F	REM		
144	90	STOP	BCC $NN	black
145	91	ON	STA ($ZZ),Y	crsr up
146	92	WAIT		reverse off
147	93	LOAD		clr/home
148	94	SAVE	STY $ZZ,X	inst/del
149	95	VERIFY	STA $ZZ,X	brown
150	96	DEF	STX $ZZ,Y	lt. red
151	97	POKE		gray 1
152	98	PRINT#	TYA	gray 2
153	99	PRINT	STA $NNNN,Y	lt. green
154	9A	CONT	TXS	lt. blue
155	9B	LIST		gray 3
156	9C	CLR		purple
157	9D	CMD	STA $NNNN,X	crsr left
158	9E	SYS		yellow
159	9F	OPEN		cyan
160	A0	CLOSE	LDY #$II	space
161	A1	GET	LDA ($ZZ,X)	
162	A2	NEW	LDX #$II	
163	A3	TAB(		
164	A4	TO	LDY $ZZ	
165	A5	FN	LDA $ZZ	
166	A6	SPC(	LDX $ZZ	
167	A7	THEN		
168	A8	NOT	TAY	
169	A9	STEP	LDA #$II	
170	AA	+	TAX	
171	AB	-		
172	AC	*	LDY $NNNN	
173	AD	/	LDA $NNNN	
174	AE	↑	LDX $NNNN	
175	AF	AND		
176	B0	OR	BCS $NN	
177	B1	>	LDA ($ZZ),Y	
178	B2	=		
179	B3	<		
180	B4	SGN	LDY $ZZ,X	
181	B5	INT	LDA $ZZ,X	
182	B6	ABS	LDX $ZZ,Y	
183	B7	USR		
184	B8	FRE	CLV	
185	B9	POS	LDA $NNNN,Y	
186	BA	SQR	TSX	
187	BB	RND		
188	BC	LOG	LDY $NNNN,X	
189	BD	EXP	LDA $NNNN,X	
190	BE	COS	LDX $NNNN,Y	
191	BF	SIN		

DEC	HEX	BASIC	6502	ASCII
192	C0	TAN	CPY #$II	
193	C1	ATN	CMP (ZZ,X)	
194	C2	PEEK		
195	C3	LEN		
196	C4	STR$	CPY $ZZ	
197	C5	VAL	CMP $ZZ	
198	C6	ASC	DEC $ZZ	
199	C7	CHR$		
200	C8	LEFT$	INY	
201	C9	RIGHT$	CMP #$II	
202	CA	MID$	DEX	
203	CB	GO		
204	CC		CPY $NNNN	
205	CD		CMP $NNNN	
206	CE		DEC $NNNN	
207	CF			
208	D0		BNE $NN	
209	D1		CMP ($ZZ),Y	
210	D2			
211	D3			
212	D4			
213	D5		CMP $ZZ,X	
214	D6		DEC $ZZ,X	
215	D7			
216	D8		CLD	
217	D9		CMP $NNNN,Y	
218	DA			
219	DB			
220	DC			
221	DD		CMP $NNNN,X	
222	DE		DEC $NNNN,X	
223	DF			
224	E0		CPX #$II	
225	E1		SBC ($ZZ,X)	
226	E2			
227	E3			
228	E4		CPX $ZZ	
229	E5		SBC $ZZ	
230	E6		INC $ZZ	
231	E7			
232	E8		INX	
233	E9		SBC #$II	
234	EA		NOP	
235	EB			
236	EC		CPX $NNNN	
237	ED		SBC $NNNN	
238	EE		INC $NNNN	
239	EF			
240	F0		BEQ $NN	
241	F1		SBC ($ZZ),Y	
242	F2			
243	F3			
244	F4			
245	F5		SBC $ZZ,X	
246	F6		INC $ZZ,X	
247	F7			
248	F8		SED	
249	F9		SBC $NNNN,Y	
250	FA			
251	FB			
252	FC			
253	FD		SBC $NNNN,X	
254	FE		INC $NNNN,X	
255	FF	π		

ASCII CODES: CODES 192-223 same as 96-127 CODES 224-254 same as 160-190 CODES 255 same as 126

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Which One Is The Real Machine Language?

I have seen many useful programs in your magazine which show how to program in machine language using three-letter commands. I have also seen a number of programs which are nothing but a stream of numbers (that have to be entered using the MLX program in the back of the magazine).

Which of these is true machine language? Is there any way I could go from one form to the other?

Those three-letter ML commands are the equivalent of BASIC commands. In both ML and BASIC there are around 50 commands, but people commonly only use about 20 of them. Machine language commands are abbreviations: LDA stands for LoaD the Accumulator, JSR for Jump to SubRoutine.

You write ML programs using an *assembler* into which you type LDA and the assembler translates that LDA into a number. The computer cannot understand LDA; it needs the number. That's because the computer's language (machine language) is pure numbers, no letters of the alphabet. But numbers are harder for us to remember than words like JSR. So, the assembler translates these commands into the numeric form that the computer can run.

To answer your first question, *both* the commands and the numbers are true machine language: They're just different forms of the same program. When an ML program is in the form of commands, it's called *source code*. After an assembler translates these commands into numbers, the result is called *object code*. So, you go from the version people can use most easily to the computer-runnable version by assembling source code into object code.

To go the other way, you use a program called a *disassembler* which looks at the pure numbers of the object code and reconstructs them into a listing of the original, three-letter commands.

As you can see, the same ML program can be printed in COMPUTE!'s GAZETTE in three forms: as source code, as object code (for MLX), or as object code which is listed in DATA statements within a little BASIC program (called a BASIC loader) which POKEs the object code into memory for you. To see examples of all three forms, take a look at last month's column. The program therein is printed as source code (Program 1), as a disassembly (Program 2), and as object code in a BASIC loader (Program 3). These are three different versions of the same program.

Where Can I Find An Advanced Assembler?

Where can I get an assembler that allows variables; automatic insert (so I can move the whole program forward in memory as many bytes as I want); and line numbering (like in BASIC)?

The LADS assembler in my new book, *The Second Book of Machine Language* (COMPUTE! Books), includes all those features.

IF, THEN, And GOTO In Machine Language

I have noticed that there are two different ways of using the CoMPare commands (CMP) in ML. I'm not sure which method works or how. They are: 1. Using BEQ or BNE after CMP to check for equal or not equal and 2. Using BCC or BCS after a CMP to check for the same thing. Would you please explain this?

The BEQ/BNE (branch if equal/branch if not equal) and BCC/BCS (branch if less than/branch if more than or equal) pairs are not checking for the same thing as we'll see in a minute.

CMP is one of the most important ML instructions. It's always used in tandem with one of the instructions beginning with the letter *B* which branch to a different part of your program depending on the results of the comparison. In other words, CMP followed by, for example, BEQ, is the equivalent of this line in a BASIC program:

```
10 IF A = 20 THEN GOTO 1000
20 RETURN
```

however you write the ML like this:

```
CMP #20
BEQ 1000
RTS
```

Whenever you use CMP, you are always CoMParing against whatever is currently in the Accumulator. So, in the example above, you will branch to *address* 1000 if the number in the Accumulator is a 20; otherwise, as in BASIC, you will go on to the next command (RTS, in this example).

By the way, be sure to remember that all the *B* instructions are limited to branches 127 bytes in either direction *from their own address*. If, in our example above, your BEQ command were assembled into memory at address 1020, that would be within range. If it were assembled to address 1500, you couldn't make a branch 500 bytes long, all the way down to 1000. You have to give a branch target which is within plus or minus 127 bytes. Many assemblers will

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automatically take care of this problem for you, but if you're using a simple assembler, you'll need to watch that you don't branch out of range.

In any case, each of the important *B* instructions you mention is equivalent to one of the BASIC comparison operators: =, <>, <, or >=. BEQ is the same as =; BNE (<>); BCC (<); and BCS (>=). Since they are so important, you might want to spend a few minutes practicing with them until you understand exactly what triggers each of these various branches. Set up a little program like this (the numbers on the left are the addresses where these instructions are assembled):

```
830   LDA   #20
832   CMP   #20
834   BEQ   840
836   BCC   846
838   BCS   852
840   LDA   #61
842   JSR   65490
845   RTS
846   LDA   #60
848   JSR   65490
851   RTS
852   LDA   #62
854   JSR   65490
857   RTS
```

After you've assembled this, you can SYS 830 and you should see an equals sign (=) printed on screen, proving that you made the BEQ branch. The 20 in the Accumulator was equal to the 20 being compared. Now POKE 831,15, replacing the 20 in the Accumulator with a number which is *less than* the CMP #20. When you next SYS 830, you will see that a branch based on less-than took place. The less-than symbol is printed. Finally, try POKEing in a number higher than 20.

If you have questions which you would like to see answered in this column, please write to:

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Debugging BASIC
Part 1

Todd Heimarck, Assistant Editor

Program bugs have a thousand faces. No matter how experienced a programmer might be, there's almost always a time between finishing and really completing a program—debugging time. This month we'll see what the computer does when you make a mistake. Next month, in Part 2, we'll look at some useful debugging methods as well as some of the mistakes a computer can make.

Some program bugs are easy to recognize: The program crashes and you are told what kind of error you made. Or, worse, the computer locks up. These are the deadly, or *fatal* bugs.

Other bugs are sneakier and not as easy to recognize. Perhaps you've made a slight mistake and the program seems to run, but is actually making incorrect calculations (like figuring interest rates on a 13-month year). Subtle bugs are sometimes worse than fatal ones; at least you can recognize something's wrong when the program crashes.

A bug happens when the programmer says one thing and the computer either doesn't know how to do it, or does something very different.

Some people say that computers never make mistakes, that all bugs are caused by people. That's not always true. After all, computers are designed and manufactured by people who can make mistakes. It may be a hardware bug or one built into the operating system. Or maybe the programmer just didn't understand how the computer would interpret a line—a misunderstanding rather than a mistake. But a computer is pigheaded. It knows how programs should look and won't compromise. Next month we'll look at some of the mistakes computers can make.

For now, we'll concentrate on some of the mistakes we, as programmers, can make and how the computer deals with them.

SYNTAX ERROR

There are over two dozen error messages, but SYNTAX ERROR seems to appear most often. The line number is always included.

The first thing to do, of course, is to LIST the offending line. Take a good look at it. If there are parentheses, make sure they match up. There should be an equal number of opening and closing parentheses.

Also, check all the BASIC keywords to make sure they're spelled correctly. You may have mistakenly abbreviated LEN as L SHIFT-E (which turns out to be the abbreviation for LET, not LEN). If you are writing to disk or tape files, you should note that the command PRINT# is distinct from the ordinary PRINT. The abbreviation for PRINT# is P SHIFT-R (not ?#); using a question mark won't work when working with tape or disk files.

Look at the punctuation, a common source of errors. It's easy to accidentally type a period instead of a comma, a semicolon where you meant to put a colon. Or there may be mismatched opening and closing quotation marks in a PRINT statement. If you're copying a program from a book or magazine, look closely at the look-alike characters (I and 1, O and 0).

Tokens, Keywords, And Reserved Variables

When you type a program line and press RETURN, you must have at least one BASIC *keyword* (command or function) in the line for it to be legal. Even the do-nothing REM is a BASIC keyword. The computer reads the line from the screen and turns all keywords into tokens before the line is stored in memory. A token is a single number between 128 and 255 which represents the command or function.

You must avoid including keywords in variable names. Say you're writing a simple accounting program which figures out the profit margin you make on different items. You need a variable for the price you pay (call it COST), another variable for the amount for which you sell it (call it LIST, for list price), and one more for the profit (MONEY). Then you calculate the margin with the formula MONEY = LIST − COST. Right? Wrong.

All three variables are illegal and will crash the program. LIST is a keyword used to list a

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program; you can't use it as a variable. COST doesn't look like a keyword, but the first three letters spell COS; your computer will try to find a cosine of an angle, although it will stop when it can't find parentheses and an argument. And MONEY is a problem because the keyword ON (as in ON-GOTO or ON-GOSUB) is embedded in the variable name. When you find an embedded keyword in one part of a program, there's a good chance the same variable is used elsewhere, in other sections. You'll have to find all of them and change them to something legal.

In addition to the many keywords, there are three reserved variables which you can't use in your programs. They are TI, TI$, and ST. The first two are used for timekeeping, and ST is short for STatus, which is used in input/ouput operations. Stay away from these variable names, unless you know you want to check the time or status. You can't define TI or ST, although you can print them to the screen and use them in IF-THEN statements and logical operations. You *can* define TI$, which is useful for timing programs, but it has to be a six-digit string (for example, TI$= "103000" sets the clock to 10:30 a.m.).

A VIC or 64 is a little more forgiving with the reserved variable names than with keywords. You can't use a variable TIPS because TI is included in the first two letters of the name. But you *can* use a variable name like ITIN, which has a TI in the middle, because only the first two letters of a variable name count. ITON, on the other hand, is not acceptable as a variable name, because there are two BASIC words in it (TO and ON), and BASIC words cannot appear *anywhere* in a variable name.

Program Glue

Need a program line inserted between 10 and 20? No problem. Type a line 15 and press RETURN; the computer automatically inserts the line in its proper position. LIST 10–20 will prove that the line is there where you wanted it.

It's almost as if your VIC or 64 broke the program in two and pasted the line in its proper place.

This cut-and-paste feature, usually quite handy, can become a curse which results in two kinds of program bugs.

The first bug, truncated lines, is relatively easy to find. It usually occurs when keywords are abbreviated. If, for example, you use ? instead of PRINT, or P SHIFT-O instead of POKE, you can create logical lines which are legal when they're entered, but exceed the limit when listed. Later editing of the line leads to problems.

If you use abbreviations and multistatement lines, the result is sometimes a line which looks longer than should be possible when listed. A question mark takes up only one space on a line; but LIST detokenizes and changes that single letter into five: PRINT. List such a line on a 64 and you may see two full screen lines plus a few characters on the third line. And the program runs without errors. But go back to edit the extra-long line, press RETURN, and the input buffer will read only the first two screen lines into memory. The result is truncated—or chopped off—program lines. You lose the last few characters. To get around the two-line limit (four on a VIC), you have two choices. Either retype the keywords using abbreviations or break the long line into two shorter lines.

This limit on line length means it's a good idea to press RETURN only when you're editing a line. To move around the screen, use the cursor keys (or SHIFT-RETURN, which does not enter the line in program memory and is also a way to get out of quote-mode).

The second bug, which is more difficult to find, happens when your computer seems to glue two program lines together. Say you're writing a program on a VIC-20. Line 500 uses exactly 44 characters (two screen lines). You type the line, but forget to press RETURN. The cursor is positioned at the beginning of a screen line, so you type line 510 and press RETURN. The computer treats the two lines as one because it received only one RETURN. The same thing can happen on a 64 if the first line is exactly 40 characters.

Some Other Common Errors

POKEs and SYSes can wreak havoc if improperly used. Most lockups are caused by one or the other of these powerful commands. When you're debugging, watch for transposed or missing digits in POKEs and SYSes (POKE 53820 instead of POKE 53280, for example).

Duplicate variable names can cause all sorts of problems. You might use a variable called A to hold a value at the beginning of the program, and then inadvertently use the same variable name later on. If the program returns to the beginning, the value has changed. FOR-NEXT loops sometimes lead to duplication. When you're using a variable like A, make sure you don't use it as an index in a FOR-NEXT loop. And remember only the first two characters of a variable count; the computer thinks ALT is the same variable name as ALIEN.

To avoid doubled variables, it helps to pick certain letters to be used only in loops and as "temporary" variables. For example, decide ahead of time you will always use J, K, and L in FOR-NEXT loops.

Be careful with additional statements after an IF-THEN. If the condition (between IF and THEN) is *not* true, the program jumps to the next

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BASIC line; it doesn't fall through to the next colon. For example, in this line:

```
55 IF A=1 THEN B=15: PRINT "NEXT
QUESTION?" :INPUT Q
```

the PRINT and INPUT statements will happen only if A equals one. If not, everything after the THEN is ignored. This feature is useful if you want multiple actions under certain conditions. But it can catch you if you don't know about it.

The error message RETURN WITHOUT GOSUB is usually the consequence of the common practice of putting subroutines at the end of a program. The computer finishes the main routine and continues through to the first subroutine until it reaches the RETURN statement. The quick fix is to place an END statement between the main routine and the first subroutine. For example, if subroutines begin at line 5000, add a line 4999 END.

NEXT WITHOUT FOR, an infrequent error message, generally comes from improper nesting of loops. Loops are like onions; you can build layers which completely enclose other layers. In other words, the first loop to begin has to be the last to end.

```
1 FOR J=1TO5: FOR K= 3TO15: NEXT K: NEXT J
2 FOR J=1TO5: FOR K= 3TO15: NEXT J: NEXT K
```

Line 1 is correct because the K-loop is inside the J-loop. But line 2 spells trouble because loops cannot overlap.

The use of arrays can lead to easily rectified errors. It's best if you DIMension all arrays at the beginning of a program, or in a one-shot subroutine. Once you use DIM, you can't use it again on the same array name or you'll get a REDIM'D ARRAY error.

Order Of Operation

Most of the mistakes described above will cause your program to stop with an error message on the screen of your TV or monitor. They're situations where you tell the computer to do something and it doesn't recognize what you want. Program crashing errors are inconvenient, of course. But it's nice to have the computer tell you what kind of mistake you made and which line was wrong.

Less convenient are errors of procedure, where you write a program to do one thing, but it ends up doing something completely different. It doesn't crash, but it does strange things to the screen, or gives seemingly impossible results.

You have probably used instructions which you interpret one way, but the computer interprets another. And you can't change the way your computer does things, unless you want to completely rewrite the operating system (even changing the rules of BASIC means you have to follow the rules of machine language). Some programmers wish they could have a new BASIC command DWIM (Do What I Mean), which would instantly straighten out procedural errors.

One of the most common problems with mathematical calculations comes from the way the computer evaluates equations. There is a definite order of operations, sometimes called the hierarchy of operators, (the items at the top of the list have a higher priority):

( )	**Parentheses**
↑	**Exponentiation (up arrow)**
+ −	**Plus and Minus Signs**
* /	**Multiply and Divide**
+ −	**Add and Subtract**
=	**Equals (Assignment)**
= < >	**Comparisons: Equals, Less Than, Greater Than**
NOT	**Logical NOT**
AND	**Logical AND**
OR	**Logical OR**

Note that some operations, like NOT, work on a single number; they're called unary. Most need two numbers and are called binary functions. Plus and minus signs can be either unary (in the number −3, the minus sign works on a single number) or binary (the minus sign connects two numbers in the expression 10 − 6).

Because the higher operations are calculated first, you can always figure out the results of an equation. For example, J = 4 + 5 * 3 assigns 19 to J because the multiplication is done first, binary addition second, and assignment-equals third.

When you're debugging a program and one of the variables is being consistently miscalculated, there's a good chance you're a victim of the hierarchy. The quickest way to fix such an error is to liberally sprinkle parentheses throughout the suspicious equations. Your other choice is to trace through the line step by step, to find how the computer is evaluating the equation.

There's a slight chance that using too many parentheses in debugging can lead to one of the more puzzling errors, stack problems, caused by one of the various limits you have to live with.

Memory Limits: The Stack

There are two causes of OUT OF MEMORY errors. The first is programs and variables filling up all available BASIC RAM (more likely to happen with a VIC). The second is a stack overflow (the likely cause of OUT OF MEMORY errors on a 64).

Let's look at the stack first. The *stack* is a special section of memory just above zero page. It takes up most of page 1. The stack is used by the operating system for notes to itself.

When a 64 or VIC begins a FOR-NEXT loop, it writes a note about where in memory the loop

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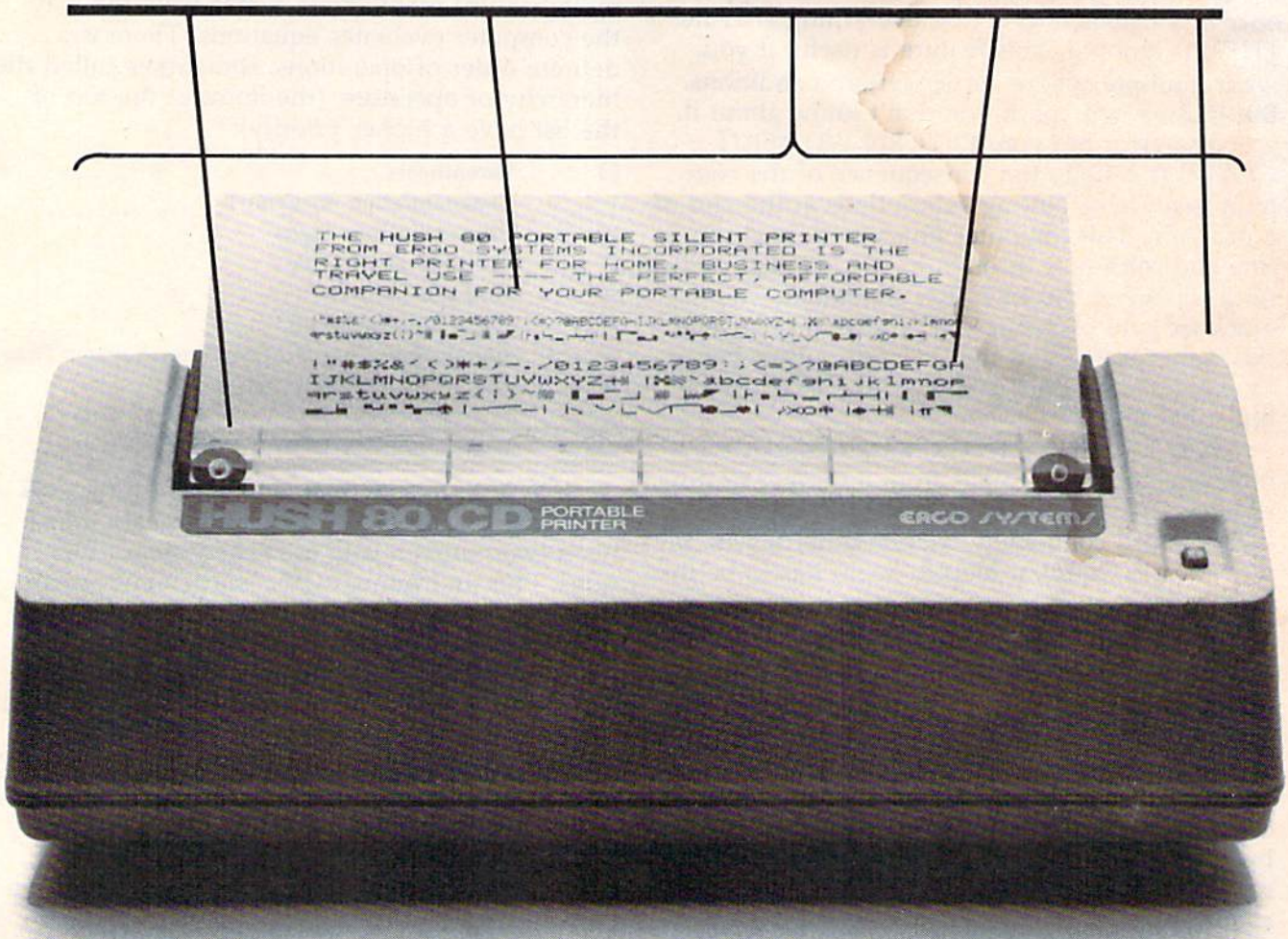

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begins, pushes it on the stack, and forgets about it until it comes across a NEXT statement. NEXT tells the computer that somewhere earlier in the program a FOR started a loop. It then pulls the information it needs off the stack and jumps back.

Something similar happens when there are parentheses in an equation, and when you use GOSUB. To illustrate, type NEW and try running the following program:

```
10 A=A+1: PRINTA
20 GOSUB 10
```

A very short program with only one variable counts up to 24 and then crashes. How could it possibly run out of memory? The key is the GOSUB. Every time you go to a subroutine, the return address is saved on the stack. Since there are no RETURNs in the program, more and more addresses are saved, until finally there is no stack space left. It's as if you were trying to stick more and more notes to a refrigerator, until the magnet could hold no more.

Type NEW and enter this program:

```
10 FORA=1TO20
20 FORB=1TO20
30 FORC=1TO20
(and so on, up to 130 FORM=1TO20)
```

Don't worry about adding any NEXTs, the computer will never get that far. Run the program and you'll get an OUT OF MEMORY error after only ten loops have begun. A FOR-NEXT loop uses up a lot of space on the stack—for a pointer to beginning of the loop, step size, highest value, and variable names.

When stack problems pop up, they're often caused by a GOTO in the middle of a subroutine. It can leave some garbage on the stack. The same goes for jumping out of a FOR-NEXT loop. And too many parentheses can give you either a FORMULA TOO COMPLEX error or contribute to an OUT OF MEMORY message. As the garbage on the stack builds up, it eventually reaches the limit.

Programs And Variables

The other way to run out of memory is fairly straightforward. You simply use too much BASIC RAM for the program and its variables. Try the following program:

```
10 T$="ABCD":U$=""
20 L=FRE(0):IFL<0THENL=L+2↑16
30 L=INT((L-30)/3):DIM A$(L)
40 FORJ=1TOL
50 A$(J)=T$+U$
60 PRINT J; LEN(A$(J)), FRE(0)
70 NEXTJ
```

It runs on a VIC (expanded or not) or a 64. You'll run out of memory almost right away.

Now change line 50:

```
50 A$(J)=T$
```

Run it again and there's no loss of memory. It will run all the way through (press RUN/STOP if you don't want to watch hundreds of strings go by). The first program wasn't able to create even ten four-letter strings, the second created hundreds. The only difference is that the first program added a null string (which has a length of zero); the second did not. The first created *dynamic strings*, the second created *static strings*.

If you define a string by concatenating (adding two strings together), by dissection (dividing a string with MID$, LEFT$, or RIGHT$), or by inputting it (from a tape or disk file, or the keyboard) the string is called dynamic. It has to use up part of BASIC memory. If you define it in BASIC, assigning it (A$="ABC") or reading it from DATA statements (READA$), the computer saves memory by remembering where the definition was in program memory. Your VIC or 64 doesn't have to use free memory to store static strings. They're already in BASIC memory.

If you define a lot of variables (as in the above program), available memory can dwindle to nothing. When you find your program running out of memory, you can try a number of things:

1). **Check free memory.** If there seems to be a lot left, you may have a full stack, caused by too many unresolved FOR-NEXT loops or GOSUBs.

2). **Eliminate unnecessary program lines, especially REMarks.** Or combine two or more statements on a single line separated by colons (every line uses five bytes for overhead, whether it has one statement or eight).

3). **Cut back on variables.** If you're using arrays, remember that integer arrays use less than half the space of floating point arrays.

4). **Completely rewrite your program.** It sounds drastic, but once you've figured out the procedures you're using, the second version of a program is often faster and uses less memory.

5). **Try chaining programs.** If you have a lot of instructions in a game program, you can write a loader program which prints the instructions and then loads the main program.

Next month, we'll look at some quirks of the VIC and 64, how imprecise and inaccurate math can be, why you can sometimes PRINT impossible-to-INPUT variables to a tape or disk file, why programs sometimes pause as if locked up and then continue, and more. We'll also look at a variety of methods to hunt down and eliminate bugs.

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Stop And Go

Jim Pejsa

When a program is running and the telephone rings, what do you do? This short machine language routine provides a pause button which temporarily halts the program. It also works on program listings. For VIC and 64.

A very useful function found on many other computers is missing from Commodore computers. Many computers allow the programmer to stop and restart a program listing or run using CTRL-S and CTRL-Q.

Pressing the CTRL key on the VIC or 64 will slow the listing down, but to carefully study a program it's often necessary to stop the listing. Having to continue the listing by retyping LIST followed by some line numbers (if the program is long) is an inconvenience. Additionally, there are times when you want to stop a program (maybe to study some output) and restart it at will.

Since I was anxious to try some machine language programming, I decided to write a program to add this feature. CTRL-S (for stop) and CTRL-Q (for restart) seem to be standard for these functions on many computers. The program is designed in such a way that the realtime clock will continue to be updated while processing is stopped.

The machine language for the program in the DATA statements is loaded by the BASIC program. Simply type in the program and run it to load the ML. The program loads beginning at location 679 ($02A7) in some unused locations below the BASIC program area, so it will not interfere with any BASIC programs. The SYS statement in line 30 starts the machine language program. Unfortunately, if RUN/STOP–RESTORE is ever used to stop a program, you will find that the CTRL-S and CTRL-Q functions become inoperative. You can get them back by typing SYS 679.

Briefly, the program works as follows. When it is initially started with SYS 679 in BASIC, the hardware interrupt (IRQ) vector is changed to point to this program. The program is accessed each time the hardware interrupt occurs (every 1/60 second). The program checks for a CTRL-S keypress. If it's detected, it stops the listing or run and then checks for CTRL-Q. When CTRL-Q is pressed, the listing or run is restarted.

Program 1: Stop And Go—64 Version

```
10 FORI=679TO743:READ A:X=X+A:POKEI,A:NEX
   T                                :rem 119
20 IFX<>7291THENPRINT"ERROR IN DATA STATE
   MENTS.":STOP                     :rem 135
30 SYS679                             :rem 8
40 DATA 120,169,180,141,20,3,169    :rem 29
50 DATA 2,141,21,3,88,96,173        :rem 95
60 DATA 141,2,201,4,208,42,165     :rem 179
70 DATA 197,201,13,208,36,120,169  :rem 87
80 DATA 49,141,20,3,169,234,141    :rem 241
90 DATA 21,3,88,173,141,2,201      :rem 135
100 DATA 4,208,249,165,197,201,62  :rem 88
110 DATA 208,250,120,169,180,141,20
                                   :rem 169
120 DATA 3,169,2,141,21,3,76        :rem 83
130 DATA 49,234                    :rem 224
```

Program 2: Stop And Go—VIC Version

```
10 FORI=679TO743:READ A:POKEI,A:X=X+A:NEX
   T                                :rem 119
20 IFX<>7589THENPRINT"ERROR IN DATA STATE
   MENTS.":STOP                     :rem 145
30 SYS679                             :rem 8
40 DATA 120,169,180,141,20,3,169    :rem 29
50 DATA 2,141,21,3,88,96,173        :rem 95
60 DATA 141,2,201,4,208,42,165     :rem 179
70 DATA 197,201,41,208,36,120,169  :rem 88
80 DATA 191,141,20,3,169,234,141    :rem 31
90 DATA 21,3,88,173,141,2,201      :rem 135
100 DATA 4,208,249,165,197,201,48  :rem 92
110 DATA 208,250,120,169,180,141,20
                                   :rem 169
120 DATA 3,169,2,141,21,3,76        :rem 83
130 DATA 191,234                   :rem 14
```


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Part 1

Baker's Dozen

Lawrence Cotton

A short, carefully designed program can produce some amazing results. To demonstrate, here's the first of a three-part series of 13 graphics and sound programs which entertain and amuse. A number of effective programming techniques are demonstrated also.

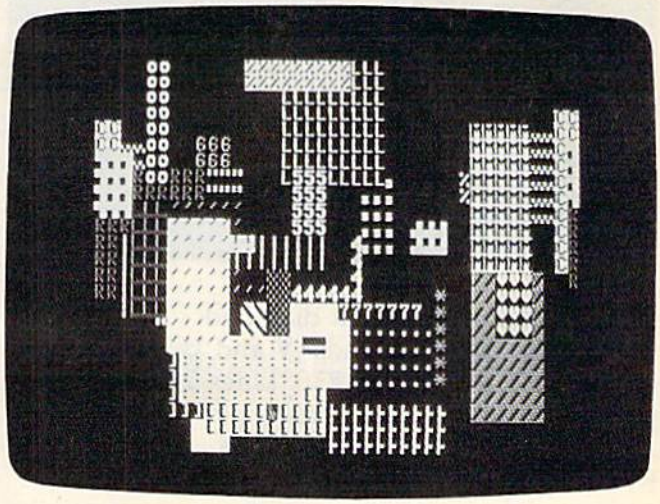
Program length cannot be equated with program quality. You might remember your first efforts at BASIC programming, and in looking back see how much more efficient and effective your programming methods could have been. Sometimes, just a few lines can go a long way.

In this series, we'll look at some programs which are designed to show off the graphics and sound capabilities of the 64. You'll notice that each of the programs is short and to the point. This makes the listings easier to understand so you can see what's happening and incorporate the ideas into your own programs. Or experiment with these short programs, expanding them to do more.

This month, the four selections are graphics programs: "Quilt," "Double Diamond," "Tunnels," and "Christmas Tree." As the series continues, you might want to experiment by combining sound from one program (we'll look at sound programs next month) with graphics from another. Most of the programs involve POKEing characters to the screen in visually pleasing patterns and colors. Feel free to substitute your own characters, colors, or limits. It's best to have a color TV or monitor.

Quilt

This ten-line program produces a multicolor patchwork quilt which changes repeatedly until you press RUN/STOP–RESTORE. Let's look at the program to see how it works.



Line 10 clears the screen (CHR$(147)), changes the character color to white (CHR$(5)), and makes the background and border colors black (POKE 53280,0 and 53281,0). In line 20, R is the amount to be added to screen memory locations to get the corresponding color memory locations. A is the increment.

Line 30 and the first half of line 40 choose random sizes of blocks to be "painted." In the last half of line 40, a random character (M) is chosen to paint the blocks.

Lines 50 and 60 make sure the selected block will fit on the screen; if not, another size is

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chosen.

Lines 70–100 perform the painting of the blocks. A loop within a loop paints a block of size N characters by P characters in color Q starting at location V. Line 100 then jumps back to restart the process.

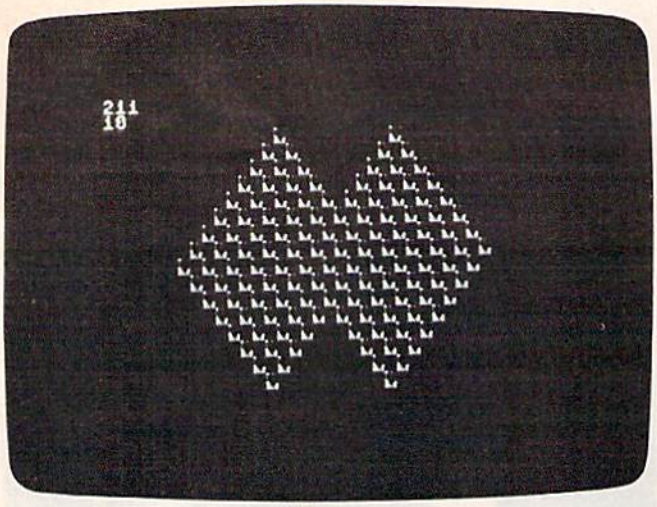
Double Diamond

This program's a bit longer (23 lines), but the effect is quite nice. It draws two superimposed diamonds of random characters and colors.

Let's look at the key lines. Lines 30 and 40 contain values for the location of the diamonds (V and W) and for the creation of the diamonds within diamonds (S and U).

Line 50 picks a random color (T).

Lines 60–120 POKE random characters and colors to the screen and increment the position of characters by A, B, C, and D to produce diagonal motion to form the left diamond. Lines 150–200



do the same for the right diamond.

Each of the diamonds (V and W) is limited in size in lines 130 and 210. Lines 220 and 230 pause then loop back to create new diamonds. Again, to stop the program, press RUN/STOP-RESTORE.

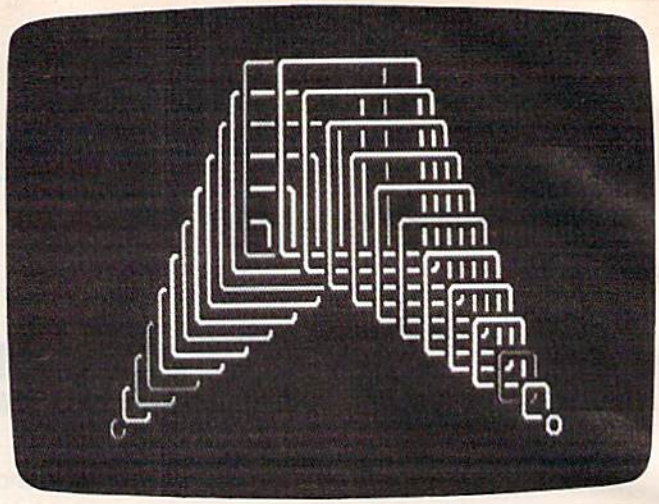
Tunnels

Probably the most interesting visual effect this month is "Tunnels."

Line 20 sets up variables for drawing the rectangles and starts at screen location 1984. Lines 30 and 70 control the number of rectangles drawn in each loop.

Lines 40, 60, and 80 determine the rectangles' positions and increase their size by one as they are drawn.

The rectangles are created in lines 120–190. Numbers 66 and 67 are the values to POKE for vertical and horizontal lines, and 73, 74, 75, and



85 are the POKE values for the four corners of each rectangle.

Christmas Tree

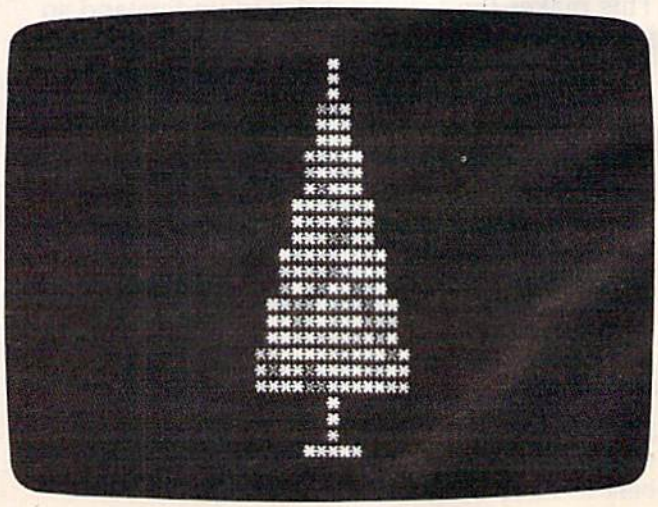
Finally, let's do a program in the holiday spirit. "Christmas Tree" draws a twinkling tree formed of "lights" which randomly turn on until the tree is completely filled. It then continues twinkling until you press RUN/STOP-RESTORE.

If you'd like to change the shape of the tree, be sure to change the 156 in lines 40–60 to the total number of spots you want to light up.

Line 90 POKEs the random spot with an asterisk (#42) and its corresponding color memory location with a random color code from 1 to 14 (omitting black and light gray). The DATA statements in lines 110–360 are the actual screen locations for the asterisks to be POKEd.

Feel free to experiment with the variables in these programs and see what interesting modifications you can come up with. Next month, we'll look at some programs which integrate sound and graphics.

See program listings on page 160.



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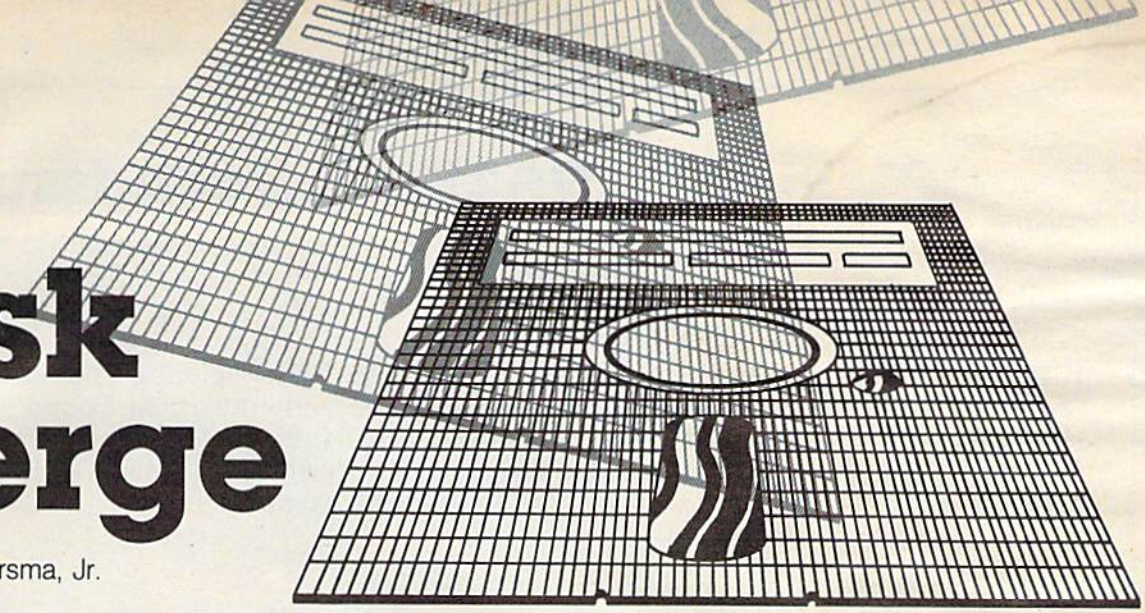

Disk Merge

Robert D. Riemersma, Jr.

A disk full of useful subroutines can be a great help when you're writing a program. But to be truly useful, two or more might need to be merged. This utility does it for you. For the VIC or 64, with a disk drive.

"Disk Merge" does just what its name says. It reads two BASIC programs from a disk and merges them into a new file on the disk. To merge more than two programs, run it more than once.

A simple appending program (see the February 1984 GAZETTE Feedback for an example) will add one program to the end of another. A merge program is more sophisticated. It must look at the line numbers and insert them in their proper place, as if shuffling a deck of cards.

Four Questions

Type in and save the program. Before running it, make sure the two programs to be merged are on the same disk. They must be PRG (program) files. Disk Merge won't work on sequential or relative files. It's a good idea to turn off any other peripherals, especially printers.

Run it and you'll be asked four questions. (The STOP key is disabled during input, so if you want to escape the program, type the asterisk (*) and press RETURN.)

Primary File?

Enter the name of the primary file you'll be merging. Keep in mind that if the two programs have a line number in common, the primary file takes precedence. For example, if they both include a line numbered 210, only the line from the primary file will appear in the final merged program.

If you have a dual disk drive, you can include the drive number by entering a quotation mark, drive number, colon, and the filename. This allows you to merge programs from two different disks. Note that this doesn't apply if you own two 1541s (device 8 and device 9). It will only work with a dual drive (drive 0 and drive 1) such as the Commodore 4040 or an MSD. With 1541s, the two programs must be on the same disk.

Secondary File?

Answer this question with the name of the second program, the one which will be merged into the first.

Merged File?

Enter a name for the new program, the output file.

Base Address? 1025

The VIC-20 and 64 automatically relocate BASIC programs on a standard LOAD, so it doesn't really matter what the number is. Simply press RETURN. However, if you want the program to work on a PET/CBM, the base address 1025 will create a program that runs on the VIC, 64, or PET/CBM models (within the usual limits of compatibility).

After answering the questions, two things will happen. You'll see the disk drive's red light turn on, and numbers will appear on the screen. The numbers tell you which line is being processed and written to disk.

On the left, you'll see the primary file's current line number. On the right is the line being merged from the secondary file.

When the program ends, you have two options. You can run it again (to merge more programs), or load the newly merged program, which should be ready to run. On large programs, the merge may take several minutes.

See program listing on page 172.

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COMPUTE!'s GAZETTE Back Issues

JULY 1983: Commodore 64 Video Update; Snake Escape; Alfabug; VIC Marquee; Word Hunt; Learning To Program In BASIC; Quickfind; 64 Paddle Reader; Machine Language For Beginners; Enlivening Programs With Sound; Using Joysticks On The 64.

OCTOBER 1983: The Anatomy of Computers; Telegaming Today And Tomorrow; Commodore's Public Domain Programs; Oil Tycoon; Re-Beep; Aardvark Attack; Word Match; Machine Language For Beginners; How To Use Tape And Disk Files; Understanding 64 Sound; Speeding Up The VIC; HOTWARE; Improving 64 Video Quality; Using The VIC's Clock.

MARCH 1984: The Electronic Castle: Managing Your Home With Your Computer; Getting Started With A Disk Drive, Part 5; CUT-OFF!; Poker; Tree Tutor For Tots; Guess America!; Sea Route To India.

APRIL 1984: Robots: The New Mobile Computers; How To Start A User Group; Bingo 64; Making Calendars; French Tutor; Hints & Tips: Adding A Second Joystick To The VIC; Power BASIC: Numeric Keypad.

MAY 1984: Exploring 64 Sound; SpeedScript Revisited; Sound Sculptor For The 64; Props; Mind Boggle; Memo Writer; The Beginner's Corner: Teaching Music With Computers.

JUNE 1984: The Future Of Computer Games: Software That Thinks For Itself; 3-D Tic-Tac-Toe; Castle Dungeon; Therapy; File Copier; Power BASIC: One-Touch Keywords; The Beginner's Corner: Planning A Game Program.

JULY 1984: In Touch With Your Computer: Graphics Tablets And Light Pens; Space Patrol; Robot Math; Ultrafont +; Machine Language For Beginners: What Is Machine Language?; The Beginner's Corner: Quilt Squares.

AUGUST 1984: A Survey Of Printers For The VIC And 64; Selecting A Printer Interface; Campaign Manager; Sprite Magic; Balloon Blitz; Disk Purge; The Beginner's Corner: Using A Printer.

Issues not listed are not available.

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NEWS & PRODUCTS

VIC, 64 Interfaces

Omnitronix Incorporated has released two interfaces for use with the VIC-20 or Commodore 64.

The parallel printer interface connects to the user I/O port on either the VIC-20 or the 64 and comes with a driver software disk which allows CBM printer emulation, such as tabbing.

Printers without bitmap graphics capability can print Commodore graphics and control codes in the form of mnemonics or the CHR$ code.

Suggested retail price is $39.95.

The second interface, the Deluxe RS-232 Interface, which also plugs into the user I/O port, provides many RS-232 signals, including ring detect. It has three user-selectable switches allowing settings for DTE/DCE, pin 5, or pin 20 handshaking, and selection of a BUSY line polarity.

The interface comes with either a male DB25 on a three-foot cable or a PCB mounting female DB25, making it compatible as a replacement for the Commodore 1011A.

Included in the $39.95 retail price is a BASIC terminal program which can be typed in.

Omnitronix Incorporated
P.O. Box 43
Mercer Island, WA 98040
(206) 236-2983

The NOMAD personal robot for the Commodore 64 retails for $179.95.

Personal Robot For 64s

Genesis Computer Corporation has introduced NOMAD, a personal robot for use with the Commodore 64.

NOMAD is driven by stepper motors, and can move forward, reverse, right, and left. It has ultrasonic "eyesight" which allows it to detect objects in its path.

NOMAD's robot control language allows the user to create complex patterns of movement. The robot also can be controlled through a joystick. NOMAD plugs into the 64's user port and comes with its own power supply and a 25-foot cord.

An optional BASIC enhancement cartridge is available which adds NOMAD control commands such as AHEAD, BACK, LEFT, and RIGHT.

NOMAD has a suggested retail price of $179.95. The BASIC cartridge retails for $39.95.

Genesis Computer Corporation
1444 Linden Street
P.O. Box 1143
Bethlehem, PA 18018
(215) 861-0850

64 Productivity Software

PFS:FILE and *PFS:REPORT*, previously available only for IBM and Apple computers, have

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been released for the Commodore 64 by Software Publishing Corporation.

PFS:FILE works like a paper filing system, allowing the user to record, retrieve, update, and review information. Data can be organized on forms which are user-designed.

PFS:REPORT sorts, calculates, formats, and prints summary tables from the information in files created with *PFS:FILE*. It prints multiple columns per report, including three calculated columns.

Totals, subtotals, averages, subaverages, counts, and subcounts can be printed for every column. The software also has sorting capabilities, as well as automatic page numbering, title printing, and centering.

PFS:FILE retails for $79.95. *PFS:REPORT* is available for $69.95.

Software Publishing Corporation
1901 Landings Drive
Mountain View, CA 94043
(415) 962-8910

Real Estate Game, Hardware For VIC And 64

Real Estate 64, a Monopoly-type game with 3-D graphics for the Commodore 64, has been introduced by Handic Software.

The firm also has introduced Vic-Switch, a multi-user disk system for the VIC and 64; Super Box 64, an expansion unit for the 64; and a 300 baud modem.

Real Estate 64, available on disk for $49.95, includes traditional Monopoly features such as buying streets, going to jail, chance, and the use of dice.

The Vic-Switch was developed for educational use, but can be used in any situation where more than one person needs access to the same disk or printer. Up to eight VIC-20s or C-64s can be hooked up to one Vic-Switch. All CPUs have access to disk drive and printer. Retail price is $149.95.

The Super Box 64 allows up to three cartridges to be plugged in simultaneously. Other features include an IEEE interface, reset function, and multi-user capabilities. It retails for $149.95.

The 300-baud modem ($149.95) is switch controlled, allowing either originate or answer options. It connects to the user port of the VIC or 64.

Handic Software Inc.
520 Fellowship Road
Mount Laurel, NJ 08054
(609) 866-1001

VIC-20 Keyboard Program Module

Micromechanisms, Inc. has introduced a Keyboard Program Module which, when combined with a VIC-20, creates a multifunction ASCII encoded keyboard for use with more sophisticated computers.

The plug-in module does not physically modify the VIC-20, allowing the computer to continue to run applications and games. The module also converts VIC function keys into special character codes required by the *Wordstar* word processor.

Suggested retail price is $35.

Quality Electronics Inc.
Micromechanisms Division Inc.
P.O. Box 1150
112 Maple Avenue
Dublin, PA 18917
(215) 249-0331

The address and telephone numbers for Mosaic Electronics, maker of the *Access-M* memory expansion system for the Commodore 64, is P.O. Box 708, Oregon City, OR, 97045; (toll free) 1-800-2ADD-RAM or (503) 653-7885. The information was inadvertantly omitted from the December *News & Products* section.

New Educational Software Series For The 64

Orbyte Software has introduced a line of 56 home educational software titles—*Challengeware*—for the Commodore 64.

Geared primarily for children from pre-school through upper elementary grades, the 110 programs are divided into nine areas: pre-school concepts, mathematics, grammar, science, social studies, economics, reading, foreign language, and logic and strategy.

The programs retail for $39.95 each.

Orbyte Software
P.O. Box 948
Waterbury, CT 06720
(203) 621-9361

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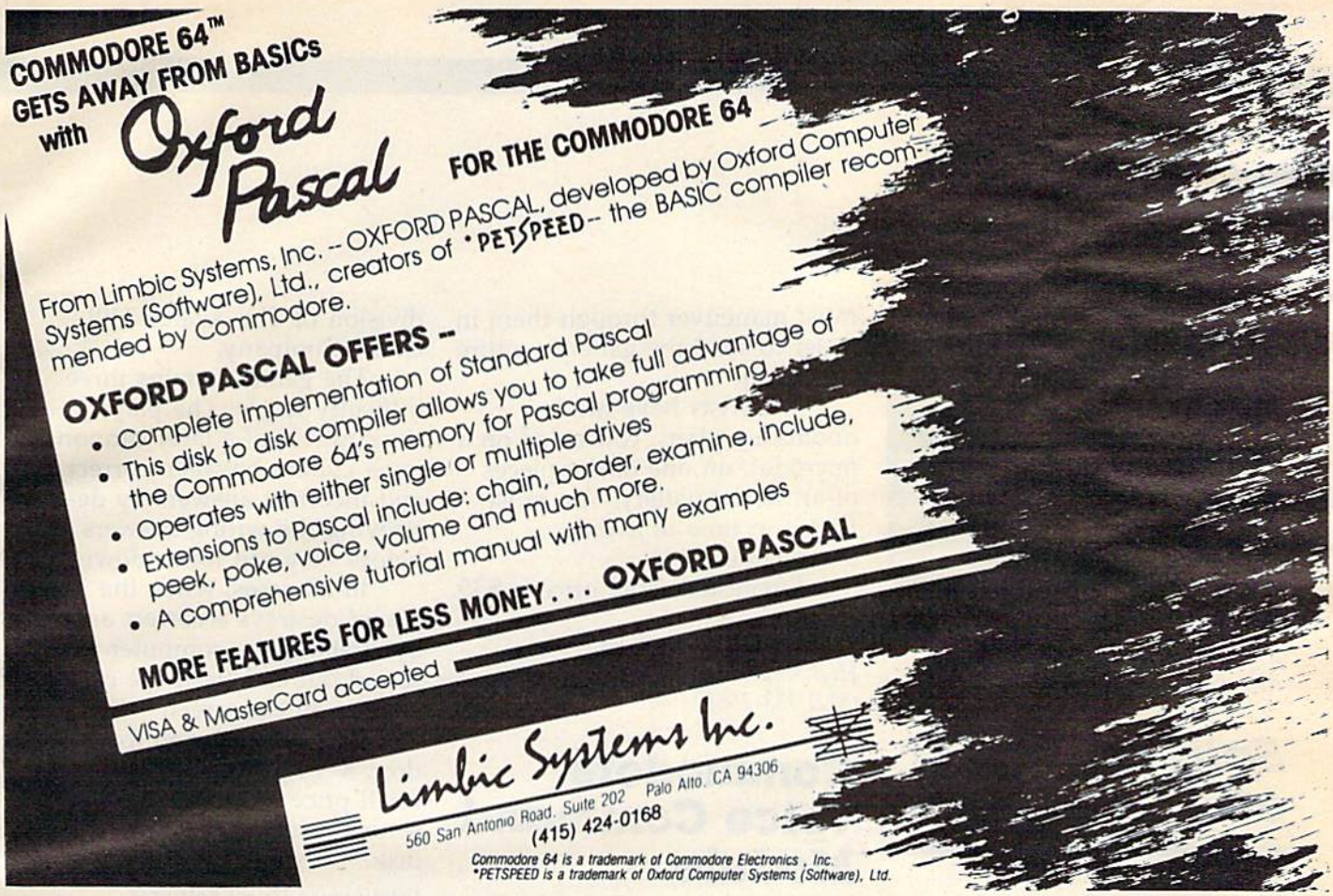

Biofeedback, Utility Programs For 64

The Stress Manager, a biofeedback monitoring system, and *HomePak*, a utility program, have been introduced for the Commodore 64 by Batteries Included.

The *Stress Manager* allows home computer owners to assess their thought patterns and physiological impulses in order to gain an understanding of factors which contribute to stress.

It uses a galvanic skin resistance (G.S.R.) method to measure a user's vital statistics. A pair of fingertip pads measure fluctuations in the skin's electrical conductivity, and these impulses are transmitted to *The Stress Manager* for analysis.

After the results are interpreted, they are displayed on three graphs. Another feature is an audio cassette, which includes methods of relaxation and stress reduction.

Suggested retail price is $79.95.

HomePak combines on one disk a telecommunications terminal program, an information management system, and a word processor for a suggested retail price of $49.95.

Each of the *HomePak* programs is capable of reading files created by the others.

HomeTerm, the telecommunications program, features a text edit window which is available for simultaneous text creation and reception. The user can define screen color, text margins, word wrapping, and key clicking (each keystroke made audible with a beep). An on-screen clock keeps track of the time elapsed since the user logged onto a bulletin board or information service.

HomeFind, the information manager program, features an English command structure to simplify use. Printed reports from *HomeFind* can be used by the *HomeText* word processing program.

HomeText features include the ability to set margins, indentations, line centering and spacing, and placement of headers, footers, and page numbers.

It also has the ability to delete portions of text and reinsert them at any point within the text body. *HomeText* is capable of supporting most major printing functions, including boldface, underlining, and extended character width.

Batteries Included
3303 Harbor Blvd., Suite C9
Costa Mesa, CA 92626
(714) 979-0920

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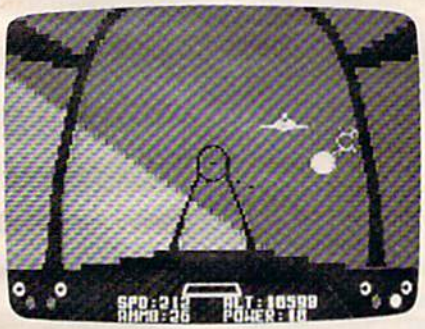

A scene from Spitfire Ace, *a new flight simulation game from MicroProse.*

Spitfire Ace For 64

MicroProse Software has announced *Spitfire Ace*, a World War II fighter pilot simulation game, for the Commodore 64.

Players maneuver their aircraft through a series of fighter tactics, including aileron rolls, loops, split S's, and Immelmann turns, while engaged in an aerial dogfight.

Suggested retail price for *Spitfire Ace* is $29.95.

MicroProse Software
10616 Beaver Dam Road
Hunt Valley, MD 21030
(301) 667-1151

Art Heist Game

The Heist, a disk-based game for the Commodore 64 which features 90 different booby trapped rooms, has been introduced by the MicroFun division of MicroLab.

The rooms are on three different levels of an art gallery, and super spy Graham Crackers must maneuver through them in order to steal the gallery's entire collection.

Terrorists have hidden doomsday plans, concealed on a microdot, on one of the pieces of art in the gallery. You must find it in time to avoid destruction.

Suggested retail price is $35.

MicroFun
2699 Skokie Valley Road
Highland Park, IL 60035
(312) 433-7550

Commodore Voice Command Module

ENG Manufacturing, Inc. has introduced Chirpee, a module which allows Commodore computers to receive and interpret selected commands.

According to product developers, Chirpee can accept commands spoken in any language because of its phonetic recognition ability, and can be trained to respond to one voice, or a number of voices.

Suggested retail price for Chirpee is $179.95.

ENG Manufacturing, Inc.
4304 W. Saturn Way
Chandler, AZ 85224
(602) 961-0165

64 Math Game

Divex, a math game designed to improve children's understanding of multiplication and division, has been introduced by Intelligence Quest Software, a division of The Avalon Hill Game Company.

The game contains three difficulty levels. The player, at the controls of a laser cannon, must choose between correct and incorrect answers by destroying the wrong answers before they can touch down.

In all cases, when the player destroys a correct answer by mistake, the computer will sound out and flash the correct answer on the screen.

Divex is designed for children 8–12 years old. Suggested retail price is $16 for the cassette version, and $21 for the disk.

Intelligence Quest Software
The Avalon Hill Game Company
4517 Harford Road
Baltimore, MD 21214
(301) 254-5300

64 Advertising Display Program

AdvertiserOne, a program to display user-designed messages on the Commodore 64, has been announced by MicroAds.

The display messages are generated and maintained with the Commodore 64's standard screen editor. Displays can be based on message files and a standard command file which comes with the system, or with a user-created command file that can control the sequence, color, and text of the displays.

Message display features include: heading, subheading, and main message areas; ability to

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change heading, subheading, and main message text at any time; use of multiple message text and background colors; automatic text centering; and sprite graphic designs.

Suggested retail price is $19.95.

MicroAds
145 East Norman Drive
Palatine, IL 60067
(312) 991-9415

Typing Program For 64

Typetown Races, a touch typing tutorial for the Commodore 64, has been introduced by Softech.

The program, first in a series of self-improvement packages from Softech, contains more than 100 lessons, all of which are designed to teach touch typing. Included are the complete upper- and lowercase alphabetic, numeric, and special character keys. Users can progress at their own speed.

Typetown Races is available on disk for $24.95.

Softech
26 Sugar Maple Street
Kitchener, Ontario
N2N 1X5
Canada
(519) 744-5586

New product releases are selected from submissions for reasons of timeliness, uniqueness, available space, and general interest. Readers should be aware that News & Products often contains an edited version of material submitted by vendors. We are unable to vouch for its accuracy at time of publication.

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DUNGEONS OF MAGDARR - Serious D of D for up to 8 players. Features full 3d GRAPHICS! You get a choice of several characters that grow from game to game and are interchangeable with characters from our famous Dungeons of Death game. A real dungeon with level after level of monsters to conquer and treasures to find - all in hi-res 3d graphics.

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TOO NEW FOR PICTURES ! !

In a last minute Christmas coup, **British Intelligence** has snagged the rights to Europes most popular graphic Adventures. **BASTOW MANOR:** A cult game in Europe and Australia. **SUPER SLUETH:** A Sherlock Holmes type Adventure. **NUCLEAR-WARGAMES:** A supercomputer wants to start WW III.

Phone or write for complete descriptions.

Available on Commodore 64 Only Tape or Disk $19.95

QUEST - A different kind of Graphic Adventure. It is played on a computer generated mape of Alesia. You'll have to build an army and feed them through combat, bargaining, exploration of ruins and temples, and outright banditry! Takes 2 - 5 hours to play and is different each time.

Available On: TRS80C 16K, CMD64, VIC20 13K, MC10 16K, TI99 (EXT. BASIC), IBMPC

TAPE $14.95 DISK $19.95

MARS - Your ship crashed on the Red Planet and you have to get home. You will have to explore a Martian City, repair your ship, and deal with possibly hostile aliens to get home again. This is recommended as a first Adventure. It is in no way simple - playing time normally runs from 30 to 50 hours, but it lets you try out Adventuring before you battle the really tough ones. Full Graphics Adventure.

Available On: TRS80C, CMD 64, IBM PC

TAPE $19.95 DISK $24.95

PYRAMID - ONE OF THE TOUGHEST ADVENTURES. Average time through the pyramid is 50 - 70 hours. Clues are everywhere and some ingenious problems make this popular around the world. FULL GRAPHIC ADVENTURE.

Available On: TRS80C 16K, CMD64, MC10 16K, IBM PC

TAPE $19.95 DISK $24.95

BAG-IT-MAN - The ultimate arcade game for TRS80C or MCD64. This one has three screens full of BAGS OF GOLD, CARTS & ELEVATORS TO RIDE IN, MINE SHAFTS, and TWO NASTY GUARDS. Great sound and color and continuous excitement.

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How To Type In COMPUTE!'s GAZETTE Programs

Each month, COMPUTE!'s GAZETTE publishes programs for the VIC-20, Commodore 64, Plus 4, and 16. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. Also, carefully read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

We publish two programs, appearing in alternating months, designed to make your typing effort easier: The Automatic Proofreader, and MLX, designed for entering machine language programs.

When entering a BASIC program, be especially careful with DATA statements as they are extremely sensitive to errors. A mistyped number in a DATA statement can cause your machine to "lock up" (you'll have no control over the computer). If this happens, the only recourse is to turn your computer off then back on, erasing whatever was in memory. So be sure to *save a copy of your program before you run it.* If your computer crashes, you can always reload the program and look for the error.

Special Characters

Most of the programs listed in each issue contain special control characters. To facilitate typing in any programs from the GAZETTE, use the following listing conventions.

The most common type of control characters in our listings appear as words within braces: {DOWN} means to press the cursor down key; {5 spaces} means to press the space bar five times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing another key), the character is underlined. For example, A means hold down the the SHIFT key and press A. You may see strange characters on your screen, but that's to be expected. If you find a number followed by an underlined key enclosed in braces (for example, {8 A}), type the key as many times as indicated (in our example, enter eight SHIFTed A's).

If a key is enclosed in special brackets, ⟦ ⟧, hold down the Commodore key (at the lower left corner of the keyboard) and press the indicated character.

Rarely, you'll see a single letter of the alphabet enclosed in braces. This can be entered on the Commodore 64 by pressing the CTRL key while typing the letter in braces. For example, {A} means to press CTRL-A.

The Quote Mode

Although you can move the cursor around the screen with the CRSR keys, often a programmer will want to move the cursor under program control. This is seen in examples such as {LEFT}, and {HOME} in the program listings. The only way the computer can tell the difference between direct and programmed cursor control is *the quote mode.*

Once you press the quote key, you're in quote mode. This mode can be confusing if you mistype a character and cursor left to change it. You'll see a reverse video character (a graphics symbol for cursor left). In this case, you can use the DELete key to back up and edit the line. Type another quote and you're out of quote mode. If things really get confusing, you can exit quote mode simply by pressing RETURN. Then just cursor up to the mistyped line and fix it.

When You Read:	Press:	See:
{CLR}	SHIFT + CLR/HOME	
{HOME}	CLR/HOME	
{UP}	SHIFT + CRSR ↕	
{DOWN}	CRSR ↕	
{LEFT}	SHIFT + CRSR ↔	
{RIGHT}	CRSR ↔	
{RVS}	CTRL + 9	
{OFF}	CTRL + 0	
{BLK}	CTRL + 1	
{WHT}	CTRL + 2	
{RED}	CTRL + 3	
{CYN}	CTRL + 4	

When You Read:	Press:	See:
{PUR}	CTRL + 5	
{GRN}	CTRL + 6	
{BLU}	CTRL + 7	
{YEL}	CTRL + 8	
{F1}	f1	
{F2}	SHIFT + f1	
{F3}	f3	
{F4}	SHIFT + f3	
{F5}	f5	
{F6}	SHIFT + f5	
{F7}	f7	
{F8}	SHIFT + f7	

When You Read:	Press:	See:
←	←	
↑	SHIFT + ↕	

For Commodore 64 Only

When You Read:	Press:	See:
⟦1⟧	C= + 1	
⟦2⟧	C= + 2	
⟦3⟧	C= + 3	
⟦4⟧	C= + 4	
⟦5⟧	C= + 5	
⟦6⟧	C= + 6	
⟦7⟧	C= + 7	
⟦8⟧	C= + 8	

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The Automatic Proofreader

"The Automatic Proofreader" will help you type in program listings from COMPUTE!'s Gazette without typing mistakes. It is a short error-checking program that hides itself in memory. When activated, it lets you know immediately after typing a line from a program listing if you have made a mistake. Please read these instructions carefully before typing any programs in COMPUTE!'s Gazette.

Preparing The Proofreader

1. Using the listing below, type in the Proofreader. The same program works on both the VIC-20 and Commodore 64. Be very careful when entering the DATA statements — don't type an l instead of a 1, an O instead of a 0, extra commas, etc.

2. SAVE the Proofreader on tape or disk at least twice *before running it for the first time.* This is very important because the Proofreader erases this part of itself when you first type RUN.

3. After the Proofreader is SAVEd, type RUN. It will check itself for typing errors in the DATA statements and warn you if there's a mistake. Correct any errors and SAVE the corrected version. Keep a copy in a safe place — you'll need it again and again, every time you enter a program from COMPUTE!'s Gazette.

4. When a correct version of the Proofreader is RUN, it activates itself. You are now ready to enter a program listing. If you press RUN/STOP-RESTORE, the Proofreader is disabled. To reactivate it, just type the command SYS 886 and press RETURN.

Using The Proofreader

All VIC and 64 listings in COMPUTE!'s Gazette now have a *checksum number* appended to the end of each line, for example ":rem 123". *Don't enter this statement when typing in a program.* It is just for your information. The rem makes the number harmless if someone does type it in. It will, however, use up memory if you enter it, and it will confuse the Proofreader, even if you entered the rest of the line correctly.

When you type in a line from a program listing and press RETURN, the Proofreader displays a number at the top of your screen. *This checksum number must match the checksum number in the printed listing.* If it doesn't, it means you typed the line differently than the way it is listed. Immediately recheck your typing. Remember, don't type the rem statement with the checksum number; it is published only so you can check it against the number which appears on your screen.

The Proofreader is not picky with spaces. It will not notice extra spaces or missing ones. This is for your convenience, since spacing is generally not important. But occasionally proper spacing *is* important, so be extra careful with spaces, since the Proofreader will catch practically everything else that can go wrong.

There's another thing to watch out for: if you enter the line by using abbreviations for commands, the checksum will not match up. But there is a way to make the Proofreader check it. After entering the line, LIST it. This eliminates the abbreviations. Then move the cursor up to the line and press RETURN. It should now match the checksum. You can check whole groups of lines this way.

Special Tape SAVE Instructions

When you're done typing a listing, you must disable the Proofreader before SAVEing the program on tape. Disable the Proofreader by pressing RUN/STOP-RESTORE (hold down the RUN/STOP key and sharply hit the RESTORE key). This procedure is not necessary for disk SAVEs, *but you must disable the Proofreader this way before a tape SAVE.*

SAVE to tape erases the Proofreader from memory, so you'll have to LOAD and RUN it again if you want to type another listing. SAVE to disk does not erase the Proofreader.

Since the Proofreader is a machine language program stored in the cassette buffer, it will be erased during a tape SAVE or LOAD. If you intend to type in a program in more than one sitting or wish to make a safety SAVE, follow this procedure:

1. LOAD and RUN the Proofreader.
2. Disable it by pressing RUN/STOP–RESTORE.
3. Type the following three lines in direct mode (without line numbers):

```
A$="PROOFREADER.T":B$="{10 SPACES}":FO
RX=1TO4:A$=A$+B$:NEXTX
FORX=886 TO 1018:A$=A$+CHR$(PEEK(X)):N
EXTX
OPEN1,1,1,A$:CLOSE1
```

After you type the last line, you will be asked to press RECORD and PLAY. We recommend you start at the beginning of a new tape.

You now have a new version of the Proofreader (PROOFREADER.T, as renamed in the above code). Turn your computer off and on, then LOAD the program you were working on. Put the cassette containing PROOFREADER.T into the tape unit and type:

```
OPEN1:CLOSE1
```

You can now get into the Proofreader by typing SYS 886. To test this, PRINT PEEK (886) should return the number 173. If it does not, repeat the steps above, making sure that A$ (PROOFREADER.T) contains 13 characters and that B$ contains 10 spaces.

The new version of Automatic Proofreader will load itself into the cassette buffer whenever you type OPEN1:CLOSE1 and PROOFREADER.T is the next program on your tape. It will not disturb the contents of BASIC memory.

Automatic Proofreader For VIC And 64

```
100 PRINT"{CLR}PLEASE WAIT...":FORI=886TO
    1018:READA:CK=CK+A:POKEI,A:NEXT
110 IF CK<>17539 THEN PRINT"{DOWN}YOU MAD
    E AN ERROR":PRINT"IN DATA STATEMENTS.
    ":END
120 SYS886:PRINT"{CLR}{2 DOWN}PROOFREADER
     ACTIVATED.":NEW
886 DATA 173,036,003,201,150,208
892 DATA 001,096,141,151,003,173
898 DATA 037,003,141,152,003,169
904 DATA 150,141,036,003,169,003
910 DATA 141,037,003,169,000,133
916 DATA 254,096,032,087,241,133
922 DATA 251,134,252,132,253,008
928 DATA 201,013,240,017,201,032
934 DATA 240,005,024,101,254,133
940 DATA 254,165,251,166,252,164
946 DATA 253,040,096,169,013,032
952 DATA 210,255,165,214,141,251
958 DATA 003,206,251,003,169,000
964 DATA 133,216,169,019,032,210
970 DATA 255,169,018,032,210,255
976 DATA 169,058,032,210,255,166
982 DATA 254,169,000,133,254,172
988 DATA 151,003,192,087,208,006
994 DATA 032,205,189,076,235,003
1000 DATA 032,205,221,169,032,032
1006 DATA 210,255,032,210,255,173
1012 DATA 251,003,133,214,076,173
1018 DATA 003
```


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Bug-Swatter:
Modifications And Corrections

• Programs 2 and 3 from "Machine Language For Beginners" (November 1984) were inadvertently omitted from the "Program Listings" section. They are the BASIC loader programs (the equivalent of the source code included in the article) which were mentioned on page 132. The two programs follow:

VIC Memory Display

```
800 FOR ADRES=830TO859:READ DATTA
810 POKE ADRES,DATTA:NEXT ADRES
830 DATA 169, 5, 160, 0, 153, 0
836 DATA 148, 153, 0, 149, 136, 208
842 DATA 247, 162, 0, 181, 0, 157
848 DATA 0, 16, 189, 0, 2, 157
854 DATA 0, 17, 202, 76, 77, 3
```

64 Memory Display

```
800 FOR ADRES=830TO877:READ DATTA
810 POKE ADRES,DATTA:NEXT ADRES
830 DATA 169, 7, 160, 0, 153, 0
836 DATA 216, 153, 0, 217, 153, 0
842 DATA 218, 153, 0, 219, 136, 208
848 DATA 241, 162, 0, 181, 0, 157
854 DATA 0, 4, 189, 0, 2, 157
860 DATA 0, 5, 189, 0, 208, 157
866 DATA 0, 6, 189, 0, 220, 157
872 DATA 0, 7, 202, 76, 83, 3
```

• Last month, we published a suggestion from a reader in Gazette Feedback ("An End To Disk Drive Chatter"). Several readers called to inform us that it sometimes doesn't work with *Easy Script*, and that their drives wouldn't read any files even after turning the drive off and on. No cause for alarm, however. We duplicated the problem once, and the drive locked up (although subsequent tests worked fine, eliminating disk drive chatter). Although the suggested technique works with most commercial programs, if your drive should lock up, the solution is to initialize the drive with this command:

```
OPEN15,8,15,"I0":CLOSE15.
```

• The article for "Screen-80" (September 1984) stated that the program was compatible with the terminal software packaged with the 1650 Automodem. It *is* compatible, except that you can't use the function keys to change terminal parameters. If you want to be able to change parameters, follow this procedure:

1. Load *64 Term*

2. Type this line (in immediate mode):

```
POKE44,64: POKE 16384,0: NEW
```

3. Enter this short program to modify *64 Term:*

```
10 FORT=4634TO4644:READD:POKET,D:NEXT
20 DATA 32,198,2,169,14,32,210,255,76,229
   ,14
30 POKE2283,76:POKE2284,26:POKE2285,18
40 POKE45,38:POKE46,18:POKE44,8:CLR
```

If the label on your terminal software says *Autoterm*, don't use the above program. Instead, enter this one:

```
10 FOR T= 5633TO5643:READD:POKET,D:NEXT
20 DATA 32,198,2,169,14,32,210,255,76,87,
   16
30 POKE2664,76:POKE2665,1:POKE2666,22
40 POKE45,13:POKE46,22:POKE44,8:CLR
```

4. Type RUN. The above program makes some modifications to *64 Term.*

5. Save this new version to a new disk or tape (be sure to keep the original *64 Term*).

Once you've created the new *64 Term*, you can load and run Screen-80. Get out of 80-column mode with RUN/STOP–RESTORE. Next, load and run the modified *64 Term.* Change the parameters, using f4. When finished, press the E key. Instead of exiting to BASIC, you'll enter terminal mode (with 80-columns) with the new parameters set. We have tested these two modifications with different versions of *64 Term* and *Autoterm.* There may, however, be other versions of these two programs, and Commodore may make changes in the future.

Readers might also note that our sister magazine, COMPUTE!, is planning to run a terminal program in the first few months of 1985. This program will be compatible with Screen-80, and can be used to access standard-ASCII bulletin boards and information networks.

• Reader Barry Friedman has pointed out an error in the "Gazette Feedback" item "PEEKing The Joystick" (November 1984). The example on page 12 should read IF (PEEK(56320)AND16)=0 THEN PRINT "FIRE". The "=0" is important because joystick movements turn bits off (making them zero) rather than turning them on.

• There are no errors in the "Turtle Graphics" programs from October 1984; however, the article contained some typographical errors on page 93, under "How It Works". The start of BASIC is moved up to $4000, leaving $0800–$3FFF free (not $0800–$03FF). The sprite definitions do not go into the last 512 bytes of this free area—they are put into $0E00–$0FFF (decimal 3584–4095).

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Tiny MLX Machine Language Entry Program

For Unexpanded VIC-20

Charles Brannon, Program Editor

Note To Readers

This is the final appearance of Tiny MLX in the Gazette. In order to better use space in the magazine and to help eliminate confusion for those typing in programs, all VIC machine language programs listed in MLX format will require VIC MLX. MLX, both VIC and 64 versions, will appear in alternate months. The use of VIC MLX requires 8K memory expansion, although expansion is often not required to run an MLX-entered VIC program (notes are always included in the article).

MLX is a labor-saving utility that allows almost fail-safe entry of machine language programs published in COMPUTE!'s GAZETTE. You need to know nothing about machine language to use MLX—it was designed for everyone. "Tiny MLX" is a special version for the unexpanded VIC.

MLX is a new way to enter long machine language (ML) programs with a minimum of fuss. MLX lets you enter the numbers from a special list that looks similar to BASIC DATA statements. It checks your typing on a line-by-line basis. It won't let you enter illegal characters when you should be typing numbers. It won't let you enter numbers greater than 255 (forbidden in ML). It won't let you enter the wrong numbers on the wrong line. In addition, MLX creates a ready-to-use tape or disk file.

Using MLX

Type in and save "Tiny MLX" (you'll want to use it in the future). When you're ready to type in an ML program, run Tiny MLX. Unlike regular MLX, Tiny MLX does not ask for the starting and ending address of the program to be entered. Instead, this information must be included in line 210. The values currently shown in line 210 are for the "Kablam!" program in this issue. It's also necessary to change lines 100 and 763 to use Tiny MLX with Kablam!, so be sure to check these lines if you're using an earlier version of Tiny MLX. Refer to the article on page 60 for details.

You'll see a prompt corresponding to the starting address. The prompt is the current line you are entering from the listing. It increases by six each time you enter a line. That's because each line has seven numbers—six actual data numbers plus a *checksum number*. The checksum verifies that you typed the previous six numbers correctly. If you enter any of the six numbers wrong, or enter the checksum wrong, the computer rings a buzzer and prompts you to reenter the line. If you enter it correctly, a bell tone sounds and you continue to the next line.

MLX accepts only numbers as input. If you make a typing error, press the INST/DEL key; the entire number is deleted. You can press it as many times as necessary back to the start of the line. If you enter three-digit numbers as listed, the computer automatically prints the comma and goes on to accept the next number. If you enter less than three digits, you can press either the comma, space bar, or RETURN key to advance to the next numbr. The checksum automatically appears in reverse video for emphasis.

MLX Commands

When you finish typing an ML listing, you can then save the completed program on tape or disk. Follow the screen instructions. If you get any errors while saving, you probably have a bad disk, or the disk is full, or you made a typo when entering the MLX program itself.

Since Tiny MLX has no provisions for reloading a partially completed program, you must enter the ML program all in one sitting.

See program listing on page 173.

All programs listed in this magazine are available on the GAZETTE Disk. See elsewhere in this issue for details.

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Telecommunications Software

The listing below is the second half of the C/G Bulletin Board System. Part 1 and the article with instructions on use were published last month. Do not enter Part 2 until you have completed typing in Part 1 and you understand the procedure as outlined in the Commands section of the MLX article published last month. Load MLX, and use a starting address of 2049 and an ending address of 17828. Then type SHIFT-L to load Part 1 and begin entering the listing below.

Note To Readers And Disk Subscribers

The C/G Bulletin Board as listed in this and the December issues, and as published on the December disk, runs as expected. However, the board can crash if a caller dials the board and hangs up before connecting. We have corrected this problem on the January disk and will publish the correction in next month's "Bug-Swatter." Those typing the program in should not hesitate to continue as the correction will POKE several new values into the final program. Non-disk subscribers who would rather not wait may write or call for the correction.

Also note that all user IDs must start with 1001. They can then run up to 1999. As the system operator, your built-in ID is 1000, but you can't create a user file with this number.

C/G Bulletin Board, Part 2

```
9759 :091,038,169,024,141,043,025
9765 :025,169,065,141,044,025,250
9771 :032,034,025,096,032,091,097
9777 :038,169,030,141,043,025,239
9783 :169,065,141,044,025,032,019
9789 :034,025,096,162,000,138,004
9795 :157,049,072,232,224,007,040
9801 :208,248,096,141,243,071,056
9807 :169,031,141,242,071,032,253
9813 :189,022,173,243,071,096,111
9819 :141,243,071,169,144,141,232
9825 :242,071,032,189,022,173,058
9831 :243,071,096,174,161,069,149
9837 :224,000,208,012,174,014,229
9843 :070,224,000,240,009,206,096
9849 :014,070,198,252,206,161,254
9855 :069,096,096,238,161,069,088
9861 :174,161,069,224,000,208,201
9867 :005,238,014,070,230,252,180
9873 :096,162,000,142,014,071,118
9879 :174,014,071,189,049,072,208
9885 :201,013,240,014,172,161,190
9891 :069,145,251,238,014,071,183
9897 :032,130,038,076,151,038,122
9903 :096,162,000,142,014,071,148
9909 :174,014,071,189,001,072,190
9915 :201,000,240,006,032,199,097
9921 :038,076,181,038,169,032,215
9927 :172,161,069,145,251,238,211
9933 :014,071,032,130,038,096,074
9939 :169,032,032,210,255,096,237
9945 :169,150,133,251,169,082,147
9951 :133,252,160,000,140,161,045
9957 :069,172,161,069,177,251,104
9963 :141,243,071,141,242,071,120
9969 :032,189,022,032,130,038,172
9975 :173,243,071,201,000,208,119
9981 :232,032,120,045,032,048,250
9987 :046,032,004,038,032,176,075
9993 :025,032,189,022,173,242,180
9999 :071,201,048,208,003,076,110
10005 :088,040,041,015,141,031,121
10011 :070,173,144,082,205,031,220
10017 :070,176,006,032,240,037,082
10023 :076,254,038,206,031,070,202
10029 :173,031,070,141,225,080,253
10035 :174,225,080,189,215,080,246
10041 :141,226,080,173,031,070,010
10047 :010,141,145,082,170,189,032
10053 :126,086,141,054,072,238,018
10059 :145,082,174,145,082,189,124
10065 :126,086,141,055,072,173,222
10071 :054,072,141,049,072,032,251
10077 :213,041,173,050,072,141,015
10083 :051,072,173,054,072,041,050
10089 :015,170,189,177,067,141,096
10095 :052,072,173,055,072,141,164
10101 :049,072,032,213,041,173,185
10107 :050,072,141,053,072,173,172
10113 :055,072,041,015,170,189,159
10119 :177,067,141,054,072,174,052
10125 :031,070,189,050,087,141,197
10131 :242,071,024,173,242,071,202
10137 :105,003,141,242,071,172,119
10143 :031,070,190,146,086,142,056
10149 :148,082,024,169,156,109,085
10155 :148,082,141,242,103,133,252
10161 :251,169,086,105,000,141,161
10167 :243,103,133,252,032,237,159
10173 :054,162,002,142,014,071,122
10179 :162,000,142,161,069,142,103
10185 :149,070,142,150,070,032,046
10191 :204,255,172,161,069,177,221
10197 :251,174,014,071,157,226,082
10203 :067,032,210,255,032,130,177
10209 :038,238,014,071,174,014,006
10215 :071,236,242,071,208,228,007
10221 :169,001,174,160,069,160,202
10227 :002,032,186,255,173,014,137
10233 :071,162,226,160,067,032,199
10239 :189,255,032,192,255,173,071
10245 :242,071,162,001,032,198,199
10251 :255,032,204,255,169,004,162
10257 :141,242,071,032,189,022,202
10263 :032,101,022,173,242,071,152
10269 :201,017,208,246,173,051,157
10275 :072,141,242,071,032,189,014
10281 :022,173,052,072,141,242,231
10287 :071,032,189,022,173,053,075
10293 :072,141,242,071,032,189,032
10299 :022,173,054,072,141,242,251
10305 :071,032,189,022,173,226,010
10311 :080,141,242,071,032,189,058
10317 :022,032,101,022,173,242,157
10323 :071,201,003,208,014,032,100
10329 :204,255,169,001,032,195,177
10335 :255,032,089,045,076,228,052
10341 :011,201,027,208,228,162,170
10347 :000,142,148,070,142,149,246
10353 :070,142,150,070,142,147,066
10359 :070,032,120,045,169,058,101
10365 :141,151,070,162,000,142,023
10371 :014,071,032,233,022,173,164
10377 :242,071,174,014,071,157,098
10383 :110,070,238,014,071,032,166
10389 :195,029,173,088,072,201,139
10395 :064,208,008,162,001,142,228
10401 :147,070,076,173,040,174,073
```


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```
10407 :014,071,224,036,208,216,168
10413 :169,001,141,161,069,160,106
10419 :000,140,023,070,172,023,095
10425 :070,185,110,070,141,049,042
10431 :072,238,023,070,174,014,014
10437 :071,236,023,070,144,048,021
10443 :032,213,041,173,050,072,016
10449 :174,161,069,157,151,070,223
10455 :141,148,070,238,161,069,018
10461 :032,194,041,173,049,072,014
10467 :041,015,170,189,177,067,118
10473 :174,161,069,157,151,070,247
10479 :141,148,070,238,161,069,042
10485 :032,194,041,076,183,040,043
10491 :173,149,070,141,049,072,137
10497 :032,213,041,173,050,072,070
10503 :174,161,069,157,151,070,021
10509 :238,161,069,173,049,072,007
10515 :041,015,170,189,177,067,166
10521 :174,161,069,157,151,070,039
10527 :238,161,069,173,150,070,124
10533 :141,049,072,032,213,041,073
10539 :173,050,072,174,161,069,230
10545 :157,151,070,238,161,069,127
10551 :173,049,072,041,015,170,063
10557 :189,177,067,174,161,069,130
10563 :157,151,070,238,161,069,145
10569 :169,013,174,161,069,157,048
10575 :151,070,032,204,255,162,185
10581 :000,142,024,070,174,024,007
10587 :070,189,151,070,141,242,186
10593 :071,238,024,070,173,242,147
10599 :071,032,189,022,173,242,064
10605 :071,201,013,208,231,032,097
10611 :101,022,173,242,071,201,157
10617 :027,208,010,174,147,070,245
10623 :224,001,240,021,076,106,027
10629 :040,201,003,208,043,032,148
10635 :204,255,169,001,032,195,227
10641 :255,032,089,045,076,228,102
10647 :011,169,005,141,242,071,022
10653 :032,244,036,169,001,032,159
10659 :195,255,032,101,022,173,173
10665 :242,071,201,017,208,246,130
10671 :032,120,045,076,228,011,175
10677 :201,018,208,006,032,120,254
10683 :045,076,081,041,076,114,108
10689 :041,024,173,148,070,109,246
10695 :149,070,141,149,070,173,183
10701 :150,070,105,000,141,150,053
10707 :070,096,173,049,072,041,200
10713 :240,024,074,074,074,074,009
10719 :170,189,177,067,141,050,249
10725 :072,096,173,049,072,201,124
10731 :058,144,015,041,015,024,020
10737 :105,009,010,010,010,010,139
10743 :141,050,072,076,006,042,122
10749 :041,015,010,010,010,010,093
10755 :141,050,072,096,173,049,072
10761 :072,201,058,144,011,041,024
10767 :015,024,105,009,141,049,102
10773 :072,076,030,042,041,015,041
10779 :141,049,072,173,049,072,071
10785 :013,050,072,141,049,072,174
10791 :096,169,021,141,242,071,011
10797 :032,244,036,032,101,022,000
10803 :173,242,071,201,017,240,227
10809 :007,201,003,208,242,076,026
10815 :088,040,032,101,022,173,007
10821 :242,071,141,051,072,032,166
10827 :101,022,173,242,071,141,057
10833 :052,072,032,101,022,173,021
10839 :242,071,141,053,072,032,186
10845 :101,022,173,242,071,141,075
10851 :054,072,032,101,022,173,041
10857 :242,071,141,226,080,162,003
10863 :000,142,014,071,032,101,215
10869 :022,173,242,071,201,013,071
10875 :240,012,174,014,071,157,023
10881 :121,072,238,014,071,076,209
10887 :115,042,174,014,071,169,208
10893 :087,157,121,072,238,014,062
10899 :071,174,014,071,142,160,011
10905 :072,142,147,082,173,226,227
10911 :080,141,185,103,173,051,124
10917 :072,141,049,072,032,231,250
10923 :041,173,052,072,141,049,187
10929 :072,032,007,042,173,049,040
10935 :072,141,146,072,173,053,072
10941 :072,141,049,072,032,231,018
10947 :041,173,054,072,141,049,213
10953 :072,032,007,042,173,049,064
10959 :072,141,147,072,173,146,190
10965 :072,205,066,104,144,045,081
10971 :173,147,072,205,067,104,219
10977 :144,037,032,204,255,169,042
10983 :094,169,195,032,210,255,162
10989 :169,075,141,043,025,169,091
10995 :068,141,044,025,032,034,075
11001 :025,032,204,255,169,003,169
11007 :141,242,071,032,244,036,253
11013 :076,228,011,056,173,066,103
11019 :104,237,146,072,141,066,009
11025 :104,173,067,104,237,147,081
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16407 :205,197,211,211,193,199,215
16413 :197,211,013,013,212,072,235
16419 :069,032,066,079,065,082,172
16425 :068,032,067,079,078,084,193
16431 :065,073,078,083,013,077,180
16437 :069,083,083,065,071,069,237
16443 :083,032,000,032,084,079,113
16449 :032,000,210,069,065,068,253
16455 :032,077,069,083,083,065,224
16461 :071,069,083,032,070,082,228
16467 :079,077,032,035,062,032,144
16473 :000,013,000,013,032,049,196
16479 :041,032,210,069,065,068,068
16485 :032,077,069,083,083,065,254
16491 :071,069,083,013,032,050,169
16497 :041,032,211,067,065,078,095
16503 :032,077,069,083,083,065,016
16509 :071,069,032,072,069,065,247
16515 :068,069,082,083,013,000,190
16521 :013,211,195,193,206,032,219
16527 :205,197,211,211,193,199,079
16533 :197,032,200,197,193,196,140
16539 :197,210,211,013,013,000,031
16545 :013,066,069,071,073,078,019
16551 :032,087,073,084,072,032,035
16557 :035,032,000,077,069,083,213
16563 :083,065,071,069,032,035,022
16569 :032,000,032,072,065,083,213
16575 :032,066,069,069,078,032,025
16581 :083,069,078,084,046,013,058
16587 :000,197,078,084,082,089,221
16593 :032,000,080,098,001,000,164
16599 :001,013,005,014,018,077,087
16605 :069,083,083,065,071,069,149
16611 :032,035,032,000,079,078,227
16617 :069,032,077,079,077,069,124
16623 :078,084,044,032,080,076,121
16629 :069,065,083,069,046,046,111
16635 :046,000,062,141,000,048,036
16641 :008,048,000,077,083,071,032
16647 :070,073,076,069,049,000,088
16653 :049,058,069,077,065,073,148
16659 :076,084,079,032,000,070,104
16665 :082,079,077,032,000,083,122
16671 :085,066,074,069,067,084,220
16677 :032,000,013,054,052,032,220
16683 :071,082,065,080,072,073,230
16689 :067,083,045,045,013,082,128
16695 :069,065,068,032,065,078,176
16701 :089,087,065,089,063,013,211
16707 :040,089,032,079,082,032,165
16713 :078,041,013,000,082,069,100
16719 :084,085,082,078,032,061,245
16725 :032,078,069,088,084,032,212
16731 :077,069,083,083,065,071,027
16737 :069,013,082,032,061,032,130
16743 :071,079,032,084,079,032,224
16749 :082,069,065,068,032,077,246
16755 :069,078,085,013,077,032,213
16761 :061,032,071,079,032,084,224
16767 :079,032,205,065,073,078,147
16773 :032,205,069,078,085,013,103
16779 :000,082,069,084,085,082,029
16785 :078,032,082,032,077,032,222
16791 :040,063,061,072,069,076,020
16797 :080,041,000,083,069,078,252
16803 :068,032,084,079,032,073,019
16809 :068,035,032,000,212,032,036
16815 :049,041,032,211,084,065,145
16821 :084,085,083,032,207,203,107
16827 :013,032,050,041,032,213,056
16833 :083,069,082,032,068,069,084
16839 :078,073,069,068,032,065,072
16845 :067,067,069,083,083,013,075
16851 :000,032,206,069,087,032,125
16857 :200,065,078,068,076,069,005
16863 :032,000,213,208,196,193,041
16869 :212,197,032,213,211,197,011
16875 :210,032,198,201,204,197,253
16881 :013,000,013,195,200,193,087
16887 :206,199,197,032,213,211,025
16893 :197,210,039,211,013,013,168
16899 :032,049,041,032,208,065,174
16905 :083,083,087,079,082,068,235
16911 :013,032,050,041,032,206,133
16917 :065,077,069,013,032,051,072
16923 :041,032,195,085,077,085,030
16929 :076,065,084,073,086,069,230
16935 :032,084,073,077,069,032,150
16941 :079,078,045,076,073,078,218
16947 :069,032,084,072,073,083,208
16953 :032,077,079,078,084,072,223
16959 :013,032,052,041,032,193,170
16965 :067,067,069,083,083,032,214
16971 :211,084,065,084,085,083,175
16977 :013,032,053,041,032,213,209
16983 :083,069,082,032,198,073,112
16989 :076,069,032,195,079,077,109
16995 :080,076,069,084,069,013,234
17001 :000,213,208,196,193,212,103
17007 :197,032,193,206,207,212,134
17013 :200,197,210,032,198,201,131
17019 :204,197,063,032,040,089,236
17025 :032,079,082,032,078,041,217
17031 :032,000,213,080,068,065,081
17037 :084,069,032,083,089,083,069
17043 :084,069,077,032,070,073,040
17049 :076,069,083,063,032,040,004
17055 :089,032,079,082,032,078,039
17061 :041,000,013,032,049,041,085
17067 :032,085,080,068,065,084,073
17073 :069,032,085,083,069,082,085
17079 :032,070,073,076,069,083,074
17085 :013,032,050,041,032,085,186
17091 :080,068,065,084,069,032,081
17097 :077,069,083,083,065,071,137
17103 :069,032,070,073,076,069,084
17109 :083,013,013,000,013,042,121
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17115 :079,080,069,082,065,084,166
17121 :073,079,078,042,013,042,040
17127 :067,065,078,067,069,076,141
17133 :076,069,068,042,013,000,249
17139 :206,065,077,069,032,000,180
17145 :083,084,082,069,069,084,208
17151 :032,065,068,068,082,069,127
17157 :083,083,032,000,067,073,087
17163 :084,089,044,032,083,084,171
17169 :065,084,069,044,032,090,145
17175 :073,080,032,000,065,082,099
17181 :069,065,032,067,079,068,153
17187 :069,032,000,084,069,076,109
17193 :069,080,072,079,078,069,232
17199 :032,078,085,077,066,069,198
17205 :082,032,000,089,079,085,164
17211 :039,082,069,032,078,079,182
17217 :084,032,082,069,083,080,239
17223 :079,078,068,073,078,071,006
17229 :013,083,079,032,201,039,012
17235 :077,032,072,065,078,071,222
17241 :073,078,071,032,085,080,252
17247 :046,032,194,089,069,000,013
17253 :048,058,084,065,066,076,242
17259 :069,083,032,049,041,032,157
17265 :085,080,068,065,084,069,052
17271 :032,085,083,069,082,032,246
17277 :070,073,076,069,083,013,253
17283 :032,050,041,032,085,080,195
17289 :068,065,084,069,032,068,011
17295 :079,087,078,076,079,065,095
17301 :068,032,077,069,078,085,046
17307 :013,013,000,083,048,058,114
17313 :084,065,066,076,069,083,092
17319 :013,000,042,069,077,080,192
17325 :084,089,042,000,048,049,229
17331 :050,051,052,053,054,055,238
17337 :056,057,065,066,067,068,052
17343 :069,070,036,049,058,068,029
17349 :042,049,041,032,045,045,195
17355 :000,084,089,080,069,032,045
17361 :048,032,070,079,082,032,040
17367 :077,065,073,078,032,077,105
17373 :069,078,085,013,000,049,003
17379 :058,000,000,000,000,000,029
17385 :000,000,000,000,000,000,233
17391 :000,000,000,000,000,000,239
17397 :032,196,207,215,206,204,025
17403 :207,193,196,032,204,201,004
17409 :194,210,193,210,217,013,014
17415 :013,000,013,196,069,083,125
17421 :067,082,073,066,069,032,146
17427 :084,072,069,032,070,073,163
17433 :076,069,013,040,053,048,068
17439 :032,067,072,065,082,065,158
17445 :067,084,069,082,083,032,198
17451 :077,065,088,041,013,000,071
17457 :042,084,082,065,078,083,227
17463 :077,073,083,083,073,079,011
17469 :078,042,001,042,071,065,104
17475 :082,066,076,069,068,042,214
17481 :013,000,013,042,070,073,028
17487 :076,069,032,087,079,078,244
17493 :039,084,032,070,073,084,211
17499 :042,013,000,013,042,083,028
17505 :089,083,079,080,032,073,021
17511 :083,032,079,078,045,076,240
17517 :073,078,069,042,013,000,128
17523 :013,013,212,200,197,032,014
17529 :195,193,204,204,197,210,044
17535 :032,215,193,206,212,211,172
17541 :032,212,207,032,195,200,243
17547 :193,212,013,013,000,013,071
17553 :042,077,065,073,078,084,052
17559 :069,078,065,078,067,069,065
17565 :032,080,069,078,068,073,045
17571 :078,071,042,013,000,013,124
17577 :032,049,041,032,195,072,078
17583 :065,078,071,069,032,080,058
17589 :065,083,083,087,079,082,148
17595 :068,013,032,050,041,032,167
17601 :195,072,065,078,071,069,231
17607 :032,072,065,078,068,076,078
17613 :069,013,032,051,041,032,187
17619 :210,069,084,085,082,078,051
17625 :032,084,079,032,077,065,074
17631 :073,078,032,077,069,078,118
17637 :085,013,013,032,000,069,185
17643 :082,065,083,069,063,032,117
17649 :040,089,032,079,082,032,083
17655 :078,041,000,071,069,084,078
17661 :084,073,078,071,032,078,157
17667 :069,088,084,032,069,077,166
17673 :065,073,076,000,078,079,124
17679 :032,069,077,065,073,076,151
17685 :000,070,073,076,069,078,131
17691 :065,077,069,032,000,013,027
17697 :196,079,069,083,032,089,069
17703 :079,085,082,032,083,089,233
17709 :083,084,069,077,032,072,206
17715 :065,086,069,013,013,032,073
17721 :049,041,032,079,078,069,149
17727 :032,068,082,073,086,069,217
17733 :044,032,035,032,048,044,048
17739 :032,068,069,086,073,067,214
17745 :069,032,056,013,032,050,077
17751 :041,032,084,087,079,032,186
17757 :068,082,073,086,069,083,042
17763 :044,032,035,032,048,044,078
17769 :032,068,069,086,073,067,244
17775 :069,083,032,056,032,065,192
17781 :078,068,032,057,013,032,141
17787 :051,041,032,084,087,079,241
17793 :032,068,082,073,086,069,027
17799 :083,044,032,035,032,048,153
17805 :032,065,078,068,032,049,209
17811 :044,032,068,069,086,073,007
17817 :067,069,032,056,013,013,147
17823 :000,008,013,013,013,013,219
```

All programs listed in this magazine are available on the GAZETTE Disk. See elsewhere in this issue for details.

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VIC Magic Draw

Article on page 52.

> **BEFORE TYPING . . .**
>
> Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: Magic Draw Boot

```
20 POKE648,30:SYS58648:REM MOVE SCREEN TO
    7680                              :rem 151
25 REM CHANGE ,8 TO ,1 FOR TAPE       :rem 102
30 PRINT"{CLR}{4 DOWN}LOAD"CHR$(34)"MAGIC
    DRAW"CHR$(34)",8{3 UP}"           :rem 203
40 POKE 631,13:POKE198,1:REM AUTOMATIC PR
   ESS RETURN                         :rem 87
50 POKE8192,0:POKE43,1:POKE44,32:NEW: MOV
   E BASIC TO 8192                    :rem 193
```

Program 2: Magic Draw

Note: Requires at least 8K expansion.

```
50 IFPEEK(648)<>30THENPRINT"{CLR}{DOWN}SE
   T SCREEN AND BASIC":END            :rem 127
60 PRINT"{CLR}":POKE36878,15:GOSUB970
                                      :rem 47
90 POKE36867,149:POKE36869,252:POKE36879,
   233                                :rem 236
100 FORI=0TO7:P%(I)=2↑(7-I):NEXT      :rem 149
120 FORI=0TO219:POKE7680+I,I:POKE38400+I,
    0:NEXTI:X=88:Y=80                 :rem 7
200 GETA$:POKE36876,0:IFA$="{UP}"THENY=Y-
    1:GOTO900                         :rem 114
220 IFA$="{DOWN}"THENY=Y+1:GOTO900
                                      :rem 160
230 IFA$="{LEFT}"THENX=X-1:GOTO900:rem 45
240 IFA$="{RIGHT}"THENX=X+1:GOTO900
                                      :rem 172
250 IFA$="D"THENCW%=NOTCW%:POKE36876,220:
    GOSUB500:GOTO300                  :rem 183
260 IFA$="E"THENEW%=NOTEW%:POKE36876,158:
    GOSUB500                          :rem 193
280 IFA$=CHR$(147)THENGOSUB980:SYS319:A$=
    CHR$(19)                          :rem 119
290 IFA$=CHR$(19)THENX=88:Y=80:POKE36876,
    200:GOSUB500                      :rem 120
300 IFA$="S"THENGOSUB550:GOSUB560:POKE251
    ,LEN(N$):SYS675:SYS694:ON-(S=1)GOSUB9
    96:RUN                            :rem 236
310 IFA$="L"THENGOSUB550:GOSUB560:POKE251
    ,LEN(N$):SYS675:SYS712:ON-(S=1)GOSUB9
    96:RUN                            :rem 221
320 IFA$="Q"THENGOSUB550:END          :rem 181
330 IFA$="G"THENA$="X":GOTO410        :rem 199
340 IFA$=CHR$(199)THENA$="Z":GOTO410
                                      :rem 52
350 IFA$="+"THENQ%=Q%+1:POKE36876,160+Q%:
    IFQ%>90THENQ%=90                  :rem 248
360 IFA$="-"THENQ%=Q%-1:POKE36876,250-Q%:
    IFQ%<1THENQ%=1                    :rem 141
370 IFA$="@"THENA$="X":GOTO430        :rem 198
380 IFA$="0"THENA$="Z":GOTO430        :rem 185
390 IFA$="{F2}"THENGOSUB2000:RUN      :rem 58
400 GOTO900                           :rem 102
410 Y=0:G%=1:FORY=0TO152STEP8:FORX=1TO168
    STEP8:IFX=1THENX=0:GOSUB900       :rem 120
420 GOSUB900:NEXTX,Y:G%=0:X=88:Y=80:GOTO2
    00                                :rem 148
430 G%=1:X%=X:FORY=YTOY+Q%:FORX=XTOX+Q%:G
    OSUB900:NEXTX:X=X%:NEXTY:G%=0:GOTO200
                                      :rem 110
500 FORII=1TO50:NEXTII:RETURN         :rem 169
550 PRINT"{CLR}{BLK}":POKE36867,174:POKE3
    6869,240:POKE36876,0:RETURN       :rem 245
560 INPUT"{BLK}NAME:";N$:ON-(N$="")GOTO99
    9:PRINT:INPUT"1-DISK 2-TAPE";S:IFS=0G
    OTO999                            :rem 21
570 POKE157,128:IFS=1THENOPEN15,8,15,"I0"
    :N$="@:"+N$:POKE678,8:RETURN      :rem 47
580 INPUT"TAPE OFF";O:POKE678,1:RETURN
                                      :rem 133
800 K%=PEEK(W%):S%=K%ORP%(C%):POKEW%,S%:R
    ETURN                             :rem 8
805 POKEW%,PEEK(W%)AND(255-P%(C%)):IFK%<>
    PEEK(W%)THENIFA$<>"Z"THENPOKEW%,S%
                                      :rem 223
820 RETURN                            :rem 122
900 W%=(YAND15)+4096+16*(22*INT(Y/16)+INT
    (X/8)):IFW%>7608GOTO200           :rem 66
910 C%=XAND7:GOSUB800:GOSUB805:POKE36876,
    250                               :rem 132
920 IFA$="Z"THENPOKE36876,160:GOSUB805:ON
    -(G%=0)GOTO200:RETURN             :rem 3
930 IFABS(EW%)=1THENA$="Z":POKE36876,220:
    GOSUB805:GOTO200                  :rem 131
950 IFA$="X"ORABS(CW%)=1THENPOKE36876,225
    :GOSUB800:IFG%=1THENRETURN        :rem 149
960 GOTO200                           :rem 106
970 FORI=675TO675+46:READA:S=S+A:POKEI,A:
    NEXT:IFS<>5648 GOTO1500           :rem 173
980 S=0:RESTORE:FORI=1TO47:READA:NEXT:FOR
    I=319TOI+33:READA:S=S+A:POKEI,A:NEXT
                                      :rem 46
990 IFS<>4875 GOTO1500                :rem 213
994 RETURN                            :rem 134
996 INPUT#15,ER%,ER$,TK%,SC%:PRINT:PRINT:
    PRINTER%;ER$,TK%;SC%:IFER%=0THENRETUR
    N                                 :rem 85
999 CLOSE15:END                       :rem 152
1000 DATA169,3,162,8,160,3,32,186,255,165
     ,251,166,51,164,52,32,189,255,96
                                      :rem 76
1010 DATA169,0,133,1,169,16,133,2,162,195
     ,160,29,169,1,32,216,255,96      :rem 68
1020 DATA169,0,162,195,160,29,32,213,255,
     96                               :rem 121
1030 DATA169,0,133,252, 169,16,133,253,16
     2,13,160,0,169,0,145,252,136,208,249
                                      :rem 200
1040 DATA230,253,202,48,6,208,242,160,195
     ,208,238,141,0,29,96             :rem 235
1500 PRINT"{CLR}DATA ERROR"S:STOP:rem 161
2000 HIGH=20:WIDE=22:ROM=2↑15:ADR=36869:O
     PEN4,4:PRINT#4,CHR$(8)           :rem 18
2010 SIZE=((PEEK(36867)AND1)+1)*8:SC=PEEK
     (648)*256:UC=PEEK(ADR)/8AND1:rem 214
2030 CH=(1-UC)*ROM+(PEEK(ADR)AND7)*1024:L
     IM=INT((5+WIDE*8)/6)*6           :rem 70
2040 FORL=0TOHIGH*SIZE-1STEP7:FORC=0TOLIM
     :A=0:X%=C/8:BIT=2↑(7-C+X%*8):FORR=LT
     OR+6                             :rem 117
2050 Y%=R/SIZE:CC=PEEK(SC+X%+Y%*WIDE):MEM
     =CH                              :rem 204
2060 IFR<HIGH*8THENIFPEEK(CC*SIZE+MEM+R-Y
     %*SIZE)ANDBITTHENA=A+2↑(R-L):rem 148
```


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```
2065 GETA$:IFA$="{F4}"ORL>154THENPRINT#4,
     CHR$(15):CLOSE4:RETURN          :rem 5
2070 NEXTR:PRINT#4,CHR$(128-(C<WIDE*8)*A)
     ;:NEXTC:PRINT#4:NEXTL:CLOSE4:RETURN
                                     :rem 92
```

Trap 'Em

Article on page 54.

Program 1: Trap 'Em—64 Version

```
100 CLR:GOSUB670:GOSUB 520:GOSUB540:GOSUB
    260:GOSUB460                     :rem 19
110 S1=0:S2=0:GOSUB410:IFFLTHEN100:rem 25
120 PRINT"{CLR}":C=54272             :rem 181
130 R=R+1:IFS1>=100OR(S2>=100ANDNP=2)OR(R
    =11ANDNP=1)THEN560               :rem 25
140 FORA=1104TO1143:POKEA,160:POKEA+C,0:P
    OKEA+880,160:POKEA+880+C,0:NEXT
                                     :rem 253
150 FORA=1144TO1944STEP40:POKEA,160:POKEA
    +C,0:POKEA+39,160:POKEA+39+C,0:NEXT
                                     :rem 67
160 IFB$="Y"THENGOSUB490             :rem 178
170 IFNP=2THENPRINT"{HOME}{7 SPACES}{RVS}
    {RED}RED"S1"{OFF}{13 SPACES}{RVS}
    {BLU}BLUE"S2                     :rem 136
180 IFNP=1THENPRINT"{HOME}"TAB(8)"{RVS}
    {RED}SCORE"S2;SPC(8)"ROUND"R :rem 226
190 POKE251,194:POKE252,5:POKE253,214:POK
    E254,5:POKE837,7:POKE838,11  :rem 193
200 TI$="000000":SYS49152:SC=INT(TI/60):I
    FNP=1THENSC=SC*LV                :rem 230
210 ONPEEK(834)GOTO220,230           :rem 211
220 SP=PEEK(870)+256*PEEK(871):GOSUB245:S
    2=S2+SC:GOTO120                  :rem 46
230 SP=PEEK(872)+256*PEEK(873):GOSUB245:S
    1=S1+SC:GOTO120                  :rem 49
245 FORA=1TO6:POKESP,PEEK(SP)-2*(PEEK(SP)
    AND128)+128:FORB=1TO400:NEXT     :rem 3
250 NEXT:RETURN                      :rem 240
260 REM OPTION ROUTINE               :rem 123
270 POKE53281,1:PRINT"{CLR}{5 DOWN}"TAB(1
    5)"{RED}TRAP 'EM":POKE198,0      :rem 96
280 PRINT"{3 DOWN}"TAB(13)"{BLU}{RVS}1
    {OFF} ONE PLAYER":PRINT"{2 DOWN}"TAB(
    13)"{RVS}2{OFF} TWO PLAYER"  :rem 171
290 PRINTSPC(13)"{2 DOWN}{RVS}3{OFF} QUIT
    "                                :rem 67
300 GETA$:IFA$<"1"ORA$>"3"THEN300 :rem 52
310 IFA$="3"THENPRINT"{CLR}":END :rem 224
320 NP=VAL(A$):POKE836,NP:PRINT"{3 DOWN}
    {BLK}"TAB(14)"{RVS}J{OFF}OYSTICK OR"
                                     :rem 49
330 PRINT"{DOWN}"TAB(8)"{RVS}K{OFF}EYBOAR
    D AND JOYSTICK 2"                :rem 134
340 GETA$:IFA$="J"THENRETURN         :rem 228
350 IFA$<>"K"THEN340                 :rem 91
360 PRINT"{CLR}{3 DOWN}{7 SPACES}WHICH KE
    Y TO GO UP?":WAIT198,1:A(1)=PEEK(197)
    :POKE198,0                       :rem 207
370 PRINT"{DOWN}{7 SPACES}WHICH KEY TO GO
     DOWN?":WAIT198,1:A(2)=PEEK(197):POKE
    198,0                            :rem 175
380 PRINT"{DOWN}{7 SPACES}WHICH KEY TO GO
     LEFT?":WAIT198,1:A(3)=PEEK(197):POKE
    198,0                            :rem 164
390 PRINT"{DOWN}{7 SPACES}WHICH KEY TO GO
     RIGHT?":WAIT198,1:A(4)=PEEK(197):POK
    E198,0                           :rem 249
400 FORA=1TO4:POKE829+A,A(A):NEXT:RETURN
                                     :rem 11
410 PRINT"{CLR}{5 DOWN}"SPC(11)"ENTER SPE
    ED (0-9)"                        :rem 1
420 PRINTSPC(7)"{2 DOWN}OR (C) TO CHANGE
    {SPACE}OPTIONS"                  :rem 161
430 GETA$:IF(A$<"0"ORA$>"9")ANDA$<>"C"THE
    N430                             :rem 203
440 IFA$="C"THENFL=1                 :rem 127
450 LV=VAL(A$):P=60-LV*6:POKE839,P:POKE84
    0,P:LV=LV+1:RETURN               :rem 168
460 PRINT"{CLR}"SPC(8)"{4 DOWN}DO YOU WAN
    T BARRIERS?"                     :rem 88
470 GETB$:IFB$<>"Y"ANDB$<>"N"THEN470
                                     :rem 54
480 RETURN                           :rem 124
490 FORA=1TO30                       :rem 57
500 Q=RND(1)*870+1104:IFPEEK(Q)<>32OR(Q>1
    463ANDQ<1503)THEN500             :rem 238
510 POKEQ,160:POKEQ+C,0:NEXT:RETURN
                                     :rem 240
520 REM INITIALIZE                   :rem 109
530 FORA=54272TO54296:POKEA,0:NEXT:RETURN
                                     :rem 71
540 POKE54287,255:POKE54290,129:POKE54273
    ,7:POKE54296,15:POKE54277,21 :rem 166
550 POKE54278,240:RETURN             :rem 175
560 GOSUB520:IFNP=2THEN600           :rem 77
570 PRINT"{CLR}{10 DOWN}"SPC(15)"{BLU}SCO
    RE:"S2                           :rem 229
580 IFS2>HITHENHI=S2                  :rem 2
590 PRINTSPC(16)"{DOWN}{RED}HIGH:"HI:GOTO
    640                              :rem 50
600 W=-(S1>=100)-2*(S2>=100):PRINT"{CLR}
    {6 DOWN}"SPC(13)"{RED}PLAYER"W"WINS!"
                                     :rem 108
610 PRINT"{2 DOWN}{BLU}{4 SPACES}PLAYER1:
    "S1:PRINTSPC(25)"{UP}PLAYER2:"S2
                                     :rem 93
620 WI(W)=WI(W)+1:PRINT"{2 DOWN}
    {4 SPACES}WINS{3 SPACES}:"WI(1):PRINT
    SPC(25)"{UP}WINS{3 SPACES}:"WI(2)
                                     :rem 99
630 T1=T1+S1:T2=T2+S2:PRINT"{2 DOWN}
    {4 SPACES}TOTAL{2 SPACES}:"T1:PRINTSP
    C(25)"{UP}TOTAL{2 SPACES}:"T2:rem 176
640 PRINTSPC(15)"{2 DOWN}HIT ANY KEY":POK
    E198,0                           :rem 71
650 GETA$:IFA$=""THEN650             :rem 89
660 ONNPGOTO100,110                  :rem 95
670 I=49152:IFPEEK(I)=32THENRETURN:rem 97
680 PRINT"{CLR}{5 DOWN}"SPC(13)"PLEASE WA
    IT"                              :rem 37
690 READ A:IF A=256 THEN RETURN  :rem 239
700 POKE I,A:I=I+1:GOTO 690      :rem 243
710 DATA 32,22,192,32,229,192    :rem 145
720 DATA 173,66,3,240,1,96       :rem 255
730 DATA 32,72,193,165,197,208   :rem 210
740 DATA 237,76,15,192,169,33    :rem 162
750 DATA 141,4,212,162,3,181      :rem 87
760 DATA 251,157,102,3,202,16    :rem 137
770 DATA 248,160,100,173,0,220   :rem 185
780 DATA 41,15,201,15,208,3       :rem 38
790 DATA 173,70,3,141,61,3       :rem 251
800 DATA 141,70,3,173,1,220       :rem 30
810 DATA 141,60,3,165,197,205    :rem 146
820 DATA 62,3,208,4,162,254       :rem 45
830 DATA 208,33,205,63,3,208      :rem 94
840 DATA 4,162,253,208,24,205    :rem 144
```

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```
850 DATA 64,3,208,4,162,251          :rem 47
860 DATA 208,15,205,65,3,208         :rem 99
870 DATA 4,162,247,208,6,173        :rem 106
880 DATA 60,3,76,111,192,138        :rem 103
890 DATA 45,60,3,41,15,201          :rem 247
900 DATA 15,208,3,173,69,3          :rem 255
910 DATA 141,60,3,141,69,3          :rem 247
920 DATA 136,208,166,169,32,141     :rem 253
930 DATA 4,212,206,71,3,208          :rem 40
940 DATA 154,173,72,3,141,71         :rem 98
950 DATA 3,160,0,162,0,185          :rem 245
960 DATA 60,3,74,176,8,169           :rem 15
970 DATA 40,32,199,192,76,190       :rem 165
980 DATA 192,74,176,8,169,40        :rem 120
990 DATA 32,217,192,76,190,192      :rem 214
1000 DATA 74,176,8,169,1,32          :rem 46
1010 DATA 199,192,76,190,192,169     :rem 58
1020 DATA 1,32,217,192,232,232      :rem 179
1030 DATA 200,204,68,3,208,207      :rem 182
1040 DATA 96,141,67,3,181,251       :rem 146
1050 DATA 56,237,67,3,149,251       :rem 153
1060 DATA 181,252,233,0,149,252     :rem 239
1070 DATA 96,24,117,251,149,251     :rem 250
1080 DATA 181,252,105,0,149,252     :rem 239
1090 DATA 96,160,0,173,68,3          :rem 50
1100 DATA 201,1,240,35,165,251      :rem 174
1110 DATA 197,253,208,29,165,252     :rem 46
1120 DATA 197,254,208,23,173,27     :rem 249
1130 DATA 212,16,9,169,1,141         :rem 87
1140 DATA 66,3,32,83,193,96          :rem 55
1150 DATA 169,2,141,66,3,32          :rem 41
1160 DATA 105,193,96,160,0,140      :rem 188
1170 DATA 66,3,173,27,212,16         :rem 94
1180 DATA 7,32,41,193,32,53          :rem 43
1190 DATA 193,96,32,53,193,32       :rem 156
1200 DATA 41,193,96,177,251,201     :rem 244
1210 DATA 32,240,5,169,1,141         :rem 81
1220 DATA 66,3,96,173,68,3            :rem 5
1230 DATA 201,1,240,11,177,253      :rem 177
1240 DATA 201,32,240,5,169,2         :rem 82
1250 DATA 141,66,3,96,32,105         :rem 93
1260 DATA 193,173,68,3,201,2         :rem 93
1270 DATA 240,1,96,169,219,145      :rem 204
1280 DATA 253,165,253,24,105,0      :rem 189
1290 DATA 133,106,165,254,105,212   :rem 82
1300 DATA 133,107,169,6,145,106     :rem 240
1310 DATA 96,160,0,169,214,145      :rem 194
1320 DATA 251,165,251,24,105,0      :rem 180
1330 DATA 133,106,165,252,105,212    :rem 75
1340 DATA 133,107,169,2,145,106     :rem 240
1350 DATA 96,256                     :rem 27
```

Program 2: Trap 'Em—VIC Loader

```
100 I=7168:PRINT"{CLR}{5 DOWN}{5 SPACES}P
    LEASE WAIT"                      :rem 207
110 READ A:IF A=256 THEN 130         :rem 150
120 POKE I,A:I=I+1:GOTO 110          :rem 226
130 S$="LO"+CHR$(34)+"VT"+CHR$(34)+",8:"+
    CHR$(131)                        :rem 167
140 REM CHANGE 8 TO 1 FOR TAPE USERS
                                     :rem 206
150 FORI=1TOLEN(S$):POKE630+I,ASC(MID$(S$
    ,I)):NEXT:POKE198,I              :rem 124
160 DATA 32,22,28,32,10,29           :rem 241
170 DATA 173,66,3,240,1,96           :rem 254
180 DATA 32,109,29,165,197,208       :rem 208
190 DATA 237,76,15,28,169,130        :rem 157
200 DATA 141,11,144,162,3,181        :rem 127
210 DATA 251,157,102,3,202,16        :rem 127
220 DATA 248,160,100,169,127,141      :rem 32
230 DATA 34,145,173,32,145,41        :rem 139
240 DATA 128,74,74,74,74,141         :rem 105
250 DATA 67,3,169,255,141,34         :rem 102
260 DATA 145,173,17,145,74,74        :rem 155
270 DATA 41,7,13,67,3,41             :rem 148
280 DATA 15,201,15,208,3,173          :rem 87
290 DATA 70,3,141,61,3,141           :rem 241
300 DATA 70,3,169,255,141,60          :rem 91
310 DATA 3,165,197,205,62,3           :rem 44
320 DATA 208,4,162,254,208,33        :rem 141
330 DATA 205,63,3,208,4,162           :rem 38
340 DATA 253,208,24,205,64,3          :rem 91
350 DATA 208,4,162,251,208,15        :rem 141
360 DATA 205,65,3,208,4,162           :rem 43
370 DATA 247,208,6,173,60,3           :rem 49
380 DATA 76,139,28,138,45,60         :rem 112
390 DATA 3,41,15,201,15,208           :rem 35
400 DATA 3,173,69,3,141,60           :rem 246
410 DATA 3,141,69,3,136,208           :rem 42
420 DATA 138,140,11,144,206,71       :rem 184
430 DATA 3,208,128,173,72,3           :rem 44
440 DATA 141,71,3,160,0,162           :rem 31
450 DATA 0,173,75,3,240,6            :rem 197
460 DATA 173,61,3,141,60,3           :rem 244
470 DATA 185,60,3,74,176,8             :rem 9
480 DATA 169,22,32,236,28,76         :rem 109
490 DATA 227,28,74,176,8,169         :rem 121
500 DATA 22,32,254,28,76,227          :rem 97
510 DATA 28,74,176,8,169,1             :rem 8
520 DATA 32,236,28,76,227,28         :rem 105
530 DATA 169,1,32,254,28,232          :rem 96
540 DATA 232,200,204,68,3,208        :rem 137
550 DATA 207,96,141,67,3,181         :rem 104
560 DATA 251,56,237,67,3,149         :rem 110
570 DATA 251,181,252,233,0,149       :rem 195
580 DATA 252,96,24,117,251,149       :rem 208
590 DATA 251,181,252,105,0,149       :rem 195
600 DATA 252,96,160,0,173,68         :rem 100
610 DATA 3,201,1,240,35,165           :rem 30
620 DATA 251,197,253,208,29,165        :rem 2
630 DATA 252,197,254,208,23,32       :rem 200
640 DATA 166,29,16,9,169,1             :rem 9
650 DATA 141,66,3,32,120,29           :rem 41
660 DATA 96,169,2,141,66,3             :rem 8
670 DATA 32,142,29,96,160,0           :rem 48
680 DATA 140,66,3,32,166,29           :rem 53
690 DATA 16,7,32,78,29,32            :rem 215
700 DATA 90,29,96,32,90,29             :rem 9
710 DATA 32,78,29,96,177,251         :rem 115
720 DATA 201,32,240,5,169,1           :rem 35
730 DATA 141,66,3,96,173,68           :rem 61
740 DATA 3,201,1,240,11,177           :rem 31
750 DATA 253,201,32,240,5,169        :rem 143
760 DATA 2,141,66,3,96,32            :rem 206
770 DATA 142,29,173,68,3,201         :rem 101
780 DATA 2,240,1,96,169,219            :rem 57
790 DATA 145,253,165,253,24,105      :rem 252
800 DATA 0,133,106,165,254,105       :rem 185
810 DATA 120,133,107,169,6,145       :rem 193
820 DATA 106,96,160,0,169,214        :rem 148
830 DATA 145,251,165,251,24,105      :rem 243
840 DATA 0,133,106,165,252,105       :rem 187
850 DATA 120,133,107,169,2,145       :rem 193
860 DATA 106,96,173,74,3,10           :rem 52
870 DATA 10,56,109,74,3,141           :rem 47
880 DATA 74,3,96,256                 :rem 232
```

Program 3:
Trap 'Em—VIC Main Game

```
100 POKE52,28:POKE56,28:CLR:POKE36878,15:
```


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```
    GOSUB270:GOSUB480                :rem 246
110 S1=0:S2=0:GOSUB430:IFFLTHEN100:rem 27
120 PRINT"{CLR}":C=30720             :rem 173
130 R=R+1:IFS1>=100OR(S2>=100ANDNP=2)OR(R
    =11ANDNP=1)THEN540               :rem 23
140 FORA=7724TO7745:POKEA,160:POKEA+C,0:P
    OKEA+440,160:POKEA+440+C,0:NEXT:rem 9
150 FORA=7746TO8142STEP22:POKEA,160:POKEA
    +C,0:POKEA+21,160:POKEA+21+C,0:NEXT
                                     :rem 60
160 IFB$="Y"THENGOSUB510             :rem 171
170 IFNP=2THENPRINT"{HOME}{RVS}{RED}RED"S
    1"{OFF}{7 SPACES}{RVS}{BLU}BLUE"S2
                                     :rem 136
180 IFNP=1THENPRINT"{HOME}{RVS}{RED}SCORE
    "S2"{HOME}"SPC(12)"ROUND"R       :rem 133
190 POKE251,225:POKE252,30:POKE253,235:PO
    KE254,30:POKE837,7:POKE838,D1    :rem 46
200 TI$="000000":SYS7168:SC=INT(TI/60):IF
    NP=1THENSC=SC*LV                 :rem 183
210 ONPEEK(834)GOTO220,230           :rem 211
220 SP=PEEK(870)+256*PEEK(871):GOSUB240:S
    2=S2+SC:GOTO120                  :rem 41
230 SP=PEEK(872)+256*PEEK(873):GOSUB240:S
    1=S1+SC:GOTO120                  :rem 44
240 POKE36877,130:FORA=1TO6          :rem 61
250 POKESP,PEEK(SP)-2*(PEEK(SP)AND128)+12
    8:FORB=1TO400:NEXT:POKE36878,6-A:NEXT
                                     :rem 24
260 POKE36877,0:POKE36878,15:RETURN
                                     :rem 87
270 REM OPTION ROUTINE               :rem 124
280 POKE36879,25:PRINT"{CLR}{5 DOWN}"TAB(
    7)"{RED}TRAP 'EM":POKE198,0      :rem 118
290 PRINT"{3 DOWN}"TAB(5)"{BLU}{RVS}1
    {OFF} ONE PLAYER":PRINT"{2 DOWN}"TAB(
    5)"{RVS}2{OFF} TWO PLAYER"       :rem 78
300 PRINTSPC(5)"{2 DOWN}{RVS}3{OFF} QUIT"
                                     :rem 12
310 GETA$:IFA$<"1"ORA$>"3"THEN310    :rem 54
320 IFA$="3"THENPRINT"{CLR}":END     :rem 225
330 NP=VAL(A$):POKE836,NP            :rem 222
340 D1=11:POKE843,0:IFNP=2THEN380:rem 175
350 PRINT"{2 DOWN} {RVS}J{OFF}OYSTICK OR
    {SPACE}{RVS}K{OFF}EYBOARD"       :rem 53
360 GETA$:IFA$="J"THENPOKE843,1:D1=7:RETU
    RN                               :rem 110
370 IFA$<>"K"THEN360                 :rem 95
380 PRINT"{CLR}{3 DOWN}WHICH KEY TO GO UP
    ":WAIT198,1:A(1)=PEEK(197):POKE198,0
                                     :rem 146
390 PRINT"{DOWN}WHICH KEY TO GO DOWN":WAI
    T198,1:A(2)=PEEK(197):POKE198,0
                                     :rem 114
400 PRINT"{DOWN}WHICH KEY TO GO LEFT":WAI
    T198,1:A(3)=PEEK(197):POKE198,0
                                     :rem 94
410 PRINT"{DOWN}WHICH KEY TO GO RIGHT":WA
    IT198,1:A(4)=PEEK(197):POKE198,0
                                     :rem 179
420 FORA=1TO4:POKE829+A,A(A):NEXT:RETURN
                                     :rem 13
430 PRINT"{CLR}{5 DOWN}{3 SPACES}ENTER SP
    EED (0-9)"                       :rem 38
440 PRINT"{2 DOWN}{2 SPACES}OR (C) FOR OP
    TIONS"                           :rem 211
450 GETA$:IF(A$<"0"ORA$>"9")ANDA$<>"C"THE
    N450                             :rem 207
460 IFA$="C"THENFL=1                 :rem 129
470 LV=VAL(A$):P=60-LV*6:POKE839,P:POKE84
    0,P:LV=LV+1:RETURN               :rem 170
480 PRINT"{CLR}{4 DOWN}DO YOU WANT BARRIE
    RS?"                             :rem 167
490 GETB$:IFB$<>"Y"ANDB$<>"N"THEN490
                                     :rem 58
500 RETURN                           :rem 117
510 FORA=1TO15                       :rem 53
520 Q=RND(1)*430+7746:IFPEEK(Q)<>32OR(Q>7
    899ANDQ<7922)THEN520             :rem 26
530 POKEQ,160:POKEQ+C,0:NEXT:RETURN
                                     :rem 242
540 IFNP=2THEN580                    :rem 1
550 PRINT"{CLR}{8 DOWN}"SPC(7)"{BLU}SCORE
    :"S2                             :rem 146
560 IFS2>HITHENHI=S2                 :rem 0
570 PRINTSPC(8)"{DOWN}{RED}HIGH:"HI:GOTO6
    20                               :rem 255
580 W=-(S1>=100)-2*(S2>=100):PRINT"{CLR}
    {5 DOWN}"SPC(5)"{RED}PLAYER"W"WINS!"
                                     :rem 51
590 PRINT"{2 DOWN}{BLU}SC{2 SPACES}:"S1:P
    RINTSPC(12)"{UP}SC{2 SPACES}:"S2
                                     :rem 143
600 WI(W)=WI(W)+1:PRINT"{2 DOWN}WINS:"WI(
    1):PRINTSPC(12)"{UP}WINS:"WI(2)
                                     :rem 93
610 T1=T1+S1:T2=T2+S2:PRINT"{2 DOWN}TOT :
    "T1:PRINTSPC(12)"{UP}TOT :"T2:rem 144
620 PRINTSPC(6)"{2 DOWN}HIT ANY KEY":POKE
    198,0                            :rem 21
630 GETA$:IFA$=""THEN630             :rem 85
640 ONNPGOTO100,110                  :rem 93
```

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Article on page 66.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```
100 SYS65517:Z=PEEK(781):IFZ=40THENPOKE53
    281,0:I$="":V=10:R$="":DIMAR$(500)
                                     :rem 56
110 IFZ=22THENPOKE36879,14:I$="{2 DOWN}":
    V=5:R$="{5 RIGHT}":Q$=CHR$(13):DIMAR$
    (50)                             :rem 77
120 DIM H$(7),B(3),T(3),MG$(3):BL$="
    {16 SPACES}"                     :rem 44
130 B(0)=1:B(1)=11:B(2)=16:B(3)=31:T(0)=1
    0:T(1)=5:T(2)=15:T(3)=1          :rem 9
140 J$="ARTICLES BY "                :rem 118
150 H$(0)="{RVS}{YEL}MAGAZINE{OFF}{WHT}":
    H$(1)="{RVS}{CYN}DATE{OFF}{WHT}"
                                     :rem 166
160 H$(2)="{RVS}{PUR}TITLE{OFF}{WHT}":H$(
    3)="{RVS}{RED}CATEGORY{OFF}{WHT}"
                                     :rem 156
170 H$(4)="TITLE OF {RVS}{YEL}MAGAZINE
    {OFF}":H$(5)="ISSUE DATE {RVS}{CYN}(M
    M/YY){OFF}"                      :rem 18
180 H$(6)="TITLE OF {RVS}{PUR}ARTICLE
    {OFF}":H$(7)="ARTICLE {RVS}{RED}CATEG
    ORY{OFF}"                        :rem 57
190 PRINT"{CLR}{DOWN}{3 RIGHT}{WHT}{RVS}
    {CYN}MAGAZINE{OFF} {RVS}INDEXER{WHT}
    {OFF}{2 DOWN}"                   :rem 212
```


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```
200 PRINT"1. LOAD ALL ARTICLES":PRINT"2.
    {SPACE}LIST ALL ARTICLES"     :rem 233
210 PRINT"3. ENTER NEW ARTICLES":PRINT"4.
     DELETE PREVIOUS "R$"ENTRIES":rem 245
220 PRINT"5. LIST "J$R$H$(0):PRINT"6. LIS
    T "J$R$H$(1)                  :rem 82
230 PRINT"7. LIST "J$R$H$(2):PRINT"8. LIS
    T "J$R$H$(3)                  :rem 91
240 PRINT"9. SAVE DATA AND END"   :rem 193
250 PRINT"{DOWN}{3 RIGHT}{RVS}SELECT CHOI
    CE{OFF} ";                    :rem 26
260 GETC$:C=VAL(C$):IFC<1ORC>9THEN260
                                  :rem 207
270 PRINTC$:FORI=1TO750:NEXT      :rem 29
280 ONCGOTO700,420,290,640,510,510,510,51
    0,700                         :rem 100
290 N=N+1                         :rem 208
300 PRINT"{CLR}";TAB(5)"{RVS}NEW ENTRIES
    {DOWN}":PRINTTAB(5)"RECORD #"N
                                  :rem 146
310 FORK=0TO3:PRINT"{DOWN}"H$(K+4);
                                  :rem 199
320 FORJ=1TOT(K)+3:PRINT"{RVS}{WHT} ";:NE
    XT:FORJ=1TOT(K)+3:PRINT"{LEFT}";:NEXT
    :INPUTMG$(K)                  :rem 63
330 IFK=1ANDMID$(MG$(K),3,1)<>"/"THENMG$(
    K)="0"+MG$(K)                 :rem 176
340 MG$(K)=LEFT$(MG$(K),T(K)):MG$(K)=MG$(
    K)+LEFT$(BL$,T(K)-LEN(MG$(K))):NEXTK
                                  :rem 101
350 AR$(N)=MG$(0)+MG$(1)+MG$(2)+MG$(3)
                                  :rem 150
360 FORK=0TO3:MG$(K)="":NEXT      :rem 150
370 PRINT"{5 DOWN}PRESS {RVS}RETURN{OFF}
    {SPACE}FOR ADD'L ENTRIES":GOSUB910
                                  :rem 98
380 GETC$:IFC$=""THEN380          :rem 93
390 IFC$=CHR$(13)THEN290          :rem 79
400 IFC$="{F1}"THEN190            :rem 89
410 C$="":GOTO380                 :rem 139
420 IFN=0THENPRINT"{DOWN}{RVS}{YEL}NO ART
    ICLES ON FILE.":FORJ=1TO1500:NEXT:GOT
    O190                          :rem 72
430 I=1                           :rem 78
440 LC=0:HD$="{RVS}LIST 'ARTICLES' FILE
    {OFF}":GOSUB850               :rem 251
450 LC=LC+1:GOSUB870:GOSUB880:I=I+1:IFI<=
    NANDLC<>VTHEN450              :rem 59
460 GOSUB900                      :rem 179
470 GETCH$:IFCH$=""THEN470        :rem 237
480 IFCH$="{F1}"ORI>NTHEN190      :rem 31
490 IFCH$=CHR$(13)THEN440         :rem 149
500 GOTO470                       :rem 105
510 PRINT"{DOWN}{WHT}"TAB(2)H$(C-1):C=C-5
                                  :rem 148
520 FORJ=1TOT(C)+3:PRINT"{RVS}{WHT} ";:NE
    XT:FORJ=1TOT(C)+3:PRINT"{LEFT}";:NEXT
    :INPUTMH$                     :rem 150
530 IFC=1ANDMID$(MH$,3,1)<>"/"THENMH$="0"
    +MH$                          :rem 217
540 MH$=LEFT$(MH$,T(C)):MH$=MH$+LEFT$(BL$
    ,T(C)-LEN(MH$))               :rem 140
550 I=1                           :rem 81
560 LC=0:HD$=J$+H$(C):GOSUB850    :rem 174
570 GOSUB870:IFMH$=MG$(C)THENGOSUB880:LC=
    LC+1                          :rem 6
580 I=I+1:IFI<=NANDLC<>VTHEN570   :rem 158
590 GOSUB900                      :rem 183
600 GETC$:IFC$=""THEN600          :rem 83
610 IFC$="{F1}"ORI>NTHEN190       :rem 210
620 IFC$=CHR$(13)THEN560          :rem 75
630 GOTO600                       :rem 104
640 PRINT"{DOWN}{WHT}{2 RIGHT}DELETE REC
    {SPACE}#";                    :rem 166
650 INPUT" {RVS}{WHT}{3 SPACES}{3 LEFT}
    {CYN}";A$:IFA$=""THEN650      :rem 21
660 I=VAL(A$):IFI>NTHENPRINT"{RVS}{YEL}RE
    CORD NOT ON FILE.";:GOTO690   :rem 241
670 AR$(I)="":PRINT"{2 RIGHT}{RVS}{YEL}RE
    CORD DELETED.";               :rem 131
680 N=N-1:FORJ=ITON:AR$(J)=AR$(J+1):NEXT
                                  :rem 167
690 FORI=1TO1000:NEXT:GOTO190     :rem 39
700 PRINT"{CLR}DISK OR CASSETTE (D/C)"
                                  :rem 42
710 GETE$:IF(E$<>"D"ANDE$<>"C")ORE$=""THE
    N710                          :rem 245
720 IFE$="D"THENF$="@0:ARTICLES":D1=1:GOT
    O740                          :rem 156
730 F$="ARTICLES":D1=0:G$=""      :rem 30
740 IFC=9THEN780                  :rem 177
750 IFD1=1THENG$=",S,R"           :rem 38
760 OPEN1,1+7*D1,8*D1,F$+G$:GOSUB810
                                  :rem 224
770 INPUT#1,N:FORI=1TON:INPUT#1,AR$(I):NE
    XT:GOSUB810:CLOSE1:GOSUB810:GOTO190
                                  :rem 109
780 IFD1=1THENG$=",S,W"           :rem 46
790 OPEN1,1+7*D1,1+7*D1,F$+G$:GOSUB810
                                  :rem 62
800 PRINT#1,N:FORI=1TON:PRINT#1,AR$(I):NE
    XT:GOSUB810:CLOSE1:GOSUB810:END
                                  :rem 101
810 IFD1=0THENRETURN              :rem 25
820 IFO=0THENOPEN15,8,15:O=1      :rem 153
830 INPUT#15,A,B$,C,D:IFATHENPRINTA,B$,C,
    D:STOP                        :rem 138
840 RETURN                        :rem 124
850 PRINT"{CLR}{WHT}"HD$:PRINT:PRINT"
    {RVS}REC#{OFF}{2 SPACES}{RVS}MAGAZINE
    {OFF}{3 SPACES}";             :rem 84
860 PRINTQ$"{RVS}DATE{OFF}{2 SPACES}{RVS}
    ARTICLE TITLE{DOWN}":RETURN   :rem 105
870 FORK=0TO3:MG$(K)=MID$(AR$(I),B(K),T(K
    )):NEXT:RETURN                :rem 56
880 X0=LEN(STR$(I)):X1$=LEFT$("***",4-X0)
    +RIGHT$(STR$(I),X0-1)         :rem 206
890 PRINT" "X1$"{2 SPACES}"MG$(0)" "Q$MG$
    (1)" "MG$(2)" ":RETURN        :rem 108
900 IFI<=NTHENPRINT"{DOWN}{WHT}PRESS
    {RVS}RETURN{OFF} TO CONT'"    :rem 93
910 PRINT"{WHT}PRESS {RVS}F1{OFF} FOR MEN
    U";:RETURN                    :rem 137
```

Baker's Dozen

Article on page 133.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: Quilt

```
10 PRINTCHR$(147)CHR$(5):POKE53280,0:POKE
   53281,0                        :rem 242
20 R=54272:A=1                    :rem 222
```


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```
30 N=INT(10*RND(1))+1:P=INT(10*RND(1))+1:
   Q=INT(15*RND(1))+1                :rem 29
40 V=INT(1000*RND(1))+1024:M=INT(255*RND(
   1))+1                             :rem 254
50 IFV+N>2023THENV=V-N:GOTO40        :rem 50
60 IFV+(40*P)>2023THENV=V-(V0*P):GOTO40
                                     :rem 23
70 FORZ=1TOP                         :rem 9
80 FORX=1TON:POKEV+A,M:POKEV+A+R,Q:V=V+A:
   NEXT                              :rem 215
90 V=V+40-N                          :rem 92
100 NEXTZ:GOTO30                     :rem 0
```

Program 2: Double Diamond

```
10 PRINTCHR$(147):FORX=1TO500:NEXT
                                     :rem 116
20 POKE53280,0:POKE53281,0           :rem 183
30 V=1475:A=-39:B=-41:C=39:D=41:W=1491:Q=
   INT(255*RND(1))+1:PRINTQ:S=55753
                                     :rem 189
40 U=55757                           :rem 3
50 T=INT(15*RND(1))+1                :rem 132
60 POKEV,Q:POKES,T:PRINTT            :rem 191
70 N=1:FORX=1TON:POKEV+A,Q:POKES+A,T:V=V+
   A:S=S+A:NEXT                      :rem 220
80 FORX=1TON:POKEV+B,Q:POKES+B,T:V=V+B:S=
   S+B:NEXT                          :rem 235
90 N=N+1:FORX=1TON:POKEV+C,Q:POKES+C,T:V=
   V+C:S=S+C:NEXT                    :rem 95
100 FORX=1TON:POKEV+D,Q:POKES+D,T:V=V+D:S
    =S+D:NEXT                        :rem 28
110 N=N+1:FORX=1TON:POKEV+A,Q:POKES+A,T:V
    =V+A:S=S+A:NEXT                  :rem 128
120 FORX=1TON:POKEV+B,Q:POKES+B,T:V=V+B:S
    =S+B:NEXT                        :rem 22
130 IFV>1042THEN90                   :rem 22
140 POKEW,Q:POKEU,T                  :rem 214
150 N=1:FORX=1TON:POKEW+A,Q:POKEU+A,T:W=W
    +A:U=U+A:NEXT                    :rem 20
160 FORX=1TON:POKEW+B,Q:POKEU+B,T:W=W+B:U
    =U+B:NEXT                        :rem 35
170 N=N+1:FORX=1TON:POKEW+C,Q:POKEU+C,T:W
    =W+C:U=U+C:NEXT                  :rem 151
180 FORX=1TON:POKEW+D,Q:POKEU+D,T:W=W+D:U
    =U+D:NEXT                        :rem 45
190 N=N+1:FORX=1TON:POKEW+A,Q:POKEU+A,T:W
    =W+A:U=U+A:NEXT                  :rem 145
200 FORX=1TON:POKEW+B,Q:POKEU+B,T:W=W+B:U
    =U+B:NEXT                        :rem 30
210 IFW>1042THEN170                  :rem 69
220 FORX=1TO1000:NEXT                :rem 30
230 GOTO10                           :rem 47
```

Program 3: Tunnels

```
10 POKE53280,0:POKE53281,0:PRINTCHR$(147)
                                     :rem 107
20 A=1:B=-1:C=40:D=-40:N=1:P=54272:V=1984
                                     :rem 246
30 FORZ=1TO12:GOSUB110               :rem 100
40 V=V-39:N=N+1                      :rem 85
50 NEXT                              :rem 164
60 V=V+42:N=N-1                      :rem 81
70 FORZ=1TO12:GOSUB110               :rem 104
80 V=V+42:N=N-1                      :rem 83
90 NEXT                              :rem 168
100 END                              :rem 104
110 Q=INT(15*RND(1))+1               :rem 174
120 FORX=1TON:POKEV+A,67:POKEV+A+P,Q:V=V+
    A:NEXT                           :rem 32
130 POKEV,75:POKEV+P,Q               :rem 104
140 FORX=1TON:POKEV+D,66:POKEV+D+P,Q:V=V+
    D:NEXT                           :rem 42
150 POKEV,73:POKEV+P,Q               :rem 104
160 FORX=1TON:POKEV+B,67:POKEV+B+P,Q:V=V+
    B:NEXT                           :rem 39
170 POKEV,85:POKEV+P,Q               :rem 109
180 FORX=1TON:POKEV+C,66:POKEV+C+P,Q:V=V+
    C:NEXT                           :rem 43
190 POKEV,74:POKEV+P,Q               :rem 109
200 RETURN                           :rem 114
```

Program 4: Christmas Tree

```
10 PRINTCHR$(147):POKE53280,0:POKE53281,0
                                     :rem 107
20 FORX=1TO1000:NEXT                 :rem 236
30 PRINTCHR$(147)                    :rem 222
40 DIMP(156)                         :rem 123
50 FORK=1TO156:READP(K):NEXT         :rem 255
60 K=INT(156*RND(1))+1               :rem 178
70 B=P(K)+54272                      :rem 1
80 C=INT(14*RND(1))+1                :rem 117
90 POKEP(K),42:POKEB,C               :rem 48
100 GOTO60                           :rem 48
110 DATA1042,1082,1122,1161,1162,1163
                                     :rem 62
120 DATA1201,1202,1203,1241,1242,1243
                                     :rem 51
130 DATA1280,1281,1282,1283,1284,1320
                                     :rem 81
140 DATA1320,1321,1322,1323,1324,1360
                                     :rem 61
150 DATA1361,1362,1363,1364,1399,1400
                                     :rem 89
160 DATA1401,1402,1403,1404,1405,1439
                                     :rem 70
170 DATA1440,1441,1442,1443,1444,1445
                                     :rem 83
180 DATA1479,1480,1481,1482,1483,1484
                                     :rem 111
190 DATA1485,1518,1519,1520,1521,1522
                                     :rem 92
200 DATA1523,1524,1525,1526,1558,1559
                                     :rem 97
210 DATA1560,1561,1562,1563,1564,1565
                                     :rem 96
220 DATA1566,1598,1599,1600,1601,1602
                                     :rem 99
230 DATA1603,1604,1605,1606,1637,1638
                                     :rem 92
240 DATA1639,1640,1641,1642,1643,1644
                                     :rem 96
250 DATA1645,1646,1647,1677,1678,1679
                                     :rem 130
260 DATA1680,1681,1682,1683,1684,1685
                                     :rem 119
270 DATA1686,1687,1717,1718,1719,1720
                                     :rem 119
280 DATA1721,1722,1723,1724,1725,1726
                                     :rem 97
290 DATA1727,1756,1757,1758,1759,1760
                                     :rem 130
300 DATA1761,1762,1763,1764,1765,1766
                                     :rem 114
310 DATA1767,1768,1796,1797,1798,1799
                                     :rem 151
320 DATA1800,1801,1802,1803,1804,1805
                                     :rem 80
330 DATA1806,1807,1808,1836,1837,1838
                                     :rem 117
340 DATA1839,1840,1841,1842,1843,1844
                                     :rem 109
```

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```
350 DATA1845,1846,1847,1848,1882,1922
                                    :rem 125
360 DATA1962,2000,2001,2002,2003,2004
                                    :rem 53
```

Math Dungeon

Article on page 62.

Note: Requires at least 8K memory expansion to run on a VIC.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```
110 DIM CM$(22),CM(22),IN$(5),IN(5),OB$(1
    3),OB(13),DS$(40),FL(10,10)   :rem 157
120 SYS65517:CC=PEEK(781)         :rem 173
130 IFCC=40THENPOKE53281,1          :rem 8
150 GOSUB 700:GOSUB1620           :rem 48
155 PRINT"{CLR}"                  :rem 255
160 GOSUB790:CM(2)=1:CM(5)=1:FORI=14TO19:
    CM(I)=1:NEXT:OB(1)=1          :rem 79
170 PR$=DS$(1):GOSUB2570:IFGTTHENPR$=DS$(
    2):GOSUB2570                  :rem 188
180 IFGT=0THENPR$=DS$(3):GOSUB2570:rem 41
190 GOSUB2310:IFPL=2ORPL=5THENGOSUB800:GO
    TO190                         :rem 183
200 IFPL=16ANDGT=0THENPR$=DS$(3):GOSUB257
    0:GOTO190                     :rem 66
210 IFPL=16THEN280                :rem 43
220 IFPL>16THENGOTO250            :rem 99
230 GOTO170                       :rem 102
240 PRINT"{CLR}":PR$=DS$(4):GOSUB2570
                                  :rem 255
250 GOSUB790:FORI=14TO19:CM(I)=1:NEXT:GOS
    UB2310:IFPL=16THEN280         :rem 109
260 IFPL=15THENPR$=DS$(4):GOSUB2570
                                  :rem 96
270 GOTO250                       :rem 105
280 GOSUB790:PRINT"{CLR}":CM(1)=1:CM(3)=1
    :CM(6)=1:FORI=14TO19:CM(I)=1:NEXT
                                  :rem 241
290 CM(4)=1                       :rem 30
300 PR$=DS$(5):GOSUB2570:IFMB=0THENPR$=DS
    $(6):GOSUB2570                :rem 32
310 IFMBTHENPR$=DS$(7):CM(7)=1:GOSUB2570:
    IFNT=1THENPR$=DS$(11):GOSUB 2570
                                  :rem 112
320 IFFD=0THENPR$=DS$(8):NT=1:GOSUB2570
                                  :rem 99
330 IFFDTHENPR$=DS$(9):NT=0:GOSUB2570
                                  :rem 247
340 GOSUB2310:IFPL=15THEN300      :rem 167
350 IF(PL=18)OR(PL=19)THENGOTO300:rem 234
360 IFPL=17THENGOTO160            :rem 104
370 IF(PL=16)AND(FD=0)THEN320     :rem 153
380 IFPL=16ANDFD=0THEN320         :rem 248
390 IFPL=16THEN450                :rem 51
400 IFPL=1THENPR$=DS$(10):GOSUB2570
                                  :rem 84
410 IF(PL=3)OR(PL=6)THENGOSUB900:GOTO340
                                  :rem 212
415 IFPL=7ANDNT=0THENPRINT"I SEE NO NOTE
    {SPACE}HERE!":GOTO340         :rem 99
420 IFPL<>7THEN340                :rem 56
430 PR$="THERE IS A QUESTION ON THE NOTE.
    ":GOSUB2570                   :rem 21
435 GOSUB1320:IFWR=1THENGOTO160   :rem 193
440 PR$=DS$(12):GOSUB2570:PR$=DS$(13):GOS
    UB2570:FD=1:MB=0:GOTO340      :rem 57
450 GOSUB790:PRINT"{CLR}{7 DOWN}"; :rem 9
470 PR$="A TRAP DOOR OPENS BENEATH YOUR F
    EET AND YOU BEGIN SLIDING DOWN A "
                                  :rem 53
480 PR$=PR$+"CHUTE. YOU PASS A NEON SIGN
    {SPACE}THAT SAYS :":GOSUB2570:PRINT
                                  :rem 75
490 PR$="{11 SPACES}'MATH DUNGEON'":GOSUB
    2570                          :rem 244
500 PRINT:PR$="{13 SPACES}'LEVEL "+STR$(L
    V)+"'":GOSUB2570:PRINT:PRINT  :rem 41
510 PR$="PRESS ANY KEY TO CONTINUE":GOSUB
    2570                          :rem 203
520 GETA$:IFA$=""THEN520          :rem 81
530 LT=1:PX=INT(RND(1)*10)+1:PY=INT(RND(1
    )*10)+1:FL(PY,PX)=2             :rem 0
540 GOSUB790:CM(9)=1:FORI=12TO19:CM(I)=1:
    NEXT:CM(9)=LT:CM(22)=1        :rem 251
550 IFFL(PY,PX)=2THENPRINT"{CLR}":PR$=DS$
    (14):GOSUB2570                :rem 193
560 IFFL(PY,PX)=1THENPRINT"{CLR}":PR$=DS$
    (15):GOSUB2570                :rem 194
570 IFLT=1THENPR$=DS$(16):GOSUB2570
                                  :rem 102
580 GOSUB2310                     :rem 227
590 IFPL=9THENGOSUB950:GOTO580    :rem 156
600 IFPL=12THENGOSUB970:GOTO580   :rem 192
610 IFPL=13THENGOSUB1000:GOTO580  :rem 227
620 IFPL=15ANDLO=0THEN550          :rem 10
630 IFPL=15ANDLO=1THENGOSUB1020:GOTO570
                                  :rem 196
640 IFPL=14THEN580                 :rem 51
650 IFPL=22THENGOSUB2470:GOTO670  :rem 243
660 IFPL>15THENGOSUB1560:IF(LO=0)OR(WA=1)
    THEN580                       :rem 204
670 ONZGOSUB1860,1860,2000        :rem 204
680 GOTO670                       :rem 116
690 END                           :rem 118
700 PRINT"{CLR}{9 DOWN}":IFCC=40THENPRINT
    TAB(10);:GOTO720               :rem 16
710 PRINTTAB(1);                  :rem 185
720 PRINT"{4 SPACES}MATH DUNGEON
    {3 SPACES}":PRINT"{DOWN}":IFCC=40THEN
    PRINTTAB(12);:GOTO740          :rem 64
730 PRINTTAB(4);                  :rem 190
740 PRINT"A MATH ADVENTURE"       :rem 133
750 PRINT"{HOME}{21 DOWN}"TAB(8);:PR$="EN
    TER DESIRED LEVEL(1-5)"       :rem 219
760 GOSUB2570:PRINTTAB(8);:INPUTLV:IFLV<1
    ORLV>5THENGOTO750             :rem 75
770 FORI=1TO22:READCM$(I):NEXT:FORI=1TO5:
    READIN$(I):NEXT               :rem 52
780 FORI=1TO29:READDS$(I):NEXT:RETURN
                                  :rem 137
790 FORI=1TO22:CM(I)=0:NEXTI:IFIN(5)=1THE
    NCM(20)=1:RETURN               :rem 38
800 IFPL=2ANDGT=1THENPR$="THE GATE IS ALR
    EADY OPEN.":GOSUB2570          :rem 12
810 IFPL=2ANDGT=0THENGT=1:PRINT"OK."
                                  :rem 25
820 IFPL=5ANDGT=0THENPR$="THE GATE IS ALR
    EADY CLOSED.":GOSUB2570       :rem 152
830 IFPL=5ANDGT=1THENGT=0:PRINT"OK."
                                  :rem 30
840 RETURN                        :rem 124
```


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```
850 IFPL=1ANDFD=1THENPR$="THE DOOR IS ALR
    EADY OPEN.":GOSUB2570          :rem 18
860 IFPL=1ANDFD=0THENFD=1:PRINT"OK."
                                   :rem 251
870 IFPL=4ANDFD=0THENPR$="THE DOOR IS ALR
    EADY CLOSED.":GOSUB2570        :rem 158
880 IFPL=4ANDFD=1THENFD=0:PRINT"OK."
                                   :rem 0
890 RETURN                         :rem 129
900 IFPL=3ANDMB=1THENPR$="THE MILKBOX IS
    {SPACE}ALREADY OPEN.":GOSUB2570
                                   :rem 247
910 IFPL=3ANDMB=0THENMB=1:PRINT"OK.":CM(7
    )=1                            :rem 195
920 IFPL=6ANDMB=0THENPR$="THE MILKBOX IS
    {SPACE}ALREADY CLOSED.":GOSUB2570
                                   :rem 131
930 IFPL=6ANDMB=1THENMB=0:PRINT"OK.":CM(7
    )=0                            :rem 199
940 RETURN                         :rem 125
950 IFIN(1)=1THENPR$="YOU ALREADY HAVE TH
    E LIGHT.":GOSUB2570:RETURN     :rem 118
960 IFLT=1THENLT=0:IN(1)=1:PRINT"OK.":CM(
    9)=0:RETURN                    :rem 231
970 IFIN(1)=0THENPR$="YOU DO NOT HAVE A L
    IGHT.":GOSUB2570:RETURN        :rem 89
980 IFLO=0THENPRINT"OK.":LO=1:RETURN
                                   :rem 93
990 IFLO=1THENPR$="THE LIGHT IS ALREADY O
    N.":GOSUB2570:RETURN           :rem 20
1000 IFLO=0THENPR$="THE LIGHT IS ALREADY
     {SPACE}OFF.":GOSUB2570:RETURN
                                   :rem 112
1010 IFLO=1THENPRINT"OK.":LO=0:RETURN
                                   :rem 126
1020 PRINT"{CLR}"DS$(16-FL(PY,PX)):rem 39
1030 EC=PX+1:DN$="EAST":IFEC=11THENGOTO10
     50                            :rem 73
1040 IFFL(PY,EC)<>0THENGOSUB1120 :rem 177
1050 WC=PX-1:DN$="WEST":IFWC=0THENGOTO107
     0                             :rem 87
1060 IFFL(PY,WC)<>0THENGOSUB1120 :rem 197
1070 NC=PY-1:DN$="NORTH":IFNC=0THENGOTO10
     90                            :rem 146
1080 IFFL(NC,PX)<>0THENGOSUB1120 :rem 189
1090 SC=PY+1:DN$="SOUTH":IFSC=11THENGOTO1
     110                           :rem 207
1100 IFFL(SC,PX)<>0THENGOSUB1120 :rem 187
1110 RETURN                        :rem 163
1120 PRINTDN$" IS A DOORWAY.":RETURN
                                   :rem 149
1130 IFGK=0ANDBK=0ANDRK=0THENPRINT"WHAT K
     EY?":RETURN                   :rem 115
1140 PRINT"OK."                    :rem 95
1150 IFGKTHENGK=0:IN(2)=1:RETURN  :rem 242
1160 IFBKTHENBK=0:IN(3)=1:RETURN  :rem 234
1170 IFRKTHENRK=0:IN(4)=1:BD=2:RETURN
                                   :rem 59
1180 RETURN                        :rem 170
1190 IFGD<>1THEN1220               :rem 132
1200 IFIN(2)=0THENPR$=DS$(10):GOSUB2570:R
     ETURN                         :rem 26
1210 IFIN(2)=1THENPR$=DS$(27):GOSUB2570:M
     A=1:CM(11)=1:CM(1)=0:RETURN   :rem 254
1220 IFBD<>1THEN1250               :rem 124
1230 IFIN(3)=0THENPR$=DS$(10):GOSUB2570:R
     ETURN                         :rem 30
1240 IFIN(3)=1THENPR$=DS$(28):GOSUB2570:C
     M(8)=1:RK=1:CM(1)=0:RETURN    :rem 232
1250 IFRD<>1THEN1280               :rem 146
1260 IFIN(4)=0THENPR$=DS$(10):GOSUB2570:R
     ETURN                         :rem 34
1270 IFIN(4)=1THENPRINT"{CLR}":PR$=DS$(29
     ):GOSUB2570:GOSUB2520         :rem 53
1280 RETURN                        :rem 171
1290 G=INT(RND(1)*LV*10)+1:PR$="YOU HAVE
     {SPACE}FOUND "+STR$(G)+" GOLD PIECES
     ."                            :rem 31
1300 GOSUB2570:GP=GP+G:PR$="YOU NOW HAVE
     {SPACE}"+STR$(GP)+" GOLD PIECES.":GO
     SUB2570                       :rem 243
1310 CM(10)=0:RETURN               :rem 142
1320 OP=INT(RND(1)*4)+1            :rem 254
1340 IF(LV<=2)AND(OP>=3)THEN1320   :rem 91
1350 PRINT"WHAT IS...";            :rem 47
1360 ONOPGOTO1370,1400,1430,1460 :rem 230
1370 X=INT(RND(1)*LV*10):Y=INT(RND(1)*LV*
     10)                           :rem 34
1380 IFLV>4THENX=X-INT(RND(1)*LV*5):Y=Y-I
     NT(RND(1)*LV*5)               :rem 168
1390 Z1=X+Y:PRINTX" + "Y"?":INPUTZ$:GOSUB
     1510:IFWR=2THEN1390           :rem 129
1395 RETURN                        :rem 178
1400 X=INT(RND(1)*LV*10):Y=INT(RND(1)*LV*
     10)                           :rem 28
1410 IFLV<=3THENIFY>XTHENT=X:X=Y:Y=T
                                   :rem 180
1420 Z1=X-Y:PRINTX" - "Y"?":INPUTZ$:GOSUB
     1510:IFWR=2THEN1420           :rem 121
1425 RETURN                        :rem 172
1430 X=INT(RND(1)*LV*5):Y=INT(RND(1)*LV*5
     )                             :rem 199
1440 IFLV>=4THENX=X-INT(RND(1)*LV*2):Y=Y-
     INT(RND(1)*LV*2)              :rem 220
1450 Z1=X*Y:PRINTX" * "Y"?":INPUTZ$:GOSUB
     1510:IFWR=2THEN1450           :rem 121
1455 RETURN                        :rem 175
1460 X=INT(RND(1)*LV*5):Y=INT(RND(1)*LV*5
     )                             :rem 202
1470 IFLV>=4THENX=X-INT(RND(1)*LV*3):Y=Y-
     INT(RND(1)*LV*3)              :rem 225
1480 IFY=0THENY=1                  :rem 24
1490 Z1=X/Y:IFZ1<>INT(Z1)THEN1460  :rem 5
1500 PRINTX" / "Y"?":INPUTZ$       :rem 66
1505 GOSUB1510:IFWR=2THEN1490     :rem 240
1506 RETURN                        :rem 172
1510 IFVAL(Z$)<>0THENZ2=VAL(Z$):GOTO1540
                                   :rem 153
1520 IFZ$<>"0"THENPR$="ANSWER THE QUESTIO
     N FIRST!":GOSUB2570:WR=2:RETURN
                                   :rem 255
1530 Z2=VAL(Z$)                    :rem 68
1540 IFZ1=Z2THENPRINT"{CLR}CORRECT!!":WR=
     0:RETURN                      :rem 254
1550 PRINT"{CLR}INCORRECT!!":WR=1:RETURN
                                   :rem 133
1560 WA=0:IFLO=0THENPR$="I'D TURN ON MY L
     IGHT FIRST.":GOSUB2570:GOTO1610
                                   :rem 73
1570 C=ABS(PL=18)-ABS(PL=19):D=ABS(PL=17)
     -ABS(PL=16):TX=PX+C:TY=PY+D   :rem 121
1580 IFTX=11ORTX=0ORTY=11ORTY=0THENPRINT"
     THERE IS A WALL THERE.":WA=1:GOTO161
     0                             :rem 176
1590 IFFL(TY,TX)=0THENPRINT"THERE IS A WA
     LL THERE.":WA=1:GOTO1610      :rem 217
1600 PX=TX:PY=TY                   :rem 37
1610 Z=FL(PY,PX):RETURN            :rem 217
1620 FORI=1TO10:FORJ=1TO10:FL(I,J)=0:NEXT
     J:NEXTI                       :rem 22
1625 NM=INT(RND(1)*10)+LV:I=1      :rem 145
1630 X=INT(RND(1)*10)+1:Y=INT(RND(1)*10)+
```

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```
    1:IFFL(Y,X)=3THEN1630          :rem 51
1640 FL(Y,X)=3:I=I+1:IFI<=NMTHEN1630
                                   :rem 127
1650 FORI=1TONM*2                   :rem 4
1660 X=INT(RND(1)*10)+1:Y=INT(RND(1)*10)+
     1                             :rem 68
1670 IFFL(Y,X)=3THEN1660           :rem 137
1680 FL(Y,X)=0:NEXTI               :rem 190
1690 FORI=1TO10:FORJ=1TO10          :rem 79
1700 IFFL(I,J)=3THENGOSUB1780      :rem 232
1710 NEXTJ:NEXTI                   :rem 20
1720 GOSUB1840:GX=X:GY=Y:IF(BX=XANDBY=Y)O
     R(RX=XANDRY=Y)ORFL(Y,X)=0THEN1720
                                   :rem 78
1730 GOSUB1840:BX=X:BY=Y:IF(GX=XANDGY=Y)O
     R(RX=XANDRY=Y)ORFL(Y,X)=0THEN1730
                                   :rem 80
1740 GOSUB1840:X1=X:Y1=Y:IF(X2=XANDY2=Y)O
     R(X3=XANDY3=Y)ORFL(Y,X)=0THEN1740
                                   :rem 200
1750 GOSUB1840:X2=X:Y2=Y:IF(X1=XANDY1=Y)O
     R(X3=XANDY3=Y)ORFL(Y,X)=0THEN1750
                                   :rem 202
1760 GOSUB1840:X3=X:Y3=Y:IF(X1=XANDY1=Y)O
     R(X2=XANDY2=Y)ORFL(Y,X)=0THEN1760
                                   :rem 204
1770 RETURN                        :rem 175
1780 FORK=JTO10:GOSUB1800:NEXTK:FORK=JTO1
     STEP-1:GOSUB1800:NEXTK        :rem 124
1790 FORK=ITO10:GOSUB1820:NEXTK:FORK=ITO1
     STEP-1:GOSUB1820:NEXTK:RETURN
                                   :rem 153
1800 IFFL(I,K)=0THENFL(I,K)=INT(RND(1)*2)
     +1                            :rem 209
1810 RETURN                        :rem 170
1820 IFFL(K,J)=0THENFL(K,J)=INT(RND(1)*2)
     +1                            :rem 213
1830 RETURN                        :rem 172
1840 X=INT(RND(1)*10)+1:Y=INT(RND(1)*10)+
     1:IFFL(Y,X)=0THEN1840          :rem 54
1850 RETURN                        :rem 174
1860 GOSUB790:FORI=12TO19:CM(I)=1:NEXT:CM
     (22)=1                         :rem 62
1870 PRINT"{CLR}":PR$=DS$(16-Z):GOSUB2570
     :IFLO=1THENGOSUB1030           :rem 56
1880 GOSUB2270:GOSUB2200           :rem 154
1890 GOSUB2310:IFPL=15ANDLOTHENGOSUB1020:
     GOTO1880                      :rem 68
1900 IFPL=20THENGOSUB2850:GOTO1890:rem 87
1910 IFPL=15ANDLO=0THEN1870        :rem 115
1920 IFPL=1THENGOSUB1190:GOTO1890  :rem 36
1930 IFPL=14THEN1890               :rem 155
1940 IFPL=11THENGOSUB2490:GOTO1890:rem 91
1950 IFPL=8THENGOSUB1130:GOTO1890  :rem 40
1960 IFPL=22THENGOSUB2470:RETURN   :rem 50
1970 IFPL>15THENGOSUB1560:IF(LO=0)OR(WA=1
     )THEN1890                     :rem 54
1980 RETURN                        :rem 178
2000 GOSUB790:FORI=10TO19:CM(I)=1:NEXTI:C
     M(22)=1                       :rem 120
2010 PR$=DS$(23):GOSUB2570:PR$=DS$(24):GO
     SUB2570:GOSUB1320:IFWR=0THENGOTO2050
                                   :rem 132
2020 GP=0:PR$=DS$(25):GOSUB2570:FORW=1TO2
     000:NEXTW                     :rem 27
2030 X=INT(RND(1)*10+1):Y=INT(RND(1)*10)+
     1:IFFL(Y,X)=0THEN2030          :rem 38
2040 PX=X:PY=Y:Z=FL(PY,PX):RETURN:rem 199
2050 PR$=DS$(26):GOSUB2570:FL(PY,PX)=2
                                   :rem 207
2060 PR$=DS$(14):GOSUB2570:IFLOTHENGOSUB1
     030                           :rem 155
2070 GOSUB2270:GOSUB2200           :rem 146
2080 GOSUB2310                      :rem 16
2090 IFPL=20THENGOSUB2850:GOTO2080:rem 80
2100 IFPL=15ANDLOTHENGOSUB1020:GOTO2070
                                   :rem 173
2110 IFPL=15ANDLO=0THEN2060        :rem 100
2120 IFPL=14THEN2080               :rem 139
2130 IFPL=11THEN2490:GOTO2080      :rem 203
2140 IFPL=8THENGOSUB1130:GOTO2080 :rem 24
2150 IFPL=1THENGOSUB1190:GOTO2080 :rem 24
2160 IFPL=10THENGOSUB1290:GOTO2080:rem 74
2170 IFPL=22THENGOSUB2470:RETURN   :rem 44
2180 IFPL>15THENGOSUB1560:IF(LO=0)OR(WA=1
     )THEN2080                     :rem 40
2190 RETURN                        :rem 172
2200 IF(X1=PXANDY1=PY)ANDGD<>2THENPR$=DS$
     (17):GOSUB2570:GD=1:CM(1)=1  :rem 122
2210 IF(X2=PXANDY2=PY)ANDBD<>2THENPR$=DS$
     (19):GOSUB2570:BD=1:CM(1)=1  :rem 117
2220 IF(X3=PXANDY3=PY)ANDRD<>2THENPR$=DS$
     (18):GOSUB2570:RD=1:CM(1)=1  :rem 151
2230 IF(X1<>PXORY1<>PY)ANDGD<>2THENGD=0
                                   :rem 209
2240 IF(X2<>PXORY2<>PY)ANDBD<>2THENBD=0
                                   :rem 202
2250 IF(X3<>PXORY3<>PY)ANDRD<>2THENRD=0
                                   :rem 237
2260 RETURN                        :rem 170
2270 IFBX=PXANDBY=PYANDIN(3)=0THENPR$=DS$
     (21):GOSUB2570:BK=1:CM(8)=1  :rem 167
2280 IFGX=PXANDGY=PYANDIN(2)=0THENPR$=DS$
     (20):GOSUB2570:GK=1:CM(8)=1  :rem 181
2290 IFRX=PXANDRY=PYANDIN(4)=0THENPR$=DS$
     (22):GOSUB2570:RK=1:CM(8)=1  :rem 219
2300 RETURN                        :rem 165
2310 INPUTC$:PL=0:FORI=1TO22:IFCM$(I)=C$T
     HENPL=I:I=23                  :rem 16
2320 NEXT                           :rem 6
2330 IFPL=0THENPRINT"YOU CAN'T DO THAT!":
     GOTO2310                      :rem 200
2340 N$="":I=1                     :rem 173
2350 T$=MID$(C$,I,1)                :rem 7
2360 IFASC(T$)=32THENL=I:GOTO2390:rem 222
2370 IFI=LEN(C$)THENGOTO2410       :rem 167
2380 I=I+1:GOTO2350                 :rem 53
2390 N$=MID$(C$,L+1,LEN(C$))       :rem 202
2400 IFCM(PL)=0THENPRINT"I SEE NO "N$" HE
     RE!":GOTO2310                 :rem 54
2410 IFC$="INV"THENGOTO2430         :rem 92
2420 RETURN                        :rem 168
2430 PRINT"YOU ARE CARRYING :"      :rem 8
2440 FORI=1TO5:IFIN(I)=1THENPRINT"A "IN$(
     I)                            :rem 62
2450 NEXTI:IFGP<>0THENPRINTGP" GOLD PIECE
     S."                           :rem 1
2460 RETURN                        :rem 172
2470 PX=INT(RND(1)*10)+1:PY=INT(RND(1)*10
     )+1:IFFL(PY,PX)=0THEN2470     :rem 118
2480 Z=FL(PY,PX):RETURN            :rem 223
2490 IFIN(5)=1THENPR$="YOU ALREADY HAVE T
     HE MAP!":GOSUB2570:RETURN      :rem 4
2500 IFMA=0THENPRINT"WHAT MAP?":RETURN
                                   :rem 188
2510 PRINT"OK.":IN(5)=1:MA=0:CM(20)=1:GD=
     2:RETURN                      :rem 148
2520 PR$="{2 DOWN}YOU HAVE FOUND YOUR WAY
      OUT OF THE MATH DUNGEON.":GOSUB2570
                                   :rem 109
2530 PR$="{DOWN}{2 SPACES}YOU HAVE WON "+
     STR$(GP)+" GOLD PIECES IN YOUR JOURN
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    EY.":GOSUB2570                  :rem 125
2540 PRINT"{DOWN} PLAY AGAIN";:INPUT A$
                                    :rem 173
2550 IFA$="Y"THENRUN                :rem 190
2560 END                            :rem 164
2570 IFLEN(PR$)<=CCTHENPRINTPR$:RETURN
                                    :rem 238
2580 T$=MID$(PR$,CC,1):IFASC(T$)=32THENI=
    CC:GOTO2620                     :rem 43
2590 I=CC-1                         :rem 58
2600 T$=MID$(PR$,I,1):IFASC(T$)=32THENGOT
    O2620                           :rem 161
2610 I=I-1:GOTO2600                 :rem 49
2620 A$=MID$(PR$,I+1,LEN(PR$)):B$=MID$(PR
    $,1,I-1):PRINTB$                :rem 195
2630 IFLEN(A$)<=CCTHENPRINTA$:RETURN
                                    :rem 41
2640 PR$=A$:GOTO2570                :rem 117
2650 DATAOPEN DOOR,OPEN GATE,OPEN MILKBOX
    ,CLOSE DOOR,CLOSE GATE,CLOSE MILKBOX
                                    :rem 145
2660 DATAGET NOTE,GET KEY,GET LIGHT,GET G
    OLD,GET MAP,LIGHT ON,LIGHT OFF,INV
                                    :rem 108
2670 DATALOOK,N,S,E,W,MAP,MAP,ALGEBRA,LIG
    HT,GREEN KEY,BLUE KEY,RED KEY,MAP
                                    :rem 154
2680 DATAYOU ARE FACING NORTH. A GATE IS
    {SPACE}IN FRONT OF YOU.,THE GATE IS
    {SPACE}OPEN.                    :rem 40
2690 DATATHE GATE IS CLOSED.,YOU ARE IN A
     DENSE FOREST.                  :rem 186
2700 DATAYOU ARE IN FRONT OF AN OLD HOUSE
    . THERE IS A MILKBOX BY THE DOOR.
                                    :rem 214
2710 DATATHE MILKBOX IS CLOSED.,THE MILKB
    OX IS OPEN.,THE DOOR IS CLOSED.
                                    :rem 67
2720 DATATHE DOOR IS OPEN.,THE DOOR IS LO
    CKED. YOU DO NOT HAVE THE RIGHT KEY.
                                    :rem 206
2730 DATATHERE IS A NOTE IN THE MILKBOX.,
    THE DOOR FLIES OPEN WITH A BANG!
                                    :rem 201
2740 DATATHE NOTE DISAPPEARS AND THE MILK
    BOX CLOSES.                     :rem 171
2750 DATAYOU ARE IN A COLD AND DAMP ROOM.
    ,YOU ARE IN A LONG AND NARROW HALLWA
    Y.                              :rem 12
2760 DATATHERE IS AN UNLIT LIGHT HERE.,TH
    ERE IS A GREEN DOOR HERE.       :rem 90
2770 DATATHERE IS A RED DOOR HERE.,THERE
    {SPACE}IS A BLUE DOOR HERE.     :rem 207
2780 DATATHERE IS A GREEN KEY HERE.,THERE
     IS A BLUE KEY HERE.            :rem 208
2790 DATATHERE IS A RED KEY HERE.,BEFORE
    {SPACE}YOU CAN GET A GOOD LOOK AT TH
    E AREA..                        :rem 111
2800 DATAA MONSTER JUMPS OUT AND SAYS 'YO
    U MUST ANSWER THIS QUESTION!:rem 245
2810 DATA'NOW I'LL TAKE ALL YOUR GOLD AND
     TRANSPORT YOU AWAY!            :rem 107
2820 DATATHE MONSTER DISAPPEARS.
    {17 SPACES}YOU SEE SOME GOLD HERE!
                                    :rem 130
2830 DATATHERE IS A MAP HERE!,THERE IS A
    {SPACE}RED KEY HERE!            :rem 233
2840 DATATHERE IS A SUDDEN FLASH AND YOU
    {SPACE}FIND YOURSELF AMIDST SOME TRE
    ES.                             :rem 127
2850 IFIN(5)=0THENPRINT"YOU DON'T HAVE A
    {SPACE}MAP!":RETURN             :rem 191
2860 PRINT"{CLR}":PRINT             :rem 251
2870 FORI=1TO10:TB=1:FORJ=1TO10     :rem 142
2880 IFI=PYANDJ=PXTHENPRINTTAB(TB)"{GRN}*
    ";:GOTO2930                     :rem 20
2890 IFFL(I,J)=3THENPRINTTAB(TB)"{BLK}M";
    :GOTO2930                       :rem 139
2900 IFFL(I,J)=2THENPRINTTAB(TB)"{BLU}R";
    :GOTO2930                       :rem 22
2910 IFFL(I,J)=1THENPRINTTAB(TB)"{PUR}H";
    :GOTO2930                       :rem 137
2920 PRINTTAB(TB)"{RVS}{YEL} {OFF}";
                                    :rem 217
2930 TB=TB+2:NEXTJ:PRINT:PRINT:NEXTI
                                    :rem 167
2940 PRINT"{BLU}":RETURN            :rem 217
```

Chomper

Article on page 56.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1—Chomper—VIC Version

```
10 PRINT"{CLR}"SPC(183)"CHOMPER":FORI=1TO
   2000:NEXT:GOTO610                :rem 170
20 M=M+1:X=45+G-INT(TI/60):IFX<0THEN240
                                    :rem 44
30 PRINT"{RVS}{HOME}"SPC(7)"TIME"X"{LEFT}
    ":GOSUB590:X=X+X1:Y=Y+Y1:IFY=0THENY=2
   2                                :rem 60
40 IFY=23THENY=1                    :rem 228
50 IFX=-1THENX=21                   :rem 14
60 IFX=22THENX=0                    :rem 226
70 IF-((PANDJ32)=0)THEN510          :rem 127
80 POKEC,32:C=FNA(0):X1=X:Y1=Y:Z=PEEK(C):
   IFZ=32THENPOKEC,36:GOTO140       :rem 186
90 POKEC,37:POKEVO,8:IFZ=34THENS=S+150:GO
   SUB190:GOTO120                   :rem 215
100 IFZ=35THENS=S-450:GOSUB200:GOTO130
                                    :rem 74
110 POKEC,33:GOTO250                :rem 160
120 IFS>=LTHENPOKES2,0:POKES3,0:GOTO210
                                    :rem 204
130 POKES1,0:POKES2,0:POKES3,0:POKES4,0:P
   RINT"{RVS}{HOME}{RIGHT}{LEFT}"S"
   {LEFT} "                         :rem 162
135 REM**DROIDS' ROUTINE**          :rem 55
140 Z=M/F:IFZ<>INT(Z)THEN20         :rem 178
150 IFW=C1THENW=0                   :rem 32
160 W=W+1:X=X(W):Y=Y(W):X=X+(-(X1>X)+(X1<
   X)):Y=Y+(-(Y1>Y)+(Y1<Y)):POKED(W),32
                                    :rem 28
170 D(W)=FNA(0):X(W)=X:Y(W)=Y:Z=PEEK(D(W)
   ):POKED(W),33:IFZ>35THEN250      :rem 96
180 GOTO20                          :rem 52
185 REM*SOUND ROUTINES              :rem 174
190 FORX=160TO198STEP3:POKES2,X:POKES3,X:
   NEXTX:RETURN                     :rem 49
200 POKES4,178:POKES1,178:FORX=150TO1STEP
   -3:POKEVO,(X/10):NEXT:POKEVO,8:RETURN
                                    :rem 1
```

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```
205 REM**BONUS**                          :rem 170
210 V=V+1:PRINT"{RVS}{HOME}"SPC(15)"*EX*
    {2 SPACES}{2 LEFT}"V:L=S+2999:G=G+R:R
    =R-5:IFV<>6THEN20                     :rem 231
220 PRINT"{CLR}{RVS}"SPC(5)"BONUS SCREEN
    {SPACE}":FORX=1TO750:NEXT:PRINT"{CLR}
    ":M=0:G=0:R=45                        :rem 82
230 PRINT"{RVS}{HOME}"SPC(15)"*EX*
    {2 SPACES}{2 LEFT}"V:GOTO510          :rem 246
235 REM**GAME OVER**                      :rem 124
240 PRINT"{HOME}":FORX=1TO10:PRINT:NEXT:P
    RINT"{RVS}{6 SPACES}TIME'S UP":FORX=1
    TO1000:NEXT:GOTO260                   :rem 223
250 FORX=230TO150STEP-1:POKES3,X:POKES1,X
    :NEXT:POKES3,0:POKES1,0               :rem 108
260 PRINT"{HOME}":FORX=1TO11:PRINT:NEXT:P
    RINTSPC(6)"{RVS}GAME OVER"            :rem 136
270 FORZ=1TO100STEP4:POKE36879,Z:POKES2,1
    28+ABS(INT(SIN(Z)*127)):NEXT:POKES2,0
                                          :rem 75
275 FORI=1TO1000:NEXT                     :rem 25
280 POKE36879,110:PRINT"{CLR}":POKE36869,
    240                                   :rem 113
285 REM**HIGH SCORE?**                    :rem 6
290 IFS<BSTHEN310                         :rem 17
300 BS=S:PRINT"{CLR}"SPC(5)"GREAT SCORE!!
    ":PRINT"{HOME}{3 DOWN} INPUT YOUR NAM
    E":INPUT" ";N$                        :rem 67
305 REM**AGAIN?**                         :rem 195
310 FORI=1TO1000:NEXT                     :rem 15
311 PRINT"{CLR}{3 DOWN}{5 RIGHT}SCORE:";S
    :PRINT"{3 DOWN}{2 RIGHT}SESSION HIGH:
    ";BS:PRINTSPC(8)"BY"                  :rem 220
320 PRINT"{2 RIGHT}";N$:PRINT"{HOME}":FOR
    Z=1TO11:PRINT:NEXT:PRINTSPC(6)"TRY AG
    AIN?"                                 :rem 175
330 PRINT:PRINTSPC(7)"YES{DOWN}"          :rem 158
340 PRINTSPC(8)"W":PRINTSPC(7)"W W NEW GA
    ME":PRINTSPC(8)"W":PRINTSPC(8)"{DOWN}
    NO"                                   :rem 82
350 GOSUB590:IFX=1THEN390                 :rem 16
360 IFY=-1THENM=-1:GOTO390                :rem 66
370 IFY=1THENPOKE36879,27:PRINT"{CLR}
    {BLU}":END                            :rem 194
380 GOTO350                               :rem 108
385 REM**VAR SETUP**                      :rem 166
390 PRINT"{CLR}":POKE36869,240:POKE36879,
    110:X=0:Y=0:Z=0:L=3000:S=0:G=0:V=0:R=
    45:W=0                                :rem 14
400 X1=11:Y1=11:C=7933:DEF FNA(A)=7680+Y*
    22+X:DEF FNB(A)=INT(RND(TI)*A+1)
                                          :rem 73
410 S1=36874:S2=36875:S3=36876:S4=36877:V
    O=36878:D=37154:PA=37137:PB=37152:POK
    E37139,0                              :rem 82
420 IFM<0THENM=0:GOTO510                  :rem 208
425 REM**LEVEL?**                         :rem 222
430 M=0:PRINT"{CLR}{WHT}ENTER LEVEL":PRIN
    T"{3 DOWN}{3 SPACES}TWO DROIDS":PRINT
    "{DOWN}"SPC(8)"W"                     :rem 141
440 PRINT"{2 SPACES}HARD W W EASY":PRINTS
    PC(8)"W":PRINT"{2 DOWN}{3 SPACES}USE
    {SPACE}JOYSTICK"                      :rem 67
450 FORZ=1TO600:NEXT                      :rem 250
460 GOSUB590:IFX=-1THENC1=1:F=3:GOTO500
                                          :rem 125
470 IFX=1THENC1=1:F=4:GOTO500             :rem 250
480 IFY=-1THENC1=2:F=2:GOTO500            :rem 40
490 GOTO460                               :rem 112
500 PRINT"{CLR}"                          :rem 249
505 REM**SCREEN SETUP**                   :rem 119
510 POKE36869,255:FORA=34TO35:FORY=1TO70
                                          :rem 160
520 X=7701+FNB(484):Z=FNB(8)-1:IFZ=6THENZ
    =7                                    :rem 14
530 IFZ=2THENZ=3                          :rem 233
540 POKE30720+X,Z:POKEX,A:NEXTY,A         :rem 58
550 POKEVO,8:FORX=128TO255:POKES2,X:NEXT:
    POKES2,0:POKEC,36:IFM<>0THEN20:rem 41
555 REM**DROID SETUP**                    :rem 46
560 FORZ=1TOC1:X=FNB(22)-1:Y=FNB(22):D(Z)
    =FNA(0):X(Z)=X:Y(Z)=Y                 :rem 214
570 POKED(Z),33:NEXT                      :rem 197
580 TI$="000000":GOTO20                   :rem 212
585 REM**JOYSTICK**                       :rem 158
590 POKED,127:P=PEEK(PA):X=-((PEEK(PB)AND
    128)=0)+((PAND16)=0):POKED,255:rem 95
600 Y=(-((PAND8)=0))+((PAND4)=0):RETURN
                                          :rem 191
605 REM**CHARACTERS**                     :rem 7
610 FORX=7424TO7431:POKEX,0:NEXT:FORY=33T
    O37:FORX=0TO7:READZ:POKE7168+8*Y+X,Z:
    NEXTX,Y                               :rem 10
630 DATA 60,66,90,66,60,36,36,102,0,0,0,2
    4,24,0,0,0,126,129,165,129,153,189,12
    9,126                                 :rem 226
640 DATA 60,126,90,126,235,129,213,126,60
    ,126,90,255,255,255,255,126:GOTO390
                                          :rem 46
```

Program 2—Chomper—64 Version

Program translation by Kevin Mykytyn.

```
49152 :032,136,198,169,162,141,070
49158 :095,195,169,003,141,112,209
49164 :003,169,016,141,114,003,202
49170 :169,039,141,115,003,169,142
49176 :000,141,032,208,141,033,067
49182 :208,169,147,032,210,255,027
49188 :032,229,192,160,007,185,073
49194 :035,198,153,123,005,136,180
49200 :016,247,160,010,185,043,197
49206 :198,153,198,005,136,016,248
49212 :247,169,001,141,107,003,216
49218 :160,005,185,054,198,153,053
49224 :027,006,136,016,247,169,161
49230 :001,141,113,003,165,162,151
49236 :105,010,197,162,208,252,250
49242 :173,112,003,141,203,005,215
49248 :173,107,003,009,048,141,065
49254 :083,005,173,000,220,074,145
49260 :176,016,238,107,003,173,053
49266 :107,003,041,007,240,246,246
49272 :141,107,003,076,082,192,209
49278 :074,176,001,000,074,176,115
49284 :008,169,210,141,111,003,006
49290 :076,191,192,074,176,007,086
49296 :169,160,141,111,003,208,168
49302 :040,074,176,029,173,113,243
49308 :003,208,179,173,095,195,241
49314 :073,011,141,095,195,173,082
49320 :112,003,073,001,141,112,098
49326 :003,169,001,141,113,003,092
49332 :076,082,192,169,000,141,072
49338 :113,003,076,082,192,032,172
49344 :192,195,032,029,196,032,100
49350 :249,192,032,081,195,032,211
49356 :052,194,032,000,194,032,196
49362 :067,193,032,004,193,032,219
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49368 :088,193,032,153,196,173,027
49374 :141,002,240,233,076,221,111
49380 :192,169,001,160,000,153,135
49386 :000,216,153,000,217,153,205
49392 :000,218,153,000,219,136,198
49398 :208,241,096,160,018,185,130
49404 :077,198,153,010,004,136,062
49410 :016,247,056,173,077,003,062
49416 :237,062,003,141,079,003,021
49422 :173,078,003,237,063,003,059
49428 :013,079,003,176,041,238,058
49434 :081,003,173,077,003,024,131
49440 :105,184,141,077,003,173,203
49446 :078,003,105,011,141,078,198
49452 :003,173,073,003,024,109,173
49458 :076,003,141,073,003,173,007
49464 :076,003,240,006,056,233,158
49470 :005,141,076,003,096,169,040
49476 :000,141,064,003,173,062,255
49482 :003,141,071,003,173,063,016
49488 :003,141,072,003,032,151,226
49494 :193,096,169,015,141,064,252
49500 :003,173,073,003,141,065,038
49506 :003,169,000,141,066,003,224
49512 :032,168,193,173,081,003,242
49518 :141,065,003,169,000,141,117
49524 :066,003,169,032,141,064,079
49530 :003,032,168,193,096,206,052
49536 :075,003,208,018,206,073,199
49542 :003,173,073,003,201,255,074
49548 :208,003,076,130,197,169,155
49554 :009,141,075,003,096,173,131
49560 :071,003,056,233,016,141,160
49566 :065,003,173,072,003,233,195
49572 :039,141,066,003,169,000,070
49578 :141,067,003,141,068,003,081
49584 :141,069,003,162,015,014,068
49590 :065,003,046,066,003,120,229
49596 :248,173,067,003,109,067,087
49602 :003,141,067,003,173,068,137
49608 :003,109,068,003,141,068,080
49614 :003,173,069,003,109,069,120
49620 :003,141,069,003,216,088,220
49626 :202,016,216,162,002,189,237
49632 :067,003,072,074,074,074,076
49638 :074,032,244,193,104,041,150
49644 :015,032,244,193,202,016,170
49650 :236,096,009,048,238,064,165
49656 :003,172,064,003,153,000,131
49662 :004,096,165,162,105,005,023
49668 :197,162,208,252,032,127,214
49674 :193,096,165,162,197,162,217
49680 :240,252,096,072,138,024,070
49686 :101,251,133,251,165,252,151
49692 :105,000,133,252,104,096,206
49698 :072,134,254,165,251,056,198
49704 :229,254,133,251,165,252,044
49710 :233,000,133,252,104,096,096
49716 :160,000,173,060,003,133,069
49722 :251,173,061,003,133,252,163
49728 :169,032,145,251,173,000,066
49734 :220,074,176,005,162,040,235
49740 :032,034,194,074,176,005,079
49746 :162,040,032,019,194,074,091
49752 :176,005,162,001,032,034,242
49758 :194,074,176,005,162,001,194
49764 :032,019,194,074,176,003,086
49770 :032,081,195,165,251,233,039
49776 :039,141,079,003,165,252,023
49782 :233,004,013,079,003,176,114
49788 :013,165,251,024,105,192,106
49794 :133,251,165,252,105,003,015
49800 :133,252,165,251,233,232,122
49806 :141,079,003,165,252,233,247
49812 :007,013,079,003,144,013,151
49818 :165,251,056,233,192,133,160
49824 :251,165,252,233,003,133,173
49830 :252,177,251,201,035,208,010
49836 :042,173,062,003,024,105,069
49842 :150,141,062,003,173,063,002
49848 :003,105,000,141,063,003,243
49854 :201,253,144,003,076,182,025
49860 :198,169,038,141,070,003,047
49866 :169,129,141,004,212,169,002
49872 :009,141,001,212,076,063,198
49878 :195,162,128,142,004,212,033
49884 :206,109,003,174,109,003,056
49890 :142,001,212,224,010,208,255
49896 :005,162,034,142,011,212,030
49902 :162,037,142,070,003,201,085
49908 :036,208,065,056,173,062,076
49914 :003,233,209,141,079,003,150
49920 :173,063,003,233,040,013,013
49926 :079,003,176,013,169,016,206
49932 :141,062,003,169,039,141,055
49938 :063,003,076,040,195,173,056
49944 :062,003,056,233,194,141,201
49950 :062,003,173,063,003,233,055
49956 :001,141,063,003,169,035,192
49962 :141,011,212,169,020,141,224
49968 :008,212,141,109,003,076,085
49974 :063,195,201,034,208,003,246
49980 :076,130,197,160,000,173,028
49986 :070,003,145,251,165,251,183
49992 :141,060,003,165,252,141,066
49998 :061,003,096,160,000,173,059
50004 :027,212,074,074,074,074,107
50010 :074,201,006,240,244,169,000
50016 :001,153,040,216,153,000,147
50022 :217,153,000,218,153,230,049
50028 :218,200,208,227,162,027,126
50034 :032,127,193,202,208,250,102
50040 :162,070,169,232,133,253,115
50046 :169,003,133,254,160,004,081
50052 :173,027,212,024,101,253,154
50058 :133,253,165,254,105,000,024
50064 :133,254,136,208,239,165,255
50070 :253,056,233,040,165,254,127
50076 :233,004,144,218,160,000,147
50082 :173,027,212,016,004,169,251
50088 :035,208,002,169,036,145,251
50094 :253,032,012,194,202,208,051
50100 :197,160,039,169,001,153,131
50106 :000,216,136,016,250,096,132
50112 :120,165,001,041,251,133,135
50118 :001,160,000,185,000,208,240
50124 :153,000,056,185,000,209,039
50130 :153,000,057,136,208,241,237
50136 :165,001,009,004,133,001,017
50142 :173,024,208,041,240,009,149
50148 :014,141,024,208,088,160,095
50154 :039,185,245,195,153,016,043
50160 :057,136,016,247,096,060,084
50166 :066,090,066,060,036,036,088
50172 :102,000,000,000,024,024,146
50178 :000,000,000,126,129,165,166
50184 :129,153,189,129,126,060,026
50190 :126,090,126,235,129,213,165
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50196 :126,060,126,090,255,255,164
50202 :255,255,126,169,147,032,242
50208 :210,255,169,006,141,032,077
50214 :208,141,033,208,169,016,045
50220 :141,062,003,169,039,141,087
50226 :063,003,169,204,141,060,178
50232 :003,169,005,141,061,003,182
50238 :169,048,141,073,003,169,153
50244 :045,141,076,003,169,009,255
50250 :141,075,003,169,199,141,034
50256 :077,003,169,050,141,078,086
50262 :003,169,000,141,081,003,227
50268 :162,008,169,006,157,093,175
50274 :003,173,027,212,157,083,241
50280 :003,202,016,242,169,003,227
50286 :141,108,003,160,023,169,202
50292 :000,153,000,212,136,016,121
50298 :250,169,015,141,024,212,165
50304 :169,017,141,005,212,141,045
50310 :012,212,169,245,141,006,151
50316 :212,141,013,212,169,129,248
50322 :141,015,212,141,018,212,117
50328 :096,169,000,141,082,003,131
50334 :173,027,212,205,111,003,121
50340 :176,003,076,069,197,173,090
50346 :060,003,172,061,003,032,245
50352 :084,197,142,104,003,141,079
50358 :103,003,172,082,003,185,218
50364 :083,003,133,251,185,093,168
50370 :003,168,133,252,165,251,142
50376 :032,084,197,142,106,003,252
50382 :141,105,003,169,032,160,048
50388 :000,145,251,173,105,003,121
50394 :205,103,003,240,015,144,160
50400 :008,162,001,032,034,194,143
50406 :076,238,196,162,001,032,167
50412 :019,194,173,106,003,205,168
50418 :104,003,240,015,144,008,244
50424 :162,040,032,034,194,076,018
50430 :005,197,162,040,032,019,197
50436 :194,160,000,177,251,201,219
50442 :037,144,003,076,130,197,085
50448 :201,034,208,013,172,082,214
50454 :003,185,083,003,133,251,168
50460 :185,093,003,133,252,172,098
50466 :082,003,165,251,153,083,003
50472 :003,165,252,153,093,003,197
50478 :160,000,169,034,145,251,037
50484 :165,251,024,105,000,133,218
50490 :251,165,252,105,212,133,152
50496 :252,169,001,145,251,238,096
50502 :082,003,173,082,003,205,106
50508 :107,003,240,003,076,184,177
50514 :196,096,141,079,003,152,237
50520 :056,233,004,141,080,003,093
50526 :162,000,173,080,003,208,208
50532 :007,173,079,003,201,040,091
50538 :144,021,173,079,003,056,070
50544 :233,040,141,079,003,173,013
50550 :080,003,233,000,141,080,143
50556 :003,232,076,096,197,096,056
50562 :032,229,192,169,032,160,176
50568 :200,153,039,004,136,208,108
50574 :250,056,173,062,003,237,155
50580 :114,003,141,079,003,173,149
50586 :063,003,237,115,003,013,076
50592 :079,003,144,012,173,062,121
50598 :003,141,114,003,173,063,151
50604 :003,141,115,003,169,001,092
50610 :141,113,003,169,000,141,233
50616 :032,208,141,033,208,141,179
50622 :008,212,160,008,185,011,006
50628 :198,153,055,004,136,016,246
50634 :247,160,014,185,020,198,002
50640 :153,132,004,136,016,247,128
50646 :160,009,185,060,198,153,211
50652 :211,004,136,016,247,173,239
50658 :114,003,141,071,003,173,219
50664 :115,003,141,072,003,169,223
50670 :220,141,064,003,032,151,081
50676 :193,173,000,220,041,016,119
50682 :208,008,173,113,003,208,195
50688 :244,076,023,192,169,000,192
50694 :141,113,003,240,234,007,232
50700 :001,013,005,032,015,022,100
50706 :005,018,032,016,018,005,112
50712 :019,019,032,020,018,009,141
50718 :007,007,005,018,032,030,129
50724 :032,004,018,015,009,004,118
50730 :019,005,001,019,025,060,171
50736 :032,062,008,001,018,004,173
50742 :022,032,017,021,009,020,175
50748 :032,008,009,032,019,003,163
50754 :015,018,005,032,003,008,147
50760 :015,013,016,005,018,020,159
50766 :009,013,005,032,032,032,201
50772 :032,032,032,032,032,032,020
50778 :032,032,042,005,024,042,011
50784 :025,015,021,032,001,018,208
50790 :005,032,015,014,005,032,205
50796 :015,006,032,020,008,005,194
50802 :032,006,005,023,032,020,232
50808 :015,032,023,009,014,032,245
50814 :001,020,032,003,008,015,205
50820 :013,016,005,018,032,029,245
50826 :196,169,000,160,150,153,198
50832 :063,003,136,208,250,032,068
50838 :229,192,160,006,185,070,224
50844 :198,153,200,005,136,016,096
50850 :247,160,014,185,020,198,218
50856 :153,020,006,136,016,247,234
50862 :173,000,220,041,016,208,064
50868 :249,096,169,147,032,210,059
50874 :255,032,229,192,160,039,069
50880 :185,096,198,153,184,005,245
50886 :136,016,247,076,130,197,232
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Kablam!

Article on page 60.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: Kablam!—64 Version

```
100 FORX=24573TO24593:CS=CS+PEEK(X):NEXT:
    IFCS=2907THEN160                    :rem 5
110 PRINT"{CLR}{5 DOWN}READING IN:"
                                        :rem 22
120 PRINT"ML ROUTINE";:FORX=24573TO25219:
    READA:POKEX,A:B=B+A:NEXT        :rem 100
130 IFB<>72932THENPRINT" ERROR IN DATA":E
    ND                                  :rem 50
```


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140 PRINT" OK":PRINT"CHARACTERS":FORX=102
    40TO10575:READA:POKEX,A:NEXT :rem 123
150 PRINT"SPRITES":FORX=12800TO13056:READ
    A:POKEX,A:NEXT                :rem 34
160 POKE53281,1                   :rem 38
170 GOTO460 :REM GOTO TITLE PAGE  :rem 97
180 POKE53272,27:PRINT"{CLR}{5}{DOWN}";CH
    R$(8):POKE53280,7             :rem 58
190 PRINTTAB(30)"{RED}{DOWN}'$$$$$$$$$"
                                  :rem 142
200 PRINTTAB(30)"{UP}#KKKKKKKKK"  :rem 69
210 FORX=0TO1:PRINTTAB(30)"{UP}#KKKKKKKKK
    "                             :rem 0
220 PRINTTAB(30)"{UP}#KKMRVRNKK"  :rem 101
230 PRINTTAB(30)"{UP}#KKX&%&WKK"  :rem 241
240 PRINTTAB(30)"{UP}#KKPTUTOKK"  :rem 110
250 PRINTTAB(30)"{UP}#KKKKKKKKK"  :rem 74
260 PRINTTAB(30)"{UP}#KKMRVRNKK"  :rem 105
270 PRINTTAB(30)"{UP}#KKX&%&WKK"  :rem 245
280 PRINTTAB(30)"{UP}#KKPTUTOKK"  :rem 114
290 PRINTTAB(30)"{UP}#KKKKKKKKK":NEXT
                                  :rem 199
300 PRINTTAB(30)"{UP}#{8}JJJJJJJJJ{HOME}"
                                  :rem 235
310 PRINT"{HOME}{5 DOWN}{7}LLLLLLLLLLLLLL
    LLLLLLLLLLLLLLLL"             :rem 79
320 PRINT"{HOME}"TAB(13)"YZ[£]!@@@@@@@@
    {DOWN}"SPC(5)"(←)]Y!C"        :rem 124
330 POKEV+21,31                   :rem 57
340 POKEV,128:POKEV+1,226:POKEV+2,20:POKE
    V+3,69:POKEV+4,30:POKEV+5,69  :rem 141
350 POKE830,1:POKE832,255:POKEV+30,0
                                  :rem 54
360 SYS24573                      :rem 157
370 A1=210:A2=30:A3=40:A4=215:A5=190:POKE
    V+21,26                       :rem 100
380 POKE24838,2:FORQ=1TO10        :rem 21
390 POKEV+8,INT(RND(1)*A1)+A2:POKEV+9,INT
    (RND(1)*A1)+A3                :rem 184
400 POKEV+6,INT(RND(1)*A4)+A2:POKEV+7,INT
    (RND(1)*A5)+A3                :rem 179
410 SYS24897:NEXT                 :rem 27
420 FORX=VTOV+9:POKEX,0:NEXT:POKEV+21,0
                                  :rem 4
430 FORI=1TO2000:NEXT:PRINT"{CLR}":POKE53
    272,21                        :rem 172
440 PRINT"{HOME}{12 DOWN}"TAB(15)"GAME OV
    ER":FORI=1TO2000:NEXT:GOTO160 :rem 48
450 REM TITLE PAGE                :rem 28
460 V=53248:S=2040:SI=54272:PRINT"{CLR}
    {BLU}":POKE53280,7            :rem 101
470 POKEV+39,9:POKEV+40,12:POKEV+41,0:POK
    EV+29,26:POKEV+43,8:POKEV+42,15
                                  :rem 36
480 POKES,200:POKES+1,202:POKES+2,201:POK
    ES+4,203:POKES+3,203          :rem 67
490 POKEV+21,12:POKEV+23,8:POKESI+24,15
                                  :rem 26
500 POKEV+4,160:POKEV+5,50:POKESI+6,240
                                  :rem 20
510 FORK=50TO130:POKEV+5,K:POKESI+1,255-K
    :POKESI,100:POKESI+4,17:NEXT  :rem 11
520 POKESI+1,0:POKESI,0:POKESI+4,0:rem 59
530 POKEV+21,8:POKEV+6,153:POKEV+7,122
                                  :rem 214
540 POKE24838,255:SYS24897:OPEN1,0
                                  :rem 217
550 PRINT"{CLR}{14 DOWN}"         :rem 236
560 PRINT"{DOWN}"TAB(8)"{8}ENTER SKILL LE
    VEL(1-15){2 RIGHT}";          :rem 187
570 INPUT#1,SL$:PRINT:SL=VAL(SL$):IFSL>15
    ORSL<1THEN550                 :rem 197
580 POKE53281,1:CLOSE1:SK=ABS(SL-16)*15+1
    5:POKE24838,SK                :rem 217
590 POKEV+6,0:POKEV+7,0:POKEV+23,0:POKEV+
    42,8                          :rem 188
600 GOTO180                       :rem 104
610 REM **** MACHINE LANGUAGE DATA ****
                                  :rem 30
620 DATA 162,0,169,10,157,192,7   :rem 244
630 DATA 169,0,157,192,219,232,224
                                  :rem 143
640 DATA 40,208,241,120,169,98,141
                                  :rem 139
650 DATA 21,3,169,66,141,20,3     :rem 138
660 DATA 88,32,149,97,76,168,96   :rem 28
670 DATA 169,0,170,168,24,109,167:rem 100
680 DATA 2,144,1,200,202,208,247  :rem 25
690 DATA 152,73,255,141,0,208,173 :rem 90
700 DATA 30,208,41,5,201,5,240    :rem 174
710 DATA 3,76,97,96,172,3,208     :rem 160
720 DATA 140,5,208,174,2,208,232  :rem 30
730 DATA 232,232,232,232,232,232,232
                                  :rem 221
740 DATA 232,232,142,4,208,32,162 :rem 78
750 DATA 97,169,255,141,64,3,76   :rem 10
760 DATA 97,96,165,197,201,60,240:rem 106
770 DATA 3,76,49,234,169,0,141    :rem 204
780 DATA 24,212,173,1,220,201,251 :rem 71
790 DATA 240,2,208,247,169,15,141 :rem 93
800 DATA 24,212,76,49,234,165,251 :rem 92
810 DATA 240,18,174,2,208,169,1   :rem 243
820 DATA 133,251,232,224,225,240,6
                                  :rem 127
830 DATA 142,2,208,76,190,96,174  :rem 50
840 DATA 2,208,169,0,133,251,202  :rem 29
850 DATA 224,17,240,226,142,2,208 :rem 82
860 DATA 76,190,96,172,3,208,140  :rem 50
870 DATA 5,208,174,2,208,232,232  :rem 38
880 DATA 232,232,232,232,232,232,232
                                  :rem 227
890 DATA 232,142,4,208,172,5,208  :rem 40
900 DATA 200,192,223,240,12,140,5 :rem 67
910 DATA 208,32,255,96,32,39,97    :rem 7
920 DATA 76,128,96,120,173,77,4    :rem 4
930 DATA 240,35,206,77,4,174,4    :rem 198
940 DATA 208,142,8,208,162,0,142  :rem 34
950 DATA 4,208,172,5,208,140,9    :rem 197
960 DATA 208,32,65,97,169,255,141:rem 109
970 DATA 9,208,141,64,3,88,76     :rem 165
980 DATA 168,96,234,76,43,98,173  :rem 74
990 DATA 62,3,141,60,3,169,235    :rem 200
1000 DATA 141,61,3,206,61,3,208   :rem 223
1010 DATA 251,206,60,3,208,241,169
                                  :rem 126
1020 DATA 5,141,62,3,169,64,141   :rem 235
1030 DATA 96,3,206,96,3,173,96    :rem 204
1040 DATA 3,208,245,96,162,32,142 :rem 83
1050 DATA 6,212,174,64,3,202,142  :rem 23
1060 DATA 64,3,142,1,212,162,10   :rem 221
1070 DATA 142,0,212,162,17,142,4  :rem 18
1080 DATA 212,96,32,149,97,169,240
                                  :rem 152
1090 DATA 141,13,212,162,4,169,8  :rem 32
1100 DATA 141,8,212,169,100,141,7 :rem 69
1110 DATA 212,169,129,141,11,212,160
                                  :rem 218
1120 DATA 15,140,62,3,32,255,96   :rem 236
1130 DATA 169,4,141,8,212,169,129 :rem 90
1140 DATA 141,11,212,202,208,220,169
                                  :rem 215
1150 DATA 5,141,8,212,169,129,141 :rem 83
1160 DATA 11,212,160,160,140,62,3 :rem 63
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1170 DATA 32,255,96,162,200,142,13
                                    :rem 129
1180 DATA 212,169,2,141,62,3,32     :rem 233
1190 DATA 255,96,202,208,242,32,149
                                    :rem 193
1200 DATA 97,96,162,0,232,169,0     :rem 244
1210 DATA 157,0,212,224,22,208,246
                                    :rem 122
1220 DATA 96,173,24,4,201,9,240     :rem 237
1230 DATA 4,238,24,4,96,173,23      :rem 194
1240 DATA 4,201,9,240,24,169,0      :rem 181
1250 DATA 141,24,4,238,23,4,206     :rem 232
1260 DATA 6,97,206,6,97,206,6       :rem 157
1270 DATA 97,206,6,97,206,6,97      :rem 216
1280 DATA 96,173,22,4,201,9,240     :rem 241
1290 DATA 12,169,0,141,23,4,141     :rem 230
1300 DATA 24,4,238,22,4,96,173      :rem 191
1310 DATA 21,4,201,9,240,12,169     :rem 227
1320 DATA 0,141,22,4,141,23,4       :rem 117
1330 DATA 238,21,4,96,173,20,4      :rem 189
1340 DATA 201,9,240,15,169,0,141    :rem 24
1350 DATA 21,4,8,49,4,141,23        :rem 86
1360 DATA 4,238,20,4,96,173,19      :rem 199
1370 DATA 4,201,9,240,15,169,0      :rem 185
1380 DATA 141,20,4,141,21,4,141     :rem 221
1390 DATA 22,4,238,19,4,96,162      :rem 202
1400 DATA 0,169,0,157,19,4,232      :rem 185
1410 DATA 224,7,208,248,96,120,169
                                    :rem 145
1420 DATA 234,141,21,3,169,49,141   :rem 81
1430 DATA 20,3,88,173,21,208,41     :rem 236
1440 DATA 18,141,21,208,76,149,97   :rem 98
1450 DATA 72,152,72,138,72,173,0    :rem 38
1460 DATA 220,41,4,208,11,173,167   :rem 79
1470 DATA 2,173,167,2,105,4,141     :rem 235
1480 DATA 167,2,173,0,220,41,8      :rem 187
1490 DATA 208,9,56,173,167,2,233    :rem 49
1500 DATA 4,141,167,2,104,170,104   :rem 68
1510 DATA 168,104,76,35,96,0,0      :rem 193
1520 DATA 0,2,0,0,0,46,0            :rem 118
1530 DATA 0,0,0,0,128,0,119         :rem 17
1540 DATA 20,255,227                :rem 213
1550 REM ******* CHARACTER DATA *******
                                    :rem 162
1560 DATA 126,102,102,230,230,230,254,0,2
     4,24,24,56,56,56,56,0,254      :rem 152
1570 DATA 198,6,254,224,224,254,0,254,6,6
     ,62,14,14,254,0,198,198        :rem 93
1580 DATA 198,254,14,14,14,0,254,192,192,
     254,14,206,254,0,254,198       :rem 139
1590 DATA 192,254,230,230,254,0,254,198,1
     2,24,56,56,56,0,126,102        :rem 76
1600 DATA 102,254,230,230,254,0,254,198,1
     98,254,14,206,254,0,255        :rem 74
1610 DATA 255,255,255,255,255,255,255,239
     ,239,239,0,127,127,127,0       :rem 150
1620 DATA 255,66,36,24,24,36,66,255,255,2
     55,192,192,192,192,192         :rem 61
1630 DATA 192,255,255,3,3,3,3,3,3,3,3,3,3
     ,3,3,255,255,192,192,192       :rem 108
1640 DATA 192,192,192,255,255,192,192,192
     ,192,192,192,192,192           :rem 225
1650 DATA 255,255,0,0,0,0,0,0,3,3,3,3,3,3
     ,3,3,0,0,0,0,0,0,255           :rem 90
1660 DATA 255,24,24,24,24,24,24,255,255,2
     55,255,24,24,24,24,24          :rem 233
1670 DATA 24,3,3,3,3,255,255,3,3,3,192,192,
     192,255,255,192,192            :rem 144
1680 DATA 192,0,60,102,48,12,102,60,0,0,6
     0,102,96,96,102,60,0           :rem 150
1690 DATA 0,60,102,102,102,102,60,0,0,124
     ,102,102,124,102,102,0         :rem 208
1700 DATA 0,126,96,120,96,96,126,0,0,102,
     102,126,102,102,102,0,0        :rem 28
1710 DATA 126,24,24,24,24,126,0,0,0,0,0,0,0
     ,0,0,0,0,24,24,0,0,24          :rem 143
1720 DATA 24,0,102,102,102,102,0,0,0,0,22
     0,222,220,216,220,222          :rem 155
1730 DATA 220,216,255,255,0,255,255,119,3
     4,0,24,24,24,255,255           :rem 182
1740 DATA 24,24,24,0,0,0,255,255,0,0,0,25
     5,255,192,223,222,220          :rem 197
1750 DATA 216,216,0,96,96,96,96,96,124,0,
     0,102,102,102,102,60,24,0      :rem 159
1760 ******* SPRITE DATA *******     :rem 11
1770 DATA 0,0,0,0,0,0,3,128,7,3,192,15,3,
     255,255,3,255,255,1            :rem 98
1780 DATA 255,254,1,255,254,0,255,252,0,2
     55,252,0,255,252,0,127         :rem 22
1790 DATA 248,0,127,248,0,0,0,0,0,0,0,0,0
     ,0,0,0,0,0,0,0,0,0,0,0         :rem 165
1800 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,128,0
     ,4,32,0,1,128,0,3,8,0,6        :rem 212
1810 DATA 32,0,6,0,0,15,0,0,15,0,0,63,192
     ,0,255,240,1,255,248,3         :rem 228
1820 DATA 255,252,3,255,252,3,255,252,3,2
     55,252,1,255,248,0             :rem 85
1830 DATA 255,240,0,127,224,0,31,128,0,0,
     127,0,0,255,128,0,65           :rem 149
1840 DATA 0,0,148,128,0,128,128,0,93,0,0,
     34,0,0,28,0,1,255              :rem 251
1850 DATA 128,6,8,96,8,0,16,8,201,16,9,0,
     144,8,129,48,4,129             :rem 95
1860 DATA 32,4,129,32,3,195,192,1,231,128
     ,2,195,64,2,0,64,1             :rem 75
1870 DATA 255,128,0,16,8,8,58,28,92,111,5
     4,246,195,99,227,1             :rem 115
1880 DATA 128,0,0,0,0,164,200,149,164,168
     ,149,170,169,93,202            :rem 137
1890 DATA 201,93,206,169,213,170,169,85,1
     70,169,84,170,205,85           :rem 218
1900 DATA 0,0,0,0,0,0,192,236,3,98,187,6,
     55,147,116,29,1,220            :rem 111
1910 DATA 8,0,136,0,0               :rem 247
```

Program 2: Kablam!—VIC Version

See special instructions in article before typing in.

```
6291 :011,016,000,000,158,052,128
6297 :049,048,057,000,000,000,051
6303 :169,000,141,092,003,141,193
6309 :093,003,169,024,141,015,098
6315 :144,032,130,020,032,100,117
6321 :016,032,012,018,032,074,105
6327 :017,169,007,141,074,003,082
6333 :169,003,141,064,003,173,230
6339 :076,003,016,024,032,235,069
6345 :017,172,074,003,196,251,146
6351 :208,003,076,077,016,032,107
6357 :055,019,032,030,019,169,025
6363 :010,141,076,003,206,076,219
6369 :003,032,140,017,032,131,068
6375 :016,032,078,019,032,219,115
6381 :019,173,072,003,208,207,151
6387 :076,245,018,169,000,141,124
6393 :060,003,141,061,003,141,146
6399 :074,003,141,108,021,141,231
6405 :064,003,032,074,017,169,108
6411 :003,141,072,003,169,010,153
6417 :141,076,003,096,169,239,229
6423 :141,019,145,173,017,145,151
```


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```
6429 :041,016,208,003,206,108,099
6435 :021,169,127,141,034,145,160
6441 :173,032,145,041,128,208,000
6447 :003,238,108,021,173,108,186
6453 :021,041,015,141,108,021,144
6459 :208,006,201,002,176,002,142
6465 :169,001,201,011,144,002,081
6471 :169,012,141,064,003,168,116
6477 :162,002,185,162,031,208,059
6483 :008,169,032,153,162,031,126
6489 :032,055,017,185,184,031,081
6495 :208,008,169,032,153,184,081
6501 :031,032,055,017,185,206,115
6507 :031,208,008,169,032,153,196
6513 :206,031,032,055,017,200,142
6519 :202,016,213,172,064,003,021
6525 :196,252,240,071,164,252,020
6531 :169,032,162,003,153,184,066
6537 :031,153,206,031,200,202,192
6543 :016,246,172,064,003,169,045
6549 :027,153,184,031,153,206,135
6555 :031,132,252,169,000,153,124
6561 :184,151,153,206,151,200,182
6567 :169,028,153,184,031,153,117
6573 :206,031,169,000,153,184,148
6579 :151,153,206,151,200,169,185
6585 :029,153,184,031,153,206,173
6591 :031,169,000,153,184,151,111
6597 :153,206,151,096,173,082,034
6603 :003,240,003,206,082,003,228
6609 :238,060,003,173,060,003,234
6615 :208,003,238,061,003,162,122
6621 :004,160,016,024,032,240,185
6627 :255,174,060,003,173,061,185
6633 :003,032,205,221,056,173,155
6639 :060,003,237,092,003,133,255
6645 :170,173,061,003,237,093,214
6651 :003,005,170,144,012,173,246
6657 :060,003,141,092,003,173,217
6663 :061,003,141,093,003,162,214
6669 :008,160,016,024,032,240,237
6675 :255,174,092,003,173,093,041
6681 :003,032,205,221,096,169,239
6687 :206,133,167,169,031,133,102
6693 :168,173,141,002,208,251,212
6699 :169,228,133,170,169,031,175
6705 :133,171,169,228,133,180,039
6711 :169,151,133,181,162,021,104
6717 :160,021,177,167,208,012,038
6723 :072,169,032,145,167,104,244
6729 :145,170,169,000,145,180,114
6735 :136,016,237,056,165,167,088
6741 :233,022,133,167,165,168,205
6747 :233,000,133,168,056,165,078
6753 :170,233,022,133,170,165,222
6759 :171,233,000,133,171,056,099
6765 :165,180,233,022,133,180,254
6771 :165,181,233,000,133,181,240
6777 :202,016,193,096,032,148,040
6783 :224,165,142,162,003,010,065
6789 :202,208,252,024,101,142,038
6795 :010,101,142,105,003,133,121
6801 :142,074,074,056,233,012,224
6807 :176,252,105,015,133,251,059
6813 :096,169,128,141,019,145,087
6819 :169,255,141,034,145,169,052
6825 :147,032,210,255,162,011,218
6831 :160,005,024,032,240,255,123
6837 :160,000,185,244,019,032,053
6843 :210,255,200,192,012,208,240
6849 :245,169,014,032,210,255,094
6855 :162,013,160,005,024,032,083
6861 :240,255,160,000,185,000,021
6867 :020,032,210,255,200,192,096
6873 :012,208,245,032,228,255,173
6879 :240,251,201,049,144,247,075
6885 :201,054,176,243,056,233,168
6891 :048,073,255,141,063,003,050
6897 :169,147,032,210,255,032,062
6903 :202,020,174,063,003,024,221
6909 :169,000,105,048,202,208,217
6915 :251,141,082,003,162,003,133
6921 :160,016,024,032,240,255,224
6927 :160,000,185,062,020,032,218
6933 :210,255,200,192,007,208,069
6939 :245,162,006,160,016,024,128
6945 :032,240,255,160,000,185,137
6951 :069,020,032,210,255,200,057
6957 :192,012,208,245,162,010,106
6963 :160,016,024,032,240,255,010
6969 :160,000,185,081,020,032,023
6975 :210,255,200,192,007,208,111
6981 :245,162,013,160,016,024,177
6987 :032,240,255,160,000,185,179
6993 :088,020,032,210,255,200,118
6999 :192,015,208,245,162,022,163
7005 :160,001,024,032,240,255,037
7011 :160,000,185,111,020,032,095
7017 :210,255,200,192,019,208,165
7023 :245,169,000,141,019,145,062
7029 :173,017,145,041,032,208,221
7035 :249,160,021,169,032,153,139
7041 :228,031,136,208,248,096,052
7047 :160,002,162,022,024,032,025
7053 :240,255,160,000,185,012,225
7059 :020,032,210,255,200,192,032
7065 :018,208,245,032,228,255,115
7071 :240,251,201,089,240,007,163
7077 :201,078,240,006,076,010,008
7083 :019,076,029,016,000,164,219
7089 :251,140,074,003,162,001,040
7095 :024,032,240,255,160,000,126
7101 :185,030,020,032,210,255,153
7107 :200,192,017,208,245,096,129
7113 :172,074,003,162,001,024,125
7119 :032,240,255,160,000,185,055
7125 :047,020,032,210,255,200,209
7131 :192,014,208,245,096,160,110
7137 :021,185,228,031,208,028,158
7143 :169,036,153,228,031,169,249
7149 :000,153,228,151,072,152,225
7155 :072,032,182,019,032,219,031
7161 :019,104,168,104,206,072,154
7167 :003,076,116,019,136,208,045
7173 :220,169,032,153,228,031,070
7179 :162,011,160,016,024,032,160
7185 :240,255,173,082,003,205,207
7191 :084,003,240,013,160,000,011
7197 :185,103,020,032,210,255,066
7203 :200,192,008,208,245,173,037
7209 :082,003,141,084,003,056,154
7215 :073,255,170,169,000,032,234
7221 :205,221,162,015,160,016,064
7227 :024,032,240,255,174,072,088
7233 :003,169,000,032,205,221,183
7239 :096,169,015,141,014,144,138
7245 :169,129,141,013,144,162,067
7251 :010,138,072,032,219,019,061
7257 :104,170,202,208,246,169,164
7263 :000,141,014,144,024,173,079
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7269 :082,003,105,016,141,082,018
7275 :003,096,172,082,003,162,113
7281 :080,202,208,253,136,192,160
7287 :255,208,246,056,173,013,046
7293 :144,233,012,009,128,141,024
7299 :013,144,096,144,032,032,080
7305 :075,065,066,076,065,077,049
7311 :032,032,032,076,069,086,214
7317 :069,076,032,040,049,045,204
7323 :053,041,063,080,076,065,021
7329 :089,032,065,071,065,073,044
7335 :078,032,089,032,079,082,047
7341 :032,078,063,031,032,157,054
7347 :017,094,095,157,157,017,204
7353 :033,035,017,157,157,144,216
7359 :017,064,144,032,157,017,110
7365 :032,032,157,157,017,032,112
7371 :032,017,157,157,017,028,099
7377 :083,067,079,082,069,144,221
7383 :030,072,073,017,157,157,209
7389 :083,067,079,082,069,144,233
7395 :156,083,080,069,069,068,240
7401 :144,066,079,077,066,083,236
7407 :017,157,157,157,157,157,017
7413 :076,069,070,084,032,032,096
7419 :032,032,157,157,157,157,175
7425 :080,082,069,083,083,032,174
7431 :070,073,082,069,032,084,161
7437 :079,032,083,084,065,082,182
7443 :084,160,000,185,000,128,064
7449 :153,000,028,200,208,247,093
7455 :160,000,185,000,129,153,146
7461 :000,029,200,208,247,160,113
7467 :007,185,020,021,153,000,173
7473 :028,136,016,247,160,039,163
7479 :185,028,021,153,216,028,174
7485 :136,016,247,160,007,185,044
7491 :068,021,153,008,029,136,226
7497 :016,247,160,031,185,076,020
7503 :021,153,024,029,136,016,202
7509 :247,169,255,141,005,144,022
7515 :096,162,021,169,059,133,219
7521 :167,169,030,133,168,160,156
7527 :006,169,037,145,167,024,139
7533 :165,168,105,120,133,168,200
7539 :169,002,145,167,056,165,051
7545 :168,233,120,133,168,136,055
7551 :208,231,024,165,167,105,003
7557 :022,133,167,165,168,105,125
7563 :000,133,168,202,208,213,039
7569 :160,015,169,038,153,088,000
7575 :030,136,016,248,160,015,244
7581 :169,002,153,088,150,136,087
7587 :016,248,096,048,008,008,075
7593 :060,126,126,126,060,255,154
7599 :255,255,063,031,015,007,033
7605 :003,255,255,255,255,255,179
7611 :255,255,255,255,255,255,181
7617 :252,248,240,224,192,015,084
7623 :018,016,010,005,060,064,116
7629 :072,240,072,008,080,160,069
7635 :056,004,036,072,072,072,011
7641 :072,119,064,064,063,036,123
7647 :036,036,036,220,004,004,047
7653 :248,200,084,156,212,051,156
7659 :043,048,035,238,238,238,051
7665 :000,187,187,187,000,255,033
7671 :065,036,024,024,036,065,241
7677 :255,058,013,013,013,013,106
```

Disk Merge

Article on page 135.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```
100 GOTO390                                :rem 102
110 GET#FI,BY$:IFBY$<>""THENPRINT#3,BY$;:
    GOTO110                                :rem 146
120 PRINT#3,NU$;:RETURN                    :rem 190
130 GET#FI,BY$:IFBY$=""THENBY=0:RETURN
                                           :rem 107
140 BY=ASC(BY$):RETURN                     :rem 110
150 DV=WD/256:HI=INT(DV):LO=WD-HI*256:PRI
    NT#3,CHR$(LO);CHR$(HI);:RETURN
                                           :rem 141
160 GOSUB130:LO=BY:GOSUB130:LI(FI)=BY*256
    +LO                                    :rem 186
170 GOSUB130:LO=BY:GOSUB130:LN(FI)=BY*256
    +LO                                    :rem 192
180 IFLI(FI)>0THENPRINTTAB((FI-1)*9);LN(F
    I);"{UP}"                              :rem 85
190 CA(FI)=CA(FI)+LS(FI):LS(FI)=LI(FI)-CA
    (FI):RETURN                            :rem 95
200 LI(3)=LI(3)+LS(FI):WD=LI(3):GOSUB150:
    WD=LN(FI):GOTO150                      :rem 187
210 GOSUB200:GOSUB110:GOTO160              :rem 251
220 IFLI(1)=0ANDLI(2)=0THENRETURN          :rem 14
230 IFLI(2)=0THENFI=1:GOSUB210:GOTO220
                                           :rem 41
240 IFLI(1)=0THENFI=2:GOSUB210:GOTO220
                                           :rem 42
250 IFLN(1)<LN(2)THENFI=1:GOSUB210:GOTO22
    0                                      :rem 27
260 IFLN(1)>LN(2)THENFI=2:GOSUB210:GOTO22
    0                                      :rem 31
270 FI=1:GOSUB210:FI=2:GOSUB280:GOTO220
                                           :rem 118
280 GET#FI,BY$:IFBY$<>""THEN280            :rem 38
290 GOTO160                                :rem 107
300 GOSUB130:LO=BY:GOSUB130:CA(FI)=BY*256
    +LO:RETURN                             :rem 191
310 WD=CA(3):GOTO150                       :rem 125
320 PRINT PROMPT$;"{5 SHIFT-SPACE}
    {5 LEFT}";                             :rem 19
330 INPUT FI$:FC$=LEFT$(FI$,1)             :rem 173
340 NULL=FC$="{SHIFT-SPACE}":QUIT=FC$="*"
    :RETURN                                :rem 9
350 OPEN FI,8,FI+2,"0:"+FI$                :rem 141
360 INPUT#15,EN,EM$,ET,ES                  :rem 220
370 ERR=EN>19:IF ERR THEN PRINT EN;EM$:CL
    OSE FI                                 :rem 44
380 RETURN                                 :rem 123
390 DIM CA(3),LI(3),LN(2),LS(2)            :rem 90
400 NU$=CHR$(0)                            :rem 26
410 PRINT:PRINT "{RVS}{5 SPACES}DISK MERG
    E{5 SPACES}"                           :rem 218
420 OPEN 15,8,15                           :rem 36
430 FI=1:PROMPT$="{2 SPACES}PRIMARY FILE"
                                           :rem 153
440 GOSUB 320:IF NULL THEN 440             :rem 120
450 IF QUIT THEN 700                       :rem 49
460 GOSUB 350:IF ERR THEN 440              :rem 43
470 FI=2:PROMPT$="SECONDARY FILE"          :rem 34
```


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```
480 GOSUB 320:SECNULL=NULL          :rem 121
490 IF SECNULL THEN PRINT "*RELOCATE ONLY
    *":GOTO530                      :rem 50
500 IF QUIT THEN 700                :rem 45
510 AF$=FI$                         :rem 49
520 GOSUB 350:IF ERR THEN 480       :rem 44
530 FI=3:PROMPT$="{3 SPACES}MERGED FILE"
                                    :rem 44
540 GOSUB 320:IF NULL THEN 540      :rem 122
550 IF QUIT THEN 700                :rem 50
560 FI$=FI$+",P,W":GOSUB 350:IF ERR=0 THE
    N 620                           :rem 228
570 IF EN<>70 THEN 540              :rem 103
580 PRINT "{UP}{16 SPACES}{UP}"     :rem 144
590 BF$=FI$:CLOSE 2:GOSUB 350:E2=ERR
                                    :rem 69
600 FI=2:FI$=AF$:GOSUB350:FI=3:FI$=BF$
                                    :rem 202
610 IF E2 THEN 530                  :rem 100
620 INPUT"{2 SPACES}BASE ADDRESS
    {2 SPACES}1025{6 LEFT}";BASE$:rem 125
630 IF LEFT$(BASE$,1)="*" THEN 700
                                    :rem 213
640 CA(3)=VAL(BASE$):LI(3)=CA(3)    :rem 234
650 FI=1:GOSUB 300:GOSUB 160        :rem 54
660 IF NOT SECNULL THEN FI=2:GOSUB 300:GO
    SUB 160                         :rem 253
670 GOSUB 310                       :rem 177
680 GOSUB 220                       :rem 178
690 PRINT#3,NU$;NU$;                :rem 178
700 CLOSE 3:CLOSE 2:CLOSE 1:CLOSE 15
                                    :rem 25
710 END                             :rem 111
```

Tiny MLX

Article on page 145.

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```
100 POKE56,24:POKE55,146:CLR:POKE788,194
                                    :rem 76
210 S=6291:E=7682                   :rem 136
300 PRINT"{CLR}";CHR$(14):AD=S      :rem 56
310 PRINTRIGHT$("0000"+MID$(STR$(AD),2),5
    );":";:FORJ=1TO6                :rem 234
320 GOSUB570:IFN=-1THENJ=J+N:GOTO320
                                    :rem 228
480 IFN<0THENPRINT:GOTO310          :rem 168
490 A(J)=N:NEXTJ                    :rem 199
500 CKSUM=AD-INT(AD/256)*256:FORI=1TO6:CK
    SUM=(CKSUM+A(I))AND255:NEXT     :rem 200
510 PRINTCHR$(18);:GOSUB570:PRINTCHR$(20)
                                    :rem 234
515 IFN=CKSUMTHEN530                :rem 255
520 PRINT:PRINT"LINE ENTERED WRONG":PRINT
    "RE-ENTER":PRINT:GOSUB1000:GOTO310
                                    :rem 129
530 GOSUB2000                       :rem 218
540 FORI=1TO6:POKEAD+I-1,A(I):NEXT:rem 80
550 AD=AD+6:IFAD<ETHEN310           :rem 212
560 GOTO710                         :rem 108
570 N=0:Z=0                         :rem 88
580 PRINT"{+}";                     :rem 79
581 GETA$:IFA$=""THEN581            :rem 95
585 PRINTCHR$(20);:A=ASC(A$):IFA=13ORA=44
    ORA=32THEN670                   :rem 229
590 IFA>128THENN=-A:RETURN          :rem 137
600 IFA<>20 THEN 630                :rem 10
610 GOSUB690:IFI=1ANDT=44THENN=-1:PRINT"
    {LEFT} {LEFT}";:GOTO690         :rem 172
620 GOTO570                         :rem 109
630 IFA<48ORA>57THEN580             :rem 105
640 PRINTA$;:N=N*10+A-48            :rem 106
650 IFN>255 THEN A=20:GOSUB1000:GOTO600
                                    :rem 229
660 Z=Z+1:IFZ<3THEN580              :rem 71
670 IFZ=0THENGOSUB1000:GOTO570      :rem 114
680 PRINT",";:RETURN                :rem 240
690 S%=PEEK(209)+256*PEEK(210)+PEEK(211)
                                    :rem 149
692 FORI=1TO3:T=PEEK(S%-I)          :rem 68
695 IFT<>44ANDT<>58THENPOKES%-I,32:NEXT
                                    :rem 205
700 PRINTLEFT$("{3 LEFT}",I-1);:RETURN
                                    :rem 7
710 PRINT"{CLR}{RVS}*** SAVE ***{3 DOWN}"
                                    :rem 236
720 INPUT"{DOWN} FILENAME";F$       :rem 228
730 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
    {RVS}D{OFF}ISK: (T/D)"          :rem 228
740 GETA$:IFA$<>"T"ANDA$<>"D"THEN740
                                    :rem 36
750 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
                                    :rem 158
760 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256                :rem 3
762 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                    :rem 109
763 POKE780,1:POKE781,DV:POKE782,0:SYS654
    66                              :rem 68
765 POKE254,S/256:POKE253,S-PEEK(254)*256
    :POKE780,253                    :rem 12
766 POKE782,E/256:POKE781,E-PEEK(782)*256
    :SYS65496                       :rem 124
770 IF(PEEK(783)AND1)OR(ST AND191)THEN780
                                    :rem 111
775 PRINT"{DOWN}DONE.":END          :rem 106
780 PRINT"{DOWN}ERROR ON SAVE.{2 SPACES}T
    RY AGAIN.":IFDV=1THEN720        :rem 171
781 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO720            :rem 103
782 GOTO720                         :rem 115
845 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                              :rem 70
1000 REM BELL TONE                  :rem 250
1001 POKE36878,15:POKE36874,190     :rem 206
1002 FORW=1TO300:NEXTW              :rem 117
1003 POKE36878,0:POKE36874,0:RETURN
                                    :rem 74
2000 REM BELL SOUND                 :rem 78
2001 FORW=15TO0STEP-1:POKE36878,W:POKE368
     76,240:NEXTW                   :rem 22
2002 POKE36876,0:RETURN             :rem 119
```

MLX For The 64

```
10 REM LINES CHANGED FROM MLX VERSION 2.0
   0 ARE 750,765,770 AND 860        :rem 50
20 REM LINE CHANGED FROM MLX VERSION 2.01
    IS 300                          :rem 147
100 PRINT"{CLR}{6}";CHR$(142);CHR$(8);:PO
    KE53281,1:POKE53280,1           :rem 67
```


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```
101 POKE 788,52:REM DISABLE RUN/STOP
                                    :rem 119
110 PRINT"{RVS}{39 SPACES}";        :rem 176
120 PRINT"{RVS}{14 SPACES}{RIGHT}{OFF}[*]
    £{RVS}{RIGHT} {RIGHT}{2 SPACES}[*]
    {OFF}[*]£{RVS}£{RVS}{14 SPACES}";
                                    :rem 250
130 PRINT"{RVS}{14 SPACES}{RIGHT} [G]
    {RIGHT} {2 RIGHT} {OFF}£{RVS}£[*]
    {OFF}[*]{RVS}{14 SPACES}";      :rem 35
140 PRINT"{RVS}{41 SPACES}"         :rem 120
200 PRINT"{2 DOWN}{PUR}{BLK} MACHINE LANG
    UAGE EDITOR VERSION 2.02{5 DOWN}"
                                    :rem 238
210 PRINT"[5]{2 UP}STARTING ADDRESS?
    {8 SPACES}{9 LEFT}";            :rem 143
215 INPUTS:F=1-F:C$=CHR$(31+119*F)
                                    :rem 166
220 IFS<256OR(S>40960ANDS<49152)ORS>53247
    THENGOSUB3000:GOTO210           :rem 235
225 PRINT:PRINT:PRINT               :rem 180
230 PRINT"[5]{2 UP}ENDING ADDRESS?
    {8 SPACES}{9 LEFT}";:INPUTE:F=1-F:C$=
    CHR$(31+119*F)                  :rem 20
240 IFE<256OR(E>40960ANDE<49152)ORE>53247
    THENGOSUB3000:GOTO230           :rem 183
250 IFE<STHENPRINTC$;"{RVS}ENDING < START
    {2 SPACES}":GOSUB1000:GOTO 230
                                    :rem 176
260 PRINT:PRINT:PRINT               :rem 179
300 PRINT"{CLR}";CHR$(14):AD=S      :rem 56
310 A=1:PRINTRIGHT$("0000"+MID$(STR$(AD),
    2),5);":";                      :rem 33
315 FORJ=ATO6                       :rem 33
320 GOSUB570:IFN=-1THENJ=J+N:GOTO320
                                    :rem 228
390 IFN=-211THEN 710                :rem 62
400 IFN=-204THEN 790                :rem 64
410 IFN=-206THENPRINT:INPUT"{DOWN}ENTER N
    EW ADDRESS";ZZ                  :rem 44
415 IFN=-206THENIFZZ<SORZZ>ETHENPRINT"
    {RVS}OUT OF RANGE":GOSUB1000:GOTO410
                                    :rem 225
417 IFN=-206THENAD=ZZ:PRINT:GOTO310
                                    :rem 238
420 IF N<>-196 THEN 480             :rem 133
430 PRINT:INPUT"DISPLAY:FROM";F:PRINT,"TO
    ";:INPUTT                       :rem 234
440 IFF<SORF>EORT<SORT>ETHENPRINT"AT LEAS
    T";S;"{LEFT}, NOT MORE THAN";E:GOTO43
    0                               :rem 159
450 FORI=FTOTSTEP6:PRINT:PRINTRIGHT$("000
    0"+MID$(STR$(I),2),5);":";      :rem 30
451 FORK=0TO5:N=PEEK(I+K):PRINTRIGHT$("00
    "+MID$(STR$(N),2),3);",";       :rem 66
460 GETA$:IFA$>""THENPRINT:PRINT:GOTO310
                                    :rem 25
470 NEXTK:PRINTCHR$(20);:NEXTI:PRINT:PRIN
    T:GOTO310                       :rem 50
480 IFN<0 THEN PRINT:GOTO310        :rem 168
490 A(J)=N:NEXTJ                    :rem 199
500 CKSUM=AD-INT(AD/256)*256:FORI=1TO6:CK
    SUM=(CKSUM+A(I))AND255:NEXT     :rem 200
510 PRINTCHR$(18);:GOSUB570:PRINTCHR$(146
    );                              :rem 94
511 IFN=-1THENA=6:GOTO315           :rem 254
515 PRINTCHR$(20):IFN=CKSUMTHEN530
                                    :rem 122
520 PRINT:PRINT"LINE ENTERED WRONG : RE-E
    NTER":PRINT:GOSUB1000:GOTO310:rem 176
530 GOSUB2000                       :rem 218
540 FORI=1TO6:POKEAD+I-1,A(I):NEXT:POKE54
    272,0:POKE54273,0               :rem 227
550 AD=AD+6:IF AD<E THEN 310        :rem 212
560 GOTO 710                        :rem 108
570 N=0:Z=0                         :rem 88
580 PRINT"[£]";                     :rem 81
581 GETA$:IFA$=""THEN581            :rem 95
582 AV=-(A$="M")-2*(A$=",")-3*(A$=".")-4*
    (A$="J")-5*(A$="K")-6*(A$="L"):rem 41
583 AV=AV-7*(A$="U")-8*(A$="I")-9*(A$="O"
    ):IFA$="H"THENA$="0"            :rem 134
584 IFAV>0THENA$=CHR$(48+AV)        :rem 134
585 PRINTCHR$(20);:A=ASC(A$):IFA=13ORA=44
    ORA=32THEN670                   :rem 229
590 IFA>128THENN=-A:RETURN          :rem 137
600 IFA<>20 THEN 630                :rem 10
610 GOSUB690:IFI=1ANDT=44THENN=-1:PRINT"
    {OFF}{LEFT} {LEFT}";:GOTO690    :rem 62
620 GOTO570                         :rem 109
630 IFA<48ORA>57THEN580             :rem 105
640 PRINTA$;:N=N*10+A-48            :rem 106
650 IFN>255 THEN A=20:GOSUB1000:GOTO600
                                    :rem 229
660 Z=Z+1:IFZ<3THEN580              :rem 71
670 IFZ=0THENGOSUB1000:GOTO570      :rem 114
680 PRINT",";:RETURN                :rem 240
690 S%=PEEK(209)+256*PEEK(210)+PEEK(211)
                                    :rem 149
691 FORI=1TO3:T=PEEK(S%-I)          :rem 67
695 IFT<>44ANDT<>58THENPOKES%-I,32:NEXT
                                    :rem 205
700 PRINTLEFT$("{3 LEFT}",I-1);:RETURN
                                    :rem 7
710 PRINT"{CLR}{RVS}*** SAVE ***{3 DOWN}"
                                    :rem 236
715 PRINT"{2 DOWN}(PRESS {RVS}RETURN{OFF}
    ALONE TO CANCEL SAVE){DOWN}":rem 106
720 F$="":INPUT"{DOWN} FILENAME";F$:IFF$=
    ""THENPRINT:PRINT:GOTO310       :rem 71
730 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
    {RVS}D{OFF}ISK: (T/D)"          :rem 228
740 GETA$:IFA$<>"T"ANDA$<>"D"THEN740
                                    :rem 36
750 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$:
    OPEN15,8,15,"S"+F$:CLOSE15      :rem 212
760 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256                :rem 3
762 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                    :rem 109
763 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                              :rem 69
765 K=S:POKE254,K/256:POKE253,K-PEEK(254)
    *256:POKE780,253                :rem 17
766 K=E+1:POKE782,K/256:POKE781,K-PEEK(78
    2)*256:SYS65496                 :rem 235
770 IF(PEEK(783)AND1)OR(191ANDST)THEN780
                                    :rem 111
775 PRINT"{DOWN}DONE.{DOWN}":GOTO310
                                    :rem 113
780 PRINT"{DOWN}ERROR ON SAVE.{2 SPACES}T
    RY AGAIN.":IFDV=1THEN720        :rem 171
781 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO720            :rem 103
790 PRINT"{CLR}{RVS}*** LOAD ***{2 DOWN}"
                                    :rem 212
795 PRINT"{2 DOWN}(PRESS {RVS}RETURN{OFF}
    ALONE TO CANCEL LOAD)"          :rem 82
800 F$="":INPUT"{2 DOWN} FILENAME";F$:IFF
    $=""THENPRINT:GOTO310           :rem 144
810 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
    {RVS}D{OFF}ISK: (T/D)"          :rem 227
```


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```
820 GETA$:IFA$<>"T"ANDA$<>"D"THEN820
                                    :rem 34
830 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
                                    :rem 157
840 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256                :rem 2
841 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                    :rem 107
845 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                              :rem 70
850 POKE780,0:SYS65493              :rem 11
860 IF(PEEK(783)AND1)OR(191ANDST)THEN870
                                    :rem 111
865 PRINT"{DOWN}DONE.":GOTO310      :rem 96
870 PRINT"{DOWN}ERROR ON LOAD.{2 SPACES}T
    RY AGAIN.{DOWN}":IFDV=1THEN800
                                    :rem 172
880 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO800            :rem 102
1000 REM BUZZER                     :rem 135
1001 POKE54296,15:POKE54277,45:POKE54278,
     165                            :rem 207
1002 POKE54276,33:POKE 54273,6:POKE54272,
     5                              :rem 42
1003 FORT=1TO200:NEXT:POKE54276,32:POKE54
     273,0:POKE54272,0:RETURN       :rem 202
2000 REM BELL SOUND                 :rem 78
2001 POKE54296,15:POKE54277,0:POKE54278,2
     47                             :rem 152
2002 POKE 54276,17:POKE54273,40:POKE54272
     ,0                             :rem 86
2003 FORT=1TO100:NEXT:POKE54276,16:RETURN
                                    :rem 57
3000 PRINTC$;"{RVS}NOT ZERO PAGE OR ROM":
     GOTO1000                       :rem 89
```

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COMPUTE!'s Gazette for Commodore

AUTHOR GUIDE

COMPUTE!'s Gazette for Commodore is looking for interesting, useful articles aimed at beginning to intermediate VIC-20 and Commodore 64 users. If you have an article idea or a good original program, we'd like to see it. Don't worry if you are not a professional writer. We are more concerned with the content of an article than its style. Simply try to be clear in your writing and check your program for any bugs.

COMPUTE!'s Gazette for Commodore is a consumer-oriented magazine for VIC-20 and Commodore 64 users who want to get the most out of their computers in a non-technical way. It is aimed primarily at home users, not all of whom necessarily want to become expert programmers. If your article covers a more advanced or technical topic, you may choose to submit it to our companion publication, **COMPUTE!**. If you submit an article to one of our magazines and we believe it would be more suitable to the other, we will transfer your submission to the right editors. The basic editorial requirements for publication are the same for both magazines; so are the payment rates.

The following guidelines will permit your good ideas and programs to be more easily edited and published. Most of these suggestions serve to improve the speed and accuracy of publication:

1. The upper left corner of the first page should contain your name, address, telephone number, and the date of submission.

2. The following information should appear in the upper right corner of the first page. If your article is specifically directed to either the VIC-20 or Commodore 64, please state which one. In addition, please indicate the memory requirements of programs.

3. The underlined title of the article should start about 2/3 of the way down the first page.

4. Following pages should be typed normally, except that in the upper right corner there should be an abbreviation of the title, your last name, and the page number. For example: Memory Map/Smith/2.

5. Short programs (under 20 lines) can easily be included within the text. Longer programs should be separate listings. *It is essential that we have a copy of the program, recorded twice, on a tape or disk.* The tape or disk should be labeled with your name and the title of the article. Tapes are fairly sturdy, but disks need to be enclosed within plastic or cardboard mailers (available at photography, stationery, or computer supply stores).

It is far easier for others to type in your program if you use CHR$(X) values and TAB(X) or SPC(X) instead of cursor manipulations to format your output. For five carriage returns, FOR I=1 TO 5:PRINT:NEXT is far more "portable" to other computers with other BASICs and also easier to type in. And, instead of a dozen right-cursor symbols, why not simply use PRINT SPC(12)? A quick check through your program – making these substitutions – would be greatly appreciated by your editors and by your readers.

6. If your article is accepted and you have since made improvements to the program, please submit an entirely new tape or disk and a new copy of the article reflecting the update. We cannot easily make revisions to programs and articles. It is necessary that you send the revised version as if it were a new submission entirely, but be sure to indicate that your submission is a revised version by writing "Revision" on the envelope and the article.

7. All lines within the text of the article should be spaced so that there is about 1/2 inch between them. A one-inch margin should be left at the right, left, top, and bottom of each page. No hyphens should be used at the ends of lines to break words. And please do not justify. Leave the lines ragged.

8. Standard typing paper should be used (no onionskin or other thin paper) and typing should be on one side of the paper only (upper- and lowercase).

9. Sheets should be attached together with a paper clip. Staples should not be used.

10. A good general rule is to spell out the numbers zero through ten in your article and write higher numbers as numerals (1024). The exceptions to this are: Figure 5, Table 3, TAB(4), etc. Within ordinary text, however, the zero through ten should appear as words, not numbers. Also, symbols and abbreviations should not be used within text: use "and" (not &), "reference" (not ref.), "through" (not thru).

11. For greater clarity, use all capitals when referring to keys (RETURN, TAB, ESC, SHIFT), BASIC words (LIST, RND, GOTO), and three languages (BASIC, APL, PILOT). Headlines and subheads should, however, be initial caps only, and emphasized words are not capitalized. If you wish to emphasize, underline the word and it will be italicized during typesetting.

12. *COMPUTE!'s Gazette* for Commodore pays between $75 and $1000 for published articles. In general, the rate reflects the length and quality of the article. Payment is made upon acceptance of an article. Following submission (Editorial Department, *COMPUTE!'s Gazette* for Commodore, P.O. Box 5406, Greensboro, NC 27403) it will take from four to six weeks for us to reply. If your work is accepted, you will be notified by a letter which will include a contract for you to sign and return. Rejected manuscripts are returned to authors who enclose an SASE. We do not consider articles which are multiple submissions. If you wish to send an article to another magazine for consideration, please do not submit it to us.

13. Articles can be of any length – from a single-line routine to a multi-issue series. The average article is about four to eight double-spaced, typed pages.

14. If you want to include photographs, they should be 5x7, black-and-white glossies.

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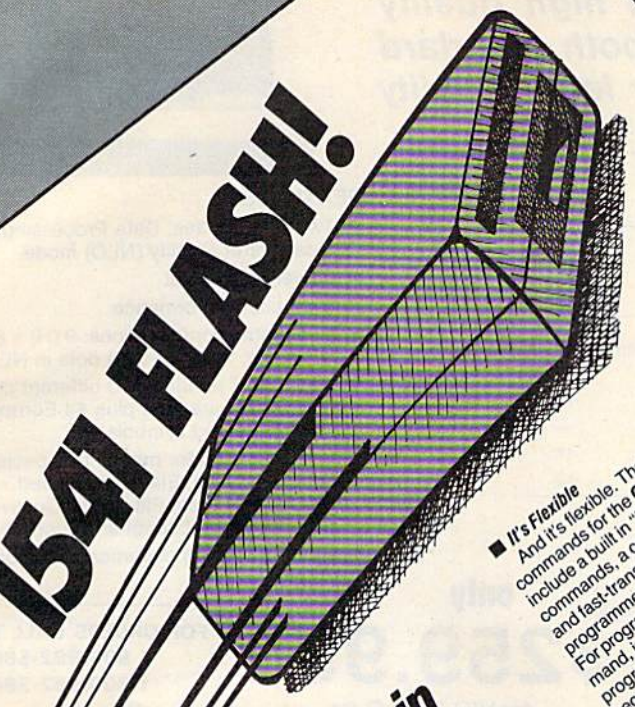
1541 FLASH!



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Elite	9 x 8 + 1	96	60	12	1
Condensed	5 x 8 + 2	136	86	17	1
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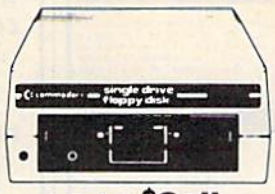

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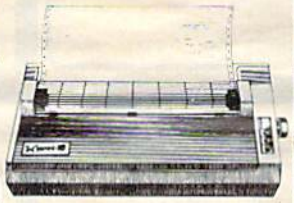

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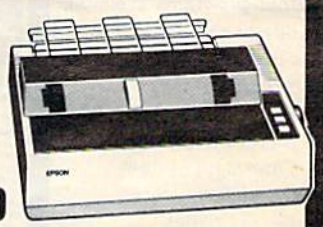

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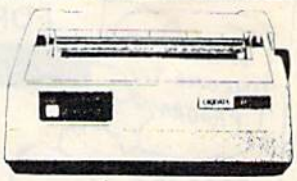

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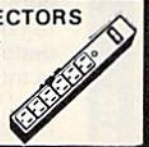

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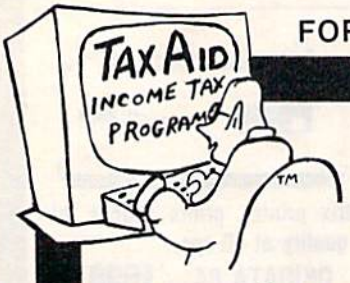

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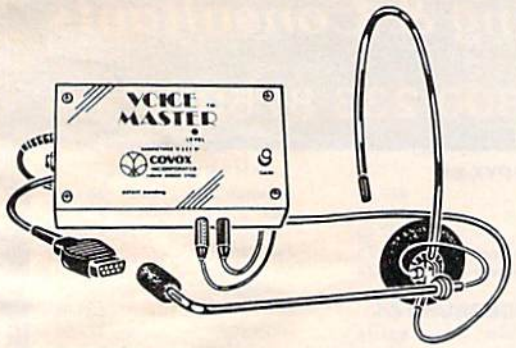

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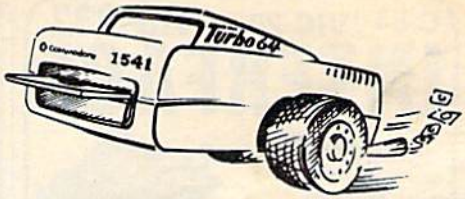

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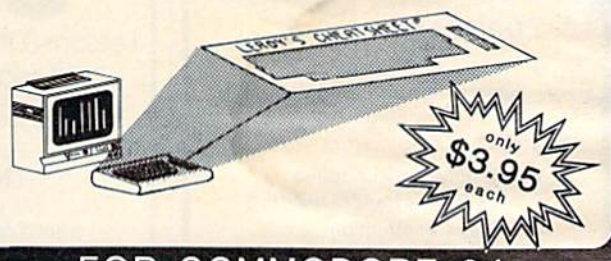

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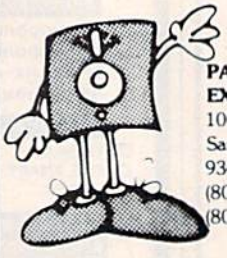

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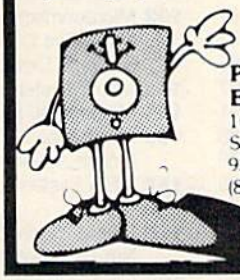

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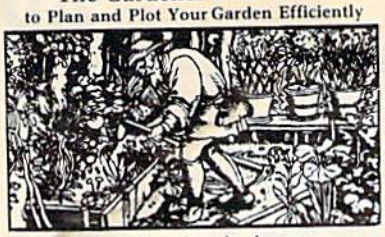

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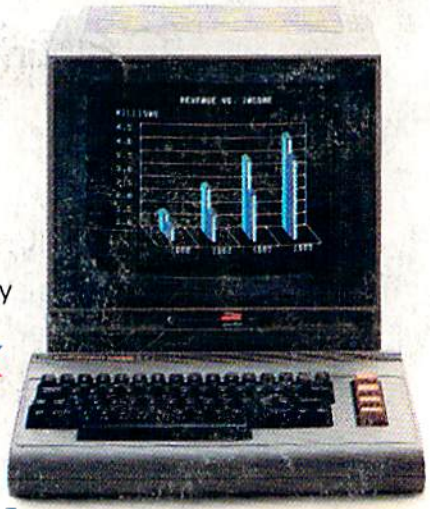

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