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VOLUME 2
NUMBER 12

Buyer's Guide to Computer Systems

FAMILY COMPUTING

A Preview: Tandy 1000

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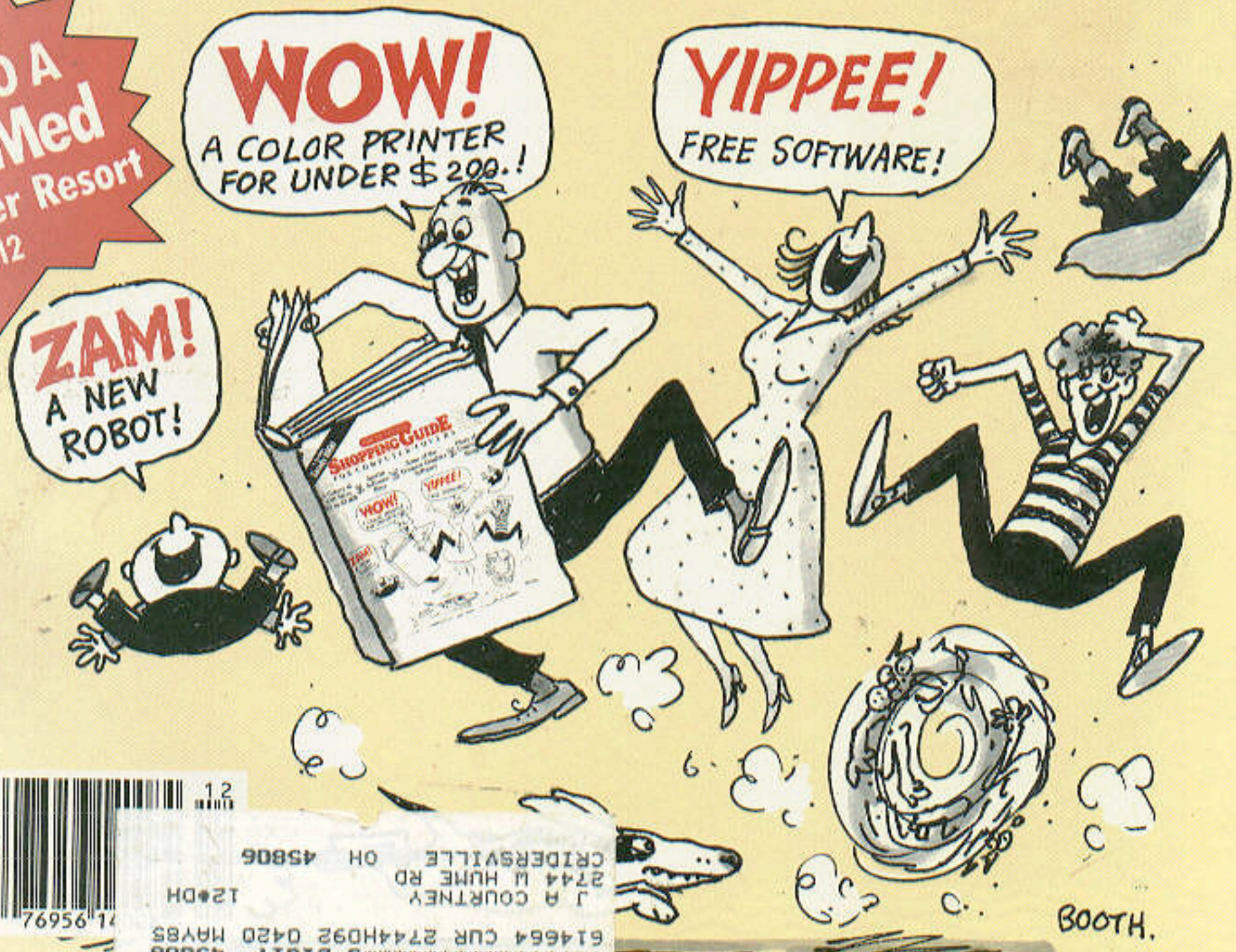

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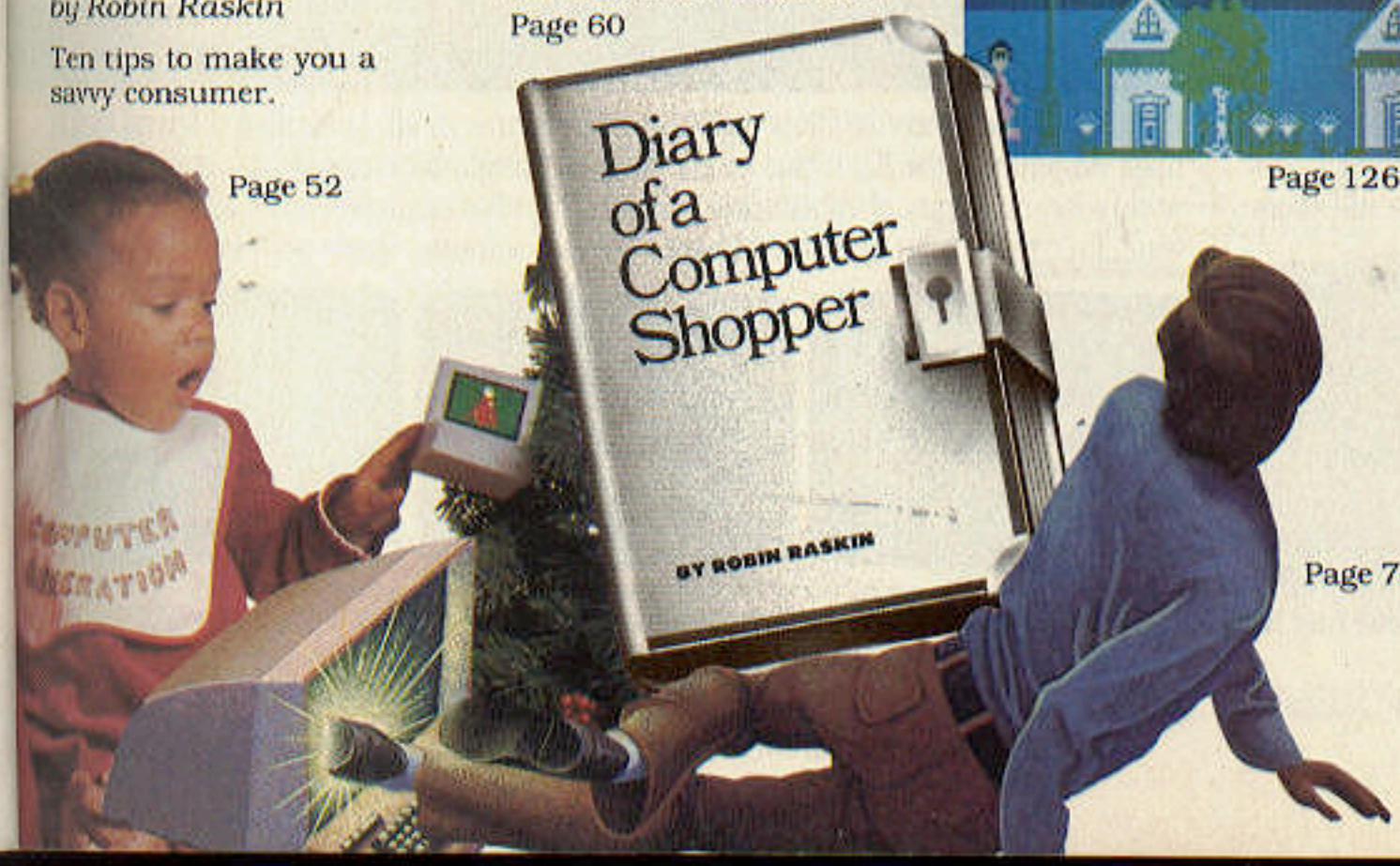
FEATURES

COVER ILLUSTRATION BY GEORGE BOOTH

Page 60



Page 52

Page 74

PROGRAMMING

PRODUCTS

Page 126

DEPARTMENTS

Check out the FAMILY COMPUTING "Computing Family of the Year Contest." Your family could win an exotic getaway to a Club Med resort. See details on page 112.

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BEHIND THE SCREENS

PEOPLE, NEWS, AND TRENDS

EDITED BY BILL CAMARDA

Reading, Writing, and . . . *Zork*?

Erving School students enjoy high-tech talk with Infocom game writers.

School's an adventure in Millers Falls, Massachusetts, where Micki Siegel and Mike Lipinski, fifth- and sixth-grade teachers at Erving Elementary School, use Infocom "interactive-fiction" games to teach reading, writing, and organizational skills.

In these games, a player takes the role of the main character, typing instructions—where to walk, what to pick up, etc. To solve them, you have to think logically, plan, and use ingenuity—plus, you have to use correct spelling and grammar.

"All the skills—mapping, directionality, reading for understanding—that the children would ordinarily learn by other methods can be done through the games," Lipinski said.

"You learn how to make your own decisions, how to do it on your own without the help of adults," said sixth-grader Cherie Willoughby. "You have to keep going back to places you've been and objects you've found, and asking yourself 'What's the purpose of that?' and then figuring out exactly how to use it."

When the Erving classes got stumped in figuring out one game, *Deadline*, they wrote to Infocom for hints. The company offered help, and also sent its first "junior adventure," *Seastalker*, which was still in the testing stage. "They sent evaluation forms for the kids to fill out—and the kids were very perceptive about what the game was lacking," said Siegel.

Infocom later invited the classes on a field trip to its Cambridge headquarters, where the students spent a day with the company's programmers. —LINDA WILLIAMS

Paperless Profits

Here's one company whose profits aren't only on paper. Intelligent Systems Corp., a Norcross, Georgia, manufacturer of PC add-ons, now offers its annual report on disk.

The disk includes spreadsheets and color graphics detailing how well each division performed last year, and describing the company's products. It also comes with market-research information that's rarely included in annual reports.

Leland Strange, Intelligent Systems' president, believes the disk-based annual report may itself be replaced soon, as companies begin to send their annual reports and financial updates via modem.

Intelligent Systems' annual report runs on the IBM PC (256K) or Apple II series (48K).

Taxing Requirements

Planning to write off a new computer at tax time? The rules have changed.

If you're using the computer strictly for business, you can still take advantage of both investment credits and depreciation. But if you use your computer for other things, too, the IRS is getting stingier.

To get an investment credit on the purchase of a new computer, you'll now have to show you're using the computer more than half the time for job-related tasks. Personal-business applications, such as home budgeting and investment analysis, won't count anymore.

If you use the computer for business part of the time, you can take a "depreciation" deduction for some of the computer's cost. *But*, if your computer use isn't primarily job-related, you'll have to divide that deduction over 12 years, instead of five.

Starting in the 1985 tax year, the IRS may request a detailed log of computer use to back up your claim of a deduction.

The new tax law affects not only computers but cars, boats, and leased property as well. If you want to see the new tax bill for yourself, the telecommunications network NewsNet is currently carrying the full text, with explanations. Call NewsNet at (800) 345-1301 for information. Needless to say, though, for expert advice you should ask your accountant.—ROXANE FARMANFARMAIAN

Apple Sends Felon to *pfs: jail*

Burglar Levi Anderson is now in prison, thanks to Howard County, Maryland, police and their Apple II plus.

Police knew there had been dozens of burglaries in and around a Columbia housing development. Using their computer and *pfs: file* database software, they discovered a pattern: The thief was working only between 4:30 p.m. and 10 p.m., and hitting homes with sliding doors. Knowing that, they were able to plan a stakeout that caught Anderson. He confessed to 48 burglaries, and is now serving a 25-year prison term.

Howard County police enter information on every break-in that's reported: point of entry, time of day, type of residence, and about 20 other categories. Then, whenever they suspect a pattern, they go to the computer.

In another case, *pfs: file* showed a pattern of burglaries early in the week, in apartments with ground-floor entrances. A police stakeout ended in an arrest; the alleged burglar is now awaiting trial.

—KATHRYN BONN

ILLUSTRATION BY HOLLY KOWITT

GAMES

for Atari, Commodore 64
Beach Head from Access, for Atari, Commodore 64
Beyond Castle Wolfenstein from Muse, for Apple, Commodore 64
Castle Wolfenstein from Muse, for Apple, Atari, Commodore 64, IBM PC
Combat Leader from Strategic Simulations, for Atari, Commodore 64
Mig Alley Ace from MicroProse, for Atari, Commodore 64
Operation Whirlwind from Broderbund, for Atari, Commodore 64
Raid on Bungeling Bay from Broderbund, for Atari, Commodore 64
Skyfox from Electronic Arts, for Apple
Star Raiders from Atari, for Atari
Submarine Commander from Thorn EMI, for Atari, Commodore 64

STRATEGY AND TACTICS

Learn firsthand how battles were waged and won or lost with this genre which simulates all manner of warfare. These difficult games require advanced planning, coordination of a number of different details, and may take several hours or days to complete.
Ideal for:
☐ World history buffs.
☐ Players who like long and serious competition.
☐ Solo or group play.
I'd recommend:
Battle for Normandy from Strategic Simulations, for Apple, Atari, Commodore 64, IBM PC
Fortress of the Witch King from Avalon Hill, for Apple, Commodore 64
Gulf Strike from Strategic Simulations, for Atari
Legionnaire from Avalon Hill, for Apple, Atari, Commodore 64
Lordlings of Yore from Softlore, for Apple
Parthian Kings from Avalon Hill, for Apple, Commodore 64
Tigers in the Snow from Strategic Simulations, for Apple, Atari, Commodore 64, IBM PC/PC*jr*

TEXT AND TEXT/GRAPHIC ADVENTURES

These games make you the hero of a novel—as the plot unfolds you encounter more obstacles to the completion of your quest. First-rate problem-solving skills are a prerequisite here, though it's often fun for the whole family to get involved.
Ideal for:
☐ Puzzle and braintwister fans.
☐ People who like to use their wits.
I'd recommend:
Enchanter (all text) from Infocom, for Apple, Atari, Commodore 64, IBM PC/PC*jr*, TI, TRS-80
The Mask of the Sun from Broderbund, for Apple, Atari, Commodore 64
Pirate Adventure (graphics) from TI/Triton, for TI
Suspended (all text) from Infocom, for Apple, Atari, Commodore 64, IBM PC/PC*jr*, TI, TRS-80
Ulysses and the Golden Fleece from Sierra Inc., for Apple, Atari, Commodore 64, IBM PC/PC*jr*

ARCADE/ROLE-PLAYING ADVENTURES

These games feature moving pictures and more interaction with the computer.
Ideal for:
☐ Arcade gamers with adventurous urges.
☐ Adventure gamers with arcade itches.
I'd recommend:
Aztec from Datamost, for Apple, Atari, Commodore 64
King's Quest from Sierra Inc., for IBM PC
Murder on the Zinderneuf from Electronic Arts, for Apple, Atari, Commodore 64, IBM PC

FINANCIAL

Manipulate money, develop strategies to beat the system, and/or your competitors in a race for the most—whether you're dealing in stocks and bonds, real estate, or synthetic bananas. These challenges require a lot of time, planning, and thought.
Ideal for:
☐ Junior financiers and executives.
☐ Students learning the ins and outs of economic wheeling and dealing.
I'd recommend:

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COMPUTING CLINIC

INCOMPATIBLE DISKS • TI DISK FILES • ON-LINE LOCKUPS GARDEN PROGRAMS • CARTRIDGES FOR THE COCO • VIC-20 SOFTWARE •

BY JEFFREY BAIRSTOW

Are any two disk drives compatible? Disks from my daughter's Commodore 64 will not work in the drives on my Franklin 1000. Why is this so?

ROSCOE MURRAY
Carson City, Nevada

Unfortunately, the recording formats for disks differ from manufacturer to manufacturer, so disks used in one maker's computer cannot generally be used in a model from another supplier. This is true for Franklin and Commodore, for example.

Some computers that use the CP/M operating system can read disks from other CP/M computers; many of the IBM PC-compatible systems can also interchange disks. In addition, there are programs available to convert disk formats from CP/M to IBM PC-DOS or MS-DOS, but none, as far as I am aware, to convert from Commodore to Apple (Franklin) formats, or vice versa.

How do I set up files on my TI-99/4A with a disk drive? When I called TI, I was told to look it up in the manual.

JASON DELOZIER
Bedford, Texas

Setting up disk files in BASIC is a relatively complex operation. Unfortunately, space does not permit me to give you complete instructions here. However, TI is correct—the information is in your manuals.

I suggest that you begin by reading the section in your TI-99/4A *User's Reference Guide* on "File Processing." Work through the examples, substituting DSK1.FILENAME for CS1 in the programs. Then read the section of your *Disk Memory System* manual that explains the use of the "Disk Manager Command Module" that came with your disk drive.

I have a Commodore 64 with an Automodem 1650. Once in a while, when I am talking to another computer, the keys lock up so I can't communicate although the other computer can. Is this the fault of the modem or the computer?

JONATHAN TOFEL
Bennington, Vermont

When there's a problem with telecommunications, the phone line is always a prime suspect. Most telephone lines were designed for voice messages, not data, and the least bit of "dirt" or "noise" throws a monkey-wrench. If the telephone tones are

---

JEFFREY BAIRSTOW, *a technical journalist who lives in West Redding, Connecticut, was a founder and managing editor of* Computer Decisions *magazine. He has also taught math and computer science in England. His family, including two preschoolers, uses a variety of computers.*

COMPUTING CLINIC

distorted or disturbed by noise from other telephone circuits, garbage characters can be generated that may appear as errors on your screen.

But your problem seems to stem from other causes. If you have this problem with one particular information service, or individual computer, then check to make sure your settings match.

If your keys "lock up" even when you aren't connected to another computer, then the fault is probably the computer's. Commodore 64s have been known to break down.

Finally, it's possible that you are operating in full-duplex, and the other computer is not "echoing" characters back to you. If this is the case, your keys haven't locked up; you just can't see what you're typing. Try switching to half-duplex.

What companies besides Radio Shack make game cartridges for the TRS-80 Color Computer?

SHIRLEY A. PRETTYMAN
Laurel, Delaware

Radio Shack is the only company that makes cartridges for the Color Computer. However, a number of independent software manufacturers market software in cassette format for the CoCo. Check at a Radio Shack Computer Center for the *Directory of Reviewed Software*. This thick, three-ring binder, published by Radio Shack, lists third-party software for all Tandy/Radio Shack computers, describes the type, and gives each listing a rating (one to five stars).

Is the Commodore VIC-20 out of production? If so, and if no new software is available, is there any conversion (or emulator) available that allows the VIC-20 to operate Commodore 64 software?

RICHARD E. PITMAN
Marion, Arkansas

The VIC-20 is, by all indications, no longer in production, and software for it from Commodore is increasingly hard to find. However, since many VIC-20s are still in use, independent software makers continue to offer programs for that machine. You may have some success in obtaining VIC-20 software by mail order from one of the companies advertising in the classified columns of this magazine.

Unfortunately, there's no way to upgrade a VIC-20 to run Commodore 64 software.

Do you know of a good gardening program for the Apple IIe?

ROGER D. THOMAS SR.
Marion, Illinois

There are a number of gardening programs for the Apple IIe and other computers. I suggest you investigate *The Gardener's Assistant*, available for the Apple II plus/IIe/IIc ($39.95), IBM PC/PC*jr* ($45), and the Commodore 64 ($29.95), from Shannon Software, Box 6126, Falls Church, VA 22046; (703) 573-9274.

This program will allow you to produce graphic displays of suggested garden layouts, and recommends planting quantities and dates for more than 50 vegetables.

ATTENTION TI OWNERS!

In the September Clinic, we omitted mention of a major supplier of TI-99/4A products: UNISOURCE, P.O. Box 64240, Lubbock, TX 79464; (800) 858-4580, in Texas (806) 745-8834.

LEARNING LOGO

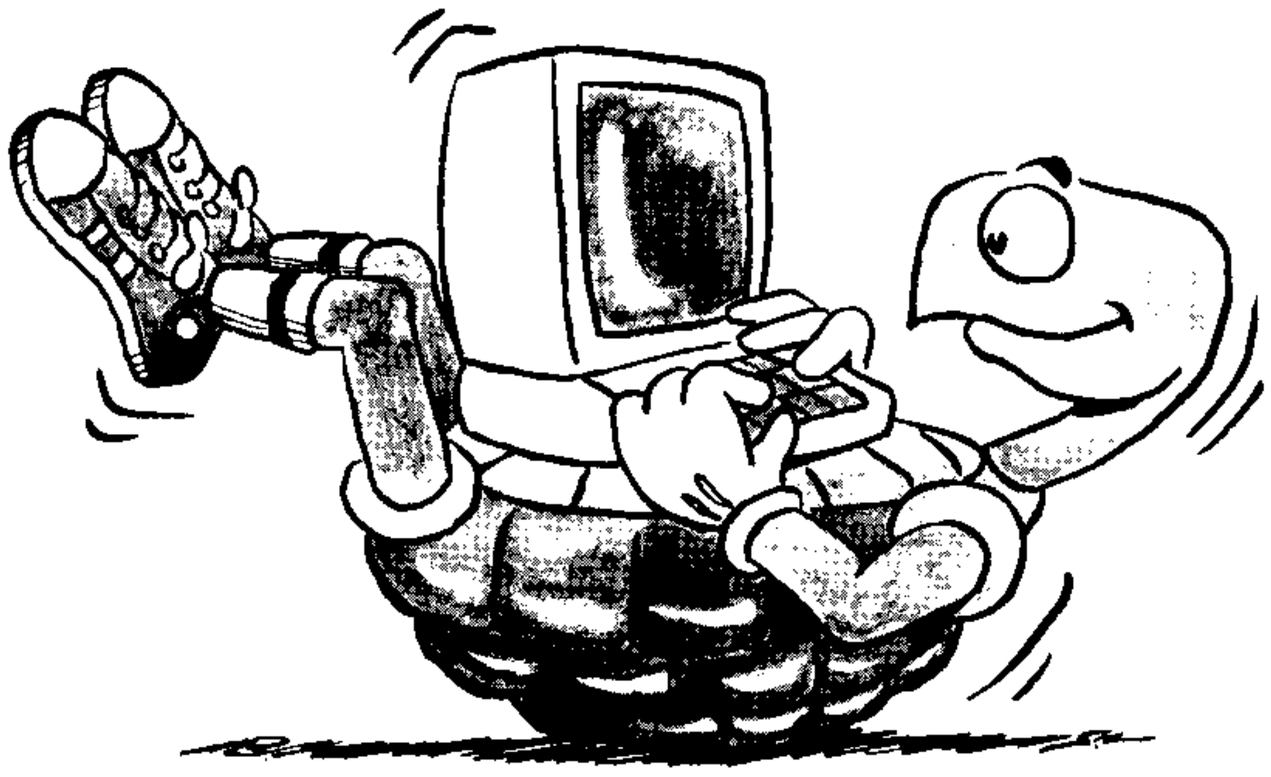
SPARKLING UP YOUR ROUTINES

Learn How to Add Color to the Most Simple Procedures, Then Try Some New Shapes

BY MINDY PANTIEL AND BECKY PETERSEN

This is the fourth article in a six-part series which takes a step-by-step approach to learning Logo. In the past months, families have learned how to write, edit, and debug their own Logo procedures using commands such as FD, BK, RT, LT, PU, PD, and REPEAT. *As with any computing language, these commands may differ somewhat depending on what version of Logo your family is using. Use your Logo manual as a companion to this article to help you pinpoint the exact commands required in your version.*

ISSUE	TOPIC
September	Meeting the turtle: seven simple commands.
October	Logo learning aids: turtle shortcuts.
November	Teaching your turtle: debugging and saving.
December	Adding sparkle: programming Logo colors; trying new shapes.
January	Variations on a theme: changing sizes and shapes.
February	Advanced Logo: where to find out more.



Kids love color—coloring books, crayons, colored pencils, and markers. Commands that add a rainbow of colors to programs are built into the Logo language. The first thing we are going to talk about this month is how to add color to procedures. Then we will use some discovery-learning strategies to define more complex shapes than those we've explored before, including triangles, other polygons, and circles.

OVER THE RAINBOW

Adding color to procedures is one of the easiest aspects of Logo to master. For most types of Logo, it boils down to two commands: **PC** (**PEN-COLOR**), which lets you set the color the turtle uses to draw, and **BG** (**BACK-GROUND COLOR**) which lets you set the color of the screen background. (Some versions of Logo use the commands **SETPC** and **SETBG** for these purposes, but the concepts are the same. This is a good example of an instance when it is important to refer to your Logo manual.) Of course you will need to be using either a color television or a color monitor as your video display in order to use the Logo color capabilities.

To change the drawing or background colors, you will type in a PC or BG command, followed by a color number which represents one of the colors available. Depending on your computer and the version of Logo you are using, the number of colors available to you at any one time can vary from three to 18. The six numbers listed here for the colors available with Krell and Terrapin Logo are common Apple color numbers:

0 Black
1 White
2 Green
3 Violet
4 Orange
5 Blue

To change the background color to green, you would enter BG 2; to change the pencolor to orange the command PC 4 would be used. Color commands can be used in either the DIRECT MODE or they can be written into procedures. In the latter case, backgrounds and pencolors are programmed into appropriate places where specific color is desired.

Here's an example (for the Apple II series) of how color can be written into a procedure which defines four different colored squares lined up horizontally on the screen. First, you define the subprocedures SQUARE and MOVE because they are needed in the final product. SQUARE creates a square with sides 30 turtle steps long. MOVE uses PU (PENUP) and PD (PENDOWN) commands to move the turtle to the next location where a square is to be placed.

```
TO SQUARE
REPEAT 4 [FD 30 RT 90]
END

TO MOVE
PU RT 90 FD 40 LT 90 PD
END
```

Now take a look at the final procedure. The first sequence of commands places the turtle far to the left side of the screen so that there is enough room to fit all four squares. On the following lines you will see that each time you use the

MINDY PANTIEL *and* BECKY PETERSEN *of Niwot, Colorado, are contributing editors to* FAMILY COMPUTING *and authors of* Kids, Teachers and Computers, *published recently by Prentice-Hall.*

LEARNING LOGO

THE FAMILY CHALLENGE

Here's a challenge that will give your family an opportunity to celebrate the holiday season with Logo. The challenge begins by entering the procedures shown below into your computer. You will see the outline of a Christmas tree appear on the screen.

```
TO TREE
PU BK 40 LT 90 FD 90 RT 180 PD
TRIANGLE
FD 80 RT 90 PD
TRUNK
END

TO TRIANGLE
REPEAT 3 [FD 180 LT 120]
END

TO TRUNK
REPEAT 3 [FD 20 LT 90]
END
```

Note that the main procedure, TREE, calls for two subprocedures: TRIANGLE and TRUNK. Can you tell what each of these subprocedures contributes to the final picture?

Now, the tree needs all kinds of decorations—every size and shape is fair game in making this the most festive tree ever! Have each family member design a procedure to create at least one type of ornament. Use your skills to make polygons and circles—perfect shapes for tree-trimming creativity. Some members of the family might also want to design a gift or two to put under the tree. Each gift shape should be defined as a separate procedure.

The final step is to combine the TREE procedures shown above with everyone's procedures for ornaments and gifts—and then add color! This will require family members to put their heads together and work as a team.

Call your final procedure XMAS. The first step is to put in the TREE procedure. Then, remembering to use PU (PENUP) and PD (PENDOWN) commands as you go, add steps to move the turtle to the points where you wish to place your special ornaments and gifts.

Put color into the final picture by adding PC and BG commands to the main procedure. The final procedure might start out something like this:

```
TO XMAS
BG 1
PC 2 TREE
PU RT 90 FD 100 PD
PC 4 ORNAMENT1
PU RT 180 FD 15 PD
PC 3 GIFT1
```

. . . and so on until each of your ornaments and gifts is where you want it. As you can see, the tree, the ornament, and the gift are each assigned their own pencolor just before they are drawn in the command sequence. (The example above is written for the Apple, using Krell/Terrapin Logo. Remember to check your manual for specific information on how your Logo system specifies color.)

Season's greetings and have fun! From the Logo turtle.

PC command along with a number, it changes the next square to a new color.

```
TO 4SQUARES
PU LT 90 FD 80 RT 90 PD
PC 2 SQUARE MOVE
PC 3 SQUARE MOVE
PC 4 SQUARE MOVE
PC 5 SQUARE MOVE
BG 1
END
```

Using the color numbers listed earlier, read the procedure and see if your family can figure out what color each of the four squares will be. Then, see who can determine what color the background turns at the end of the procedure. (Answers: square 1 is green, square 2 is violet, square 3 is orange, square 4 is blue, the background color is white.)

IN A FLASH

Adding color to procedures that form distinct figures makes sense. For instance, if a clown face has been defined, different pencolor commands can be put into the final procedure to make blue eyes, a red nose and mouth, and orange hair.

Kids love to add flashing colors to almost anything they design. Try adding **TO FLASH** to the end of any procedure.

```
TO FLASH
REPEAT 5 [BG 0 BG 1 BG 2 BG 3 BG 4 BG
5]
END
```

FLASH directs the computer to flash all of the colors in order five times. Add it to the end of the 4SQUARES procedure you did earlier and see what happens.

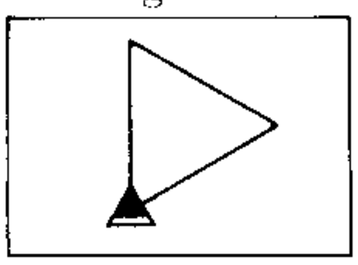
GOING IN CIRCLES

Up until this point, we have talked mostly about right angles, and generally squares have been used to illustrate Logo concepts and commands. This is because everyone—young children as well as adults—easily understands what a square is and can quickly recognize the forward and 90-degree turn motions needed to create a square.

Now it's time to move beyond right angles and explore circles. On the way, we will practice making many-sided geometric shapes, or polygons, ranging from triangles, to pentagons, to shapes with over 100 sides. The end result should move children toward discovering that one way to create a Logo circle is to come up with a formula for making a figure with 360 sides. Eventually the turtle will repeat FD 1 RT 1 movements until it has created a full circle.

LEARNING BY DISCOVERING

First, challenge your children to see if they can figure out how to make an equilateral triangle with turtle graphics. Many will need reminding that this kind of triangle



has three equal sides. See what they come up with and how long it takes them. For that matter, adults and teenagers should give it a try, too, paying particular attention to the thought processes they go through and, again, how long it takes them to solve the problem.

Children will soon discover that they need to do a lot of experimenting with angle sizes in order to get a triangle with equal sides to work. Here's a hint: A quick way to determine how far you want the turtle to turn with each angle of a polygon is to divide 360 by the number of sides in the figure.

Compare notes. Help youngsters to discover the number of turtle turns that were needed in each angle to make the finished triangle. Point out that in creating an equilateral triangle they are telling the turtle to repeat a pair of operations (i.e. drawing a line, turning by a certain angle) three times. How might this knowledge be used to increase the efficiency of a triangle-drawing procedure? Hint: Since all sides and angles of an equilateral triangle (or any regular polygon) are equal, the most

LEARNING LOGO

efficient way to create such a figure is to use the REPEAT command. Remember, REPEAT is used along with a number indicating how many times the commands within the brackets are to be repeated. For instance, an efficient procedure for an equilateral triangle might look like this:

```
TO TRI
REPEAT 3 [FD 30 RT 120]
END
```

Next, have family members try drawing a pentagon, or five-sided figure, like the one below. And, after that, try the hexagon, or six-sided figure. Make sure to use the REPEAT command in each procedure that is defined.

Next, help your kids examine the common elements in the commands that have been used to define these shapes. Toss in the formula for a square (a four-sided figure) as well, and see what similarities they identify. Most kids will need help with this aspect of the discovery learning approach.

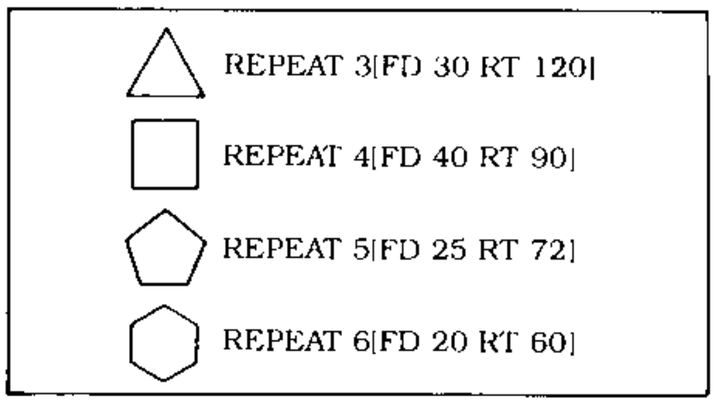
Help them to note these four things:

1. Making any regular shape requires repeating a pair of operations (e.g. draw/turn) several times.

2. The number of repeats needed to make the shape is the same as the number of sides in the shape.

3. The size turn (degrees in each angle) needed to make the shape can be determined by dividing the number of sides into 360.

4. The number of forward steps in a side can differ from figure to figure.



To help youngsters get even closer to discovering how to make a circle, have them try a 10-sided figure next, than a 36-sided figure. Suggest that they also begin to experiment with sides that are shorter, i.e. with fewer turtle steps in them. (This will help prevent the turtle from going off the screen, or wrapping around as it attempts to draw the shape.)

Keep going by attempting figures that have over 100 sides. For instance, try a 120-sided figure with sides only four turtle steps long, then a 360-sided figure with sides that are only one turtle step long. What has been created with the last scenario? A circle!

TIME TO TALK

Naturally, children are going to need some guidance through the discovery learning process and it does require mastery of the basic arithmetic skill of division. (If you're not comfortable with this process, you can either skip it, or better yet, learn along with your child.) Generally, children in the fourth or fifth grade are ready to handle the concepts involved in creating Logo polygons and circles, and have mastered the requisite arithmetic skill of division. Even at that, you will need to talk to them about what they think might be happening. Ask open-ended questions to help them draw conclusions about the progression from 3-sided figures to figures with 360 sides—from triangles to circles. For example, when looking at two circles, you could ask "Why do you think that circle is bigger than the one we just drew?" rather than "Which circle is bigger?"

Parents might wonder why it wouldn't be much easier just to give youngsters the formula for a circle and then show them how to change its size by altering the number of turtle steps in each side. It works. They can make circles that way, but they are missing the opportunity to think through what is happening. In short, they haven't had to put any problem-solving skills to work, thereby circumventing one of the major strengths of what Logo can teach youngsters.

That's not to say that very young children should not use circles in Logo designs. Even preschoolers can put circles to work in their pictures if parents or older brothers or sisters define a set of circles for them to use. However, once they are old enough to understand the conceptual basis for the commands Logo uses to make circles, it would be helpful for parents to back track and help them examine the meaning of those commands.

In the "Family Challenge" this month we provide a Logo program that outlines a Christmas tree. Logo learners are encouraged to write procedures that add colorful ornaments to the tree and packages underneath it. Next month we will take a look at using variables in Logo procedures, making it easier to create shapes of differing sizes. FC

Home on the Range

Duration	2		2	2	2	4	1	1	2	2	2	4	1	1	
Appl/Atari	108		108	81	72	64	81	85	96	60	60	60	64	60	
C 64 HI	18		18	25	28	31	25	23	21	33	33	33	31	33	
LO	209		209	30	49	165	30	180	31	135	135	135	165	135	
TI-99/4A	294		294	392	440	494	392	370	330	523	523	523	494	523	
CoCo	108		108	147	159	170	147	140	125	176	176	176	170	176	
VIC-20	147		147	175	183	191	175	169	159	195	195	195	191	195	

Duration	3	1	2	2	2	2	10--		2	2	2	2	
Appl/Atari	53	81	81	81	85	81	72		108	108	81	72	
C 64 HI	37	25	25	25	23	25	28		18	18	25	28	
LO	162	30	30	30	180	30	49		209	209	30	49	
TI-99/4A	587	392	392	392	370	392	440		294	294	392	440	
CoCo	185	147	147	147	140	147	159		108	108	147	159	
VIC-20	201	175	175	175	169	175	184		147	147	175	183	

Duration	4	1	1	2	2	2	4	1	1	3	1	2	2	2	2
Appl/Atari	64	81	85	96	60	60	60	60	60	64	72	81	85	81	72
C 64 HI	31	25	23	21	33	33	33	33	33	31	28	25	23	25	28
LO	165	30	180	31	135	135	135	135	135	165	49	30	180	30	49
TI-99/4A	494	392	370	330	523	523	523	523	523	494	440	392	370	392	440
CoCo	170	147	140	125	176	176	176	176	176	170	159	147	140	147	159
VIC-20	191	175	169	159	195	195	195	195	195	191	183	175	169	175	183

Duration	10--		2	6	2	3	1	10--			1	1
Appl/Atari	81		0	53	60	64	72	64			108	108
C 64 HI	25		0	37	33	31	28	31			18	18
LO	30		0	162	135	165	49	165			209	209
TI-99/4A	392		44733	587	523	494	440	494			294	294
CoCo	147		0	185	176	170	159	170			108	108
VIC-20	175		0	201	195	191	183	191			147	147

Duration	4	1	1	2	2	2	10--		2	2	2	2	4	1	1
Appl/Atari	81	81	81	81	85	81	72		108	108	81	72	64	81	85
C 64 HI	25	25	25	25	23	25	28		18	18	25	28	31	25	23
LO	30	30	30	30	180	30	49		209	209	30	49	165	30	180
TI-99/4A	392	392	392	392	370	392	440		294	294	392	440	494	392	370
CoCo	147	147	147	147	140	147	159		108	108	147	159	170	147	140
VIC-20	175	175	175	175	169	175	183		147	147	175	183	191	175	169

Duration	2	2	2	4	1	1	3	1	2	2	2	2	10--	
Appl/Atari	96	60	60	60	60	60	64	72	81	85	81	72	81	
C 64 HI	21	33	33	33	33	33	31	28	25	23	25	28	25	
LO	31	135	135	135	135	135	165	49	30	180	30	49	30	
TI-99/4A	330	523	523	523	523	523	494	440	392	370	392	440	392	
CoCo	125	176	176	176	176	176	170	159	147	140	147	159	147	
VIC-20	159	195	195	195	195	195	191	183	175	169	175	183	175	

The numbers underneath each note represent that note for the computers shown. The first number in each column is the note's duration. Both numbers are used as data in the music programs (next page).

ART CREATED BY JOHN JAINSCHIGG USING THE MACINTOSH, MACPAINT, AND THE IMAGEWRITER

JUST TYPE IN OUR SHORT PROGRAM AND YOU'LL HEAR ONE OF AMERICA'S FAVORITE TUNES

BY MICHAEL HOWARD AND ALAN ARTHUR

The best way to learn how to program music on your computer is to start by experimenting with a simple, one-line melody. Programming a tune like "Home on the Range" won't tie you up for hours, and it's simple enough

MICHAEL HOWARD, *a technical writer who has worked for Atari, General Foods, and other corporations, has played classical guitar for 15 years.* ALAN ARTHUR *is a freelance programmer who specializes in games for the Atari.*

that you can check your work by humming along. You can just type in the program we've written and hear your computer sing, or, you can read on and learn the logic of music programming.

MELODY

A melody is a string of notes played to a certain beat and at a certain speed. Each note has a pitch (high or low sound) and lasts a specific length of time. A melody also has rests, or brief periods of silence, between some of its notes. The tune proceeds at a particular rate or tempo—what you tap your foot to.

Programming a melody involves expressing four variables—pitches of each note, silences (rests), durations of pitches and rests, and tempo—in terms the computer can understand. To summarize, we'll be learning to make the computer . . .

1. Produce sound at a certain pitch.
2. Turn off sound to produce a rest.
3. Hold a sound or rest for a certain length of time in relation to other notes and rests.
4. Do the above repeatedly at a consistent tempo.

PITCH AND RESTS

Most personal computers generate tones through built-in hardware—either a tone generator or music synthesizer chip. In systems that don't have such components, musical tones can sometimes be produced by using a machine-language routine with POKEs, as we've done here for the Apple.

The mechanics of playing a note differ from one brand of computer to another. Some computers have a SOUND command built into the BASIC language that lets you turn sound on and off, control its pitch, perhaps its tonal quality, and sometimes its duration as well. Other computers don't have such commands—Commodore sound, for example, is controlled by POKEing memory locations.

The one thing all SOUND commands and other systems have in common, however, is that they require numeric input. To produce a sound at a certain pitch you have to express the pitch as a number. The first step in preparing a melody for your computer, therefore, is to convert its pitches into a list of corresponding numbers. (Note: some IBM PC versions of BASIC, and Extended Color BASIC for the TRS-80 Color Computer, offer a PLAY command that lets you express an entire melody line as a string of characters. This is an advanced feature.)

Pitch-numbering systems vary widely from one brand of computer to another. As shown in the sheet music, the note D (above middle C) has a numeric value of 108 on Atari, Apple, and coincidentally, CoCo; 294 for TI; 147 for VIC-20; and 18/209 for Commodore 64 (see the C 64 program notes for an explanation of these two numbers). Look in your owners' or BASIC manual for a note-to-number conversion table.

On most systems, playing a note with a pitch value of zero will turn off the sound (a null value of 44733 will do that for the TI). So when you are converting your melody into a table of pitch values, you can use zeros (or nulls) to mark the rests. For those few machines with pitch-numbering systems that do not include a null value for silence, special programming steps must be taken to create a rest (see CoCo and Apple versions).

DURATION

Once you have pitch values for the notes in your melody, you can go on to determine the relative duration of each note. The technique we've used here takes the note of shortest duration as a common denominator, and expresses all other durations as multiples of this value. As you can see from the sheet music, the shortest notes in "Home on the Range" are eighth notes—the ones you sing under "where the" in "where the Buffalo roam . . . ."

Our procedure was to give all the eighth notes in the melody an arbitrary duration value of 1. Then, by tapping our feet and humming the tune, we decided that some of the notes lasted twice as long as our minimum (quarter notes), other notes three times as long (dotted quarters), some four times (half notes), and some six (dotted halves). The last line in the table below the sheet music shows the relative durations we came up with. Try humming the tune and see if you agree with our findings.

TEMPO

By supplying relative durations, you have told your computer how long each note lasts in relation to the others, but you have not told it what tempo to maintain when counting off the duration of each note. Computers count very fast, so if you asked the computer to play the melody in its current form with the small relative duration values you supplied, the music would end in a matter of nanoseconds. Too fast!

The best way to slow things down is to make each note X times longer. Therefore, multiply each *relative* duration by a certain constant (X) so your melody doesn't sound like a 33 rpm record played at 45 rpms.

The particular multiplier (tempo value) you use depends on two factors—how fast your computer can count, and, of course, how fast you want the melody to play. In the programs that follow, we use tempo constants of up to 100. If you'd prefer a slower or faster tempo, try increasing or decreasing the value of the variable TEMPO in line 10.

PULLING IT ALL TOGETHER

Though the programs presented here are each slightly different, all work more or less as follows: Each note and rest in the melody is represented by a pair of numbers (three numbers each for the Commodore 64) signifying pitch and relative duration. These numbers are stored in DATA statements.

For each note, the computer READs a pitch value and a corresponding relative duration value from the data. It then plays the note or handles the rest (silence) by the following procedure. First, it calculates an *absolute* duration ADUR for the note or rest by multiplying the relative duration by the tempo constant, TEMPO. Then, it plays the note. The process repeats for each note or rest in the melody. When the computer reaches the end of the data, it finds a set of markers we've planted there: −1s. Then the condition PITCH = −1 is satisfied so the program stops. Note: You can modify the programs below to play your own tunes. Simply substitute new music data (numeric values) for the "Home on the Range" data. Remember to mark the end with −1s as explained above.

So there you have it. These programs might be a little confusing at first, but if you keep on going over them as though you were the computer reading each line, you'll soon understand how they work.

APPLE

```
10 TEMPO = 24
20 REST = 4*TEMPO
30 FOR I = 0 TO 28:READ A:POKE 768+I,A:NEXT I
40 READ PITCH,DUR
50 IF PITCH = -1 THEN END
60 IF PITCH <> 0 THEN 100
70 ADUR = DUR*REST
80 FOR LOOP = 1 TO ADUR:NEXT LOOP
90 GOTO 40
100 ADUR = DUR*TEMPO
110 POKE 6,ADUR:POKE 8,PITCH:CALL 768
120 GOTO 40
999 REM --MACHINE-LANGUAGE ROUTINE FOR SOUND--
1000 DATA 165,8,74,133,10,164,8,173,48,192,136,234
1010 DATA 234,208,251,165,7,56,229,10,133,7,176,237
1020 DATA 198,6,208,233,96
1999 REM --MUSIC DATA STARTS HERE--
2000 DATA 108,2,108,2,81,2,72,2,64,4,81,1,85,1,96,2
2010 DATA 60,2,60,2,60,4,64,1,60,1,53,3,81,1,81,2
2020 DATA 81,2,85,2,81,2,72,10,108,2,108,2,81,2
2030 DATA 72,2,64,4,81,1,85,1,96,2,60,2,60,2,60,4
2040 DATA 60,1,60,1,64,3,72,1,81,2,85,2,81,2,72,2
2050 DATA 81,10,0,2,53,6,60,2,64,3,72,1,64,10,108,1
2060 DATA 108,1,81,4,81,1,81,1,81,2,85,2,81,2,72,10
2070 DATA 108,2,108,2,81,2,72,2,64,4,81,1,85,1,96,2
2080 DATA 60,2,60,2,60,4,60,1,60,1,64,3,72,1,81,2
2090 DATA 85,2,81,2,72,2,81,10,-1,-1
```

To play a note, you POKE duration into address 6 and pitch into address 8, then CALL a machine-language routine at address 768. (Line 30 READs that routine from lines 1000–1020 and POKEs it into memory.) A separate routine (lines 70–90) is necessary to handle rests, using the constant REST defined in line 20.

ATARI

```
10 TEMPO=50
20 READ PITCH,DURATION
30 IF PITCH=-1 THEN END
40 SOUND 0,PITCH,10,8
50 ADUR=DURATION*TEMPO
60 FOR LOOP=1 TO ADUR:NEXT LOOP
70 SOUND 0,0,0,0
80 GOTO 20
1000 DATA 108,2,108,2,81,2,72,2,64,4,81,1,85,1,96,2
1010 DATA 60,2,60,2,60,4,64,1,60,1,53,3,81,1,81,2,81,2
1020 DATA 85,2,81,2,72,10,108,2,108,2,81,2,72,2,64,4
1030 DATA 81,1,85,1,96,2,60,2,60,2,60,4,60,1,60,1
1040 DATA 64,3,72,1,81,2,85,2,81,2,72,2,81,10,0,2,53,6
1050 DATA 60,2,64,3,72,1,64,10,108,1,108,1,81,4,81,1
1060 DATA 81,1,81,2,85,2,81,2,72,10,108,2,108,2,81,2
1070 DATA 72,2,64,4,81,1,85,1,96,2,60,2,60,2,60,4
1080 DATA 60,1,60,1,64,3,72,1,81,2,85,2,81,2,72,2
1090 DATA 81,10,-1,-1
```

The four numbers given in the SOUND command (line 40) are voice (four are available, numbered 0–3), pitch, tone quality (10 is pure tone, no noise), and volume (0–15, 15 being loudest).

COMMODORE 64

```
10 TEMPO=50
20 FOR M=54272 TO 54296:POKE M,0:NEXT M
30 POKE 54296,15
40 POKE 54277,100
50 POKE 54278,100
60 READ HI,LO,DUR
70 IF HI=-1 THEN POKE 54296,0:END
80 POKE 54273,HI:POKE 54272,LO
90 POKE 54276,17
100 ADUR=DUR*TEMPO
110 FOR LOOP=1 TO ADUR:NEXT LOOP
120 POKE 54273,0:POKE 54272,0
130 GOTO 60
1000 DATA 18,209,2,18,209,2,25,30,2,28,49,2,31,165,4
1010 DATA 25,30,1,23,180,1,21,31,2,33,135,2,33,135,2
1020 DATA 33,135,4,31,165,1,33,135,1,37,162,3,25,30,1
1030 DATA 25,30,2,25,30,2,23,180,2,25,30,2,28,49,10
1040 DATA 18,209,2,18,209,2,25,30,2,28,49,2,31,165,4
1050 DATA 25,30,1,23,180,1,21,31,2,33,135,2,33,135,2,33
1060 DATA 135,4,33,135,1,33,135,1,31,165,3,28,49,1
1070 DATA 25,30,2,23,180,2,25,30,2,28,49,2,25,30,10
1080 DATA 0,0,2,37,162,6,33,135,2,31,165,3,28
1090 DATA 49,1,31,165,10,18,209,1,18,209,1,25,30,4
1100 DATA 25,30,1,25,30,1,25,30,2,23,180,2,25,30,2
1110 DATA 28,49,10,18,209,2,18,209,2,25,30,2,28,49,2
1120 DATA 31,165,4,25,30,1,23,180,1,21,31,2,33,135,2
1130 DATA 33,135,2,33,135,4,33,135,1,33,135,1,31,165,3
1140 DATA 28,49,1,25,30,2,23,180,2,25,30,2,28,49,2
1150 DATA 25,30,10,-1,-1,-1
```

After clearing the synthesizer chip (line 20), you POKE the volume level (0–15, 15 being loudest) into location 54296, and set the tone quality (locations 54277 and 54278 for voice 1). It takes two values, HI and LO, to specify each pitch (see line 80). Line 90 turns on the sound and also affects the tone quality.

TI-99/4A

```
10 TEMPO=150
20 READ PITCH,DUR
30 IF PITCH=-1 THEN 70
40 ADUR=DUR*TEMPO
50 CALL SOUND(ADUR,PITCH,2)
60 GOTO 20
70 END
1000 DATA 294,2,294,2,392,2,440,2,494,4,392,1,370,1
1010 DATA 330,2,523,2,523,2,523,4,494,1,523,1,587,3
1020 DATA 392,1,392,2,392,2,370,2,392,2,440,10,294,2
1030 DATA 294,2,392,2,440,2,494,4,392,1,370,1,330,2
1040 DATA 523,2,523,2,523,4,523,1,523,1,494,3,440,1
1050 DATA 392,2,370,2,392,2,440,2,392,10,44733,2
1060 DATA 587,6,523,2,494,3,440,1,494,10,294,1,294,1
1070 DATA 392,4,392,1,392,1,392,2,370,2,392,2,440,10
1080 DATA 294,2,294,2,392,2,440,2,494,4,392,1
1090 DATA 370,1,330,2,523,2,523,2,523,4,523,1,523,1
1100 DATA 494,3,440,1,392,2,370,2,392,2,440,2
1110 DATA 392,10,-1,-1
```

The three numbers given in the CALL SOUND command (line 50) control the duration, pitch, and volume (0–30, 0 being loudest) of voice 1. You can add one or two more duration-pitch-volume values to control voices 2 and 3.

TRS-80 COCO

```
10 TEMPO=2
20 REST=25*TEMPO
30 READ PITCH,DUR
40 IF PITCH=-1 THEN END ELSE IF PITCH<>0 THEN 80
50 ADUR=DUR*REST
60 FOR LOOP=1 TO ADUR:NEXT LOOP
70 GOTO 30
80 ADUR=DUR*TEMPO
90 SOUND PITCH,ADUR
100 GOTO 30
1000 DATA 108,2,108,2,147,2,159,2,170,4,147,1,140,1
1010 DATA 125,2,176,2,176,2,176,4,170,1,176,1,185,3
1020 DATA 147,1,147,2,147,2,140,2,147,2,159,10,108,2
1030 DATA 108,2,147,2,159,2,170,4,147,1,140,1,125,2
1040 DATA 176,2,176,2,176,4,176,1,176,1,170,3,159,1
1050 DATA 147,2,140,2,147,2,159,2,147,10,0,2,185,6
1060 DATA 176,2,170,3,159,1,170,10,108,1,108,1,147,4
1070 DATA 147,1,147,1,147,2,140,2,147,2,159,10,108,2
1080 DATA 108,2,147,2,159,2,170,4,147,1,140,1,125,2
1090 DATA 176,2,176,2,176,4,176,1,176,1,170,3,159,1
1100 DATA 147,2,140,2,147,2,159,2,147,10,-1,-1
```

The CoCo SOUND command requires two numbers: pitch and duration. Like the Apple, the CoCo requires a separate routine (lines 50–60) to handle rests.

VIC-20

```
10 TEMPO=75
20 POKE 36878,12
30 READ PITCH,DUR
40 IF PITCH=-1 THEN END
50 POKE 36876,PITCH
60 ADUR=DUR*TEMPO
70 FOR LOOP=1 TO ADUR:NEXT LOOP
80 POKE 36876,0
90 GOTO 30
1000 DATA 147,2,147,2,175,2,183,2,191,4,175,1,169,1
1010 DATA 159,2,195,2,195,2,195,4,191,1,195,1,201,3
1020 DATA 175,1,175,2,175,2,169,2,175,2,184,10,147,2
1030 DATA 147,2,175,2,183,2,191,4,175,1,169,1,159,2
1040 DATA 195,2,195,2,195,4,195,1,195,1,191,3,183,1
1050 DATA 175,2,169,2,175,2,183,2,175,10,0,2,201,6
1060 DATA 195,2,191,3,183,1,191,10,147,1,147,1
1070 DATA 175,4,175,1,175,1,175,2,169,2,175,2,183,10
1080 DATA 147,2,147,2,175,2,183,2,191,4,175,1
1090 DATA 169,1,159,2,195,2,195,2,195,4,195,1,195,1
1100 DATA 191,3,183,1,175,2,169,2,175,2,183,2,175
1110 DATA 10,-1,-1
```

You set volume by POKEing a value between 0 and 15 (15 being loudest) into location 36878. Pitch goes into location 36874, 36875, or 36876 for the low, medium, or high voice, respectively.

SANTA CLAUS

BY JOEY LATIMER

Apple Version of *Santa Claus*

Santa Claus, or St. Nicholas, is an enduring symbol of the Christmas season. In fact, though, the familiar image of the bearded Santa in a red, fur-collared suit is a fairly modern idea. It's based on a newspaper illustration rendered only a little over 100 years ago by the cartoonist Thomas Nast. Now, we've modernized Santa even further by bringing him to your computer screen in living color and animation!

Type in the program as shown, SAVE it to disk or tape, and type RUN. Merry Christmas! Ho! Ho! Ho!

ADAM & Apple/*Santa Claus*

```
10 HOME
20 GR
30 COLOR= 4
40 FOR Q = 32 TO 39
50 HLIN Q,39-Q AT Q
60 NEXT Q
70 FOR Q = 35 TO 17 STEP -1
80 FOR P = 12-2*(Q < 22) TO 26+2*(Q < 22)
90 COLOR= 5
100 IF Q/2 > INT(Q/2) AND (P-Q)/4 > INT((P-Q)/4) THEN CO
LOR= 8
110 PLOT P,Q
120 NEXT P,Q
130 COLOR= 9
140 FOR Q = 0 TO 6
150 HLIN 19-Q+(Q = 6),19+2*(Q-(Q = 6)) AT Q
160 NEXT Q
170 HLIN 12,26 AT 15
180 HLIN 11,27 AT 16
190 FOR Q = 9 TO 19
200 READ X
210 COLOR= 13
220 IF Q < 18 THEN HLIN 20-X,18+X AT Q-2
230 COLOR= 15
240 HLIN 18-X,20+X AT Q
250 NEXT Q
260 HLIN 14,24 AT 6
270 PLOT 29,7
280 COLOR= 4
290 PLOT 17,8
300 PLOT 21,8
310 COLOR= 5
320 PLOT 19,10
330 COLOR= 9
340 HLIN 18,20 AT 13
350 FOR DL = 1 TO RND(1)*2000+500:NEXT DL
360 COLOR= 22-SCRN(17,12)
370 PLOT 17,12
380 PLOT 21,12
390 GOTO 350
1000 DATA 5,5,5,5,4,4,3,3,2,1,0
```

Atari/*Santa Claus*

```
10 S=(PEEK(106)-4)*256
20 POKE 106,S/256
30 GRAPHICS 17
40 SETCOLOR 2,0,15
50 FOR X=S+264 TO S+351
60 READ Q
70 POKE X,Q
80 NEXT X
90 POKE 756,S/256
100 FOR Y=14 TO 19
110 FOR X=19-Y TO Y
120 COLOR 98-((X+Y)/2=INT((X+Y)/2))
130 PLOT X,Y
140 NEXT X
150 NEXT Y
160 FOR Y=9 TO 18
170 COLOR 67
180 IF Y/2=INT(Y/2) THEN COLOR 68
190 FOR X=5-(Y<11) TO 14+(Y<11)
200 PLOT X,Y
210 NEXT X
220 NEXT Y
230 FOR Y=1 TO 4
240 FOR X=10-Y TO 8+Y*2
250 COLOR 229-3*(X=10-Y)-4*(X=8+Y*2)
260 PLOT X,Y-1
270 NEXT X
280 NEXT Y
290 FOR X=5 TO 13
300 COLOR 229-3*(X=5)-4*(X=13)
301 PLOT X,8
302 NEXT X
310 FOR Y=3 TO 12
320 COLOR 197+(Y=3)
330 FOR X=7-(Y=3)+(Y-10)*(Y>9) TO 11+(Y=3)-(Y-10)*(Y>9
)
340 PLOT X,Y
350 NEXT X
360 NEXT Y
370 FOR Q=1 TO 7
380 READ CO,X,Y
390 COLOR CO
400 PLOT X,Y
410 NEXT Q
420 COLOR 200
430 IF RND(0)<0.4 THEN COLOR 203
440 PLOT 8,5
450 PLOT 10,5
460 COLOR 202
470 IF RND(0)<0.4 THEN COLOR 203
480 PLOT 9,8
490 FOR DELAY=1 TO 200
500 NEXT DELAY
510 GOTO 420
1000 DATA 240,248,252,254,255,255,255,255
1010 DATA 15,31,63,127,255,255,255,255
1020 DATA 0,0,239,239,239,239,0,0
1030 DATA 0,0,127,127,127,127,0,0
1040 DATA 255,255,255,255,255,255,255,255
1050 DATA 0,102,60,255,60,102,0,0
```

```
1060 DATA 0,0,0,219,219,219,219,0
1070 DATA 126,0,231,231,231,255,255,255
1080 DATA 255,255,255,255,255,255,126,60
1090 DATA 255,255,126,60,24,129,195,255
1100 DATA 255,195,129,24,60,126,255,255
1110 DATA 199,5,9,199,13,9,200,8,5,200,10,5
1120 DATA 233,9,6,202,9,8,198,16,4
```

Commodore 64/*Santa Claus*

```
10 PRINT CHR$(147);CHR$(5)
20 POKE 53281,0
30 GOSUB 1000
40 FOR Q=21 TO 12 STEP -1
50 FOR P=10+2*(Q<14) TO 28-2*(Q<14)
60 CH=3760
70 IF Q/2>INT(Q/2) AND (P-Q)/4>INT((P-Q)/4) THEN CH=28
60
80 GOSUB 2000
90 NEXT P,Q
100 FOR X=1 TO 5
110 GOSUB 1000
120 NEXT X
130 MD=1
140 POKE 1525,203-MD*2
150 POKE 1521,202+MD*11
160 POKE 1360,170+MD*4
170 POKE 1366,170+MD*4
180 FOR DL=1 TO RND(1)*1000+2000
190 NEXT DL
200 MD=1-MD
210 GOTO 140
1000 READ CH,Q,Q1
1010 READ M1,P1,P2
1020 FOR M=1 TO M1
1030 FOR P=P1 TO P2
1040 GOSUB 2000
1050 NEXT P
1060 Q=Q+1
1070 NEXT M
1080 IF Q<Q1 THEN 1010
1090 RETURN
2000 CL=INT(CH/300)
2010 POKE 1024+P+40*Q,CH-CL*300
2020 POKE 55296+P+40*Q,CL
2030 RETURN
3000 DATA 1714,19,25,1,5,34,1,4,35,1,3,36,1,2,37,1,1
3010 DATA 38,1,0,39,760,1,12,1,14,21,1,12,23,1,11,25
3020 DATA 1,11,27,1,11,29,1,28,31,1,29,33,2,19,19,1,10
3030 DATA 28,1,9,29,460,6,18,1,11,27,1,15,16,4,11,27
3040 DATA 2,12,26,1,13,25,1,14,24,1,15,23,1,16,22
3050 DATA 3160,7,16,4,13,25,2,14,24,2,15,23,1,16,22
3060 DATA 3192,12,13,1,18,20,342,8,8,1,33,33
```

IBM PC w/Color Graphics Adapter & IBM PC*jr*/*Santa Claus*

```
10 WIDTH 40
20 SCREEN 0,1
30 COLOR 2,0
40 CLS
50 KEY OFF
60 COL=0
70 FOR Q=25 TO 21 STEP -1
80 LOCATE Q,26-Q,0:PRINT STRING$(Q*2-10,219);
90 NEXT Q
100 FOR Q=23 TO 15 STEP -1
110 FOR P=12+2*(Q<18) TO 26-2*(Q<18)
120 COLOR 7
130 IF Q/2>INT(Q/2) AND (P-Q)/4>INT((P-Q)/4) THEN COLO
R 6
140 LOCATE Q,P:PRINT CHR$(219)
150 NEXT P,Q
160 COLOR 4
170 FOR Q=1 TO 7
180 LOCATE Q,20-Q:PRINT STRING$(3*Q-2,219)
190 NEXT Q
200 LOCATE 13,12:PRINT STRING$(15,219)
210 LOCATE 14,11:PRINT STRING$(17,219)
220 FOR Q=9 TO 18
230 READ X
240 COLOR 15,7
250 IF Q<18 THEN LOCATE Q-1,19-X:PRINT STRING$(X*2+1,3
2)
260 LOCATE Q,17-X:PRINT STRING$(X*2+5,219)
270 NEXT Q
280 LOCATE 7,13:PRINT STRING$(13,219)
290 LOCATE 8,32:PRINT CHR$(219)
300 COLOR 4,7
310 LOCATE 11,19:PRINT CHR$(234)
320 LOCATE 14,17:PRINT STRING$(5,22)
330 LOCATE 14,17:PRINT CHR$(22-5*COL)
340 LOCATE 14,21:PRINT CHR$(22-6*COL)
350 COLOR 15,0
360 LOCATE 9,16:PRINT CHR$(254-239*COL)
370 LOCATE 9,22:PRINT CHR$(254-239*COL)
380 FOR DL=1 TO RND(1)*2000+1000:NEXT DL
390 COL=1-COL
400 COLOR 4,7
410 GOTO 330
1000 DATA 5,5,5,5,4,4,3,3,2,1,0
```

TI-99/4A/*Santa Claus*

```
10 CALL CLEAR
20 CALL SCREEN(2)
30 FOR X=1 TO 11
40 READ CH,S$
50 CALL CHAR(CH,S$)
60 NEXT X
70 FOR X=1 TO 7
80 READ CS,F,B
90 CALL COLOR(CS,F,B)
100 NEXT X
110 FOR X=1 TO 7
120 READ CH,Y,Z
130 FOR RO=Y TO Z STEP -1
140 READ CO,REP
150 CALL HCHAR(RO,CO,CH,REP)
160 NEXT RO
170 NEXT X
180 FOR X=1 TO 9
190 READ CH,CO,RO
200 CALL HCHAR(CO,RO,CH)
210 NEXT X
220 CALL HCHAR(8,15,133)
230 CALL HCHAR(8,18,133)
240 CALL HCHAR(12,15,129)
250 CALL HCHAR(12,18,131)
260 FOR DELAY=1 TO (1000*RND)+1000
270 NEXT DELAY
280 CALL HCHAR(12,15,128)
290 CALL HCHAR(12,18,130)
300 FOR DELAY=1 TO (1000*RND)+1000
310 NEXT DELAY
320 IF RND>0.5 THEN 240
330 CALL HCHAR(8,15,132)
340 CALL HCHAR(8,18,132)
350 FOR DELAY=1 TO 50
360 NEXT DELAY
370 GOTO 220
1000 DATA 128,080C060301000000,129,0000000103060C08
1010 DATA 130,103060C080000000,131,00000 080C0603010
1020 DATA 132,000000FFFF000000,133,00183C7E7E3C1800
1030 DATA 112,FFFFFFFFFF7E3C18,136,181818FFFF181818
1040 DATA 144,FFFFFFFFFFFFFFFF,152,FFFFFFFFFFFFFFFF
```

```
80 POKE 7680+CO+22*RO,CH
90 POKE 38400+CO+22*RO,KO
100 NEXT CO,RO,X
110 FOR X=1 TO 5
120 READ CH,KO,LO
130 POKE LO,CH
140 POKE LO+30720,KO
150 NEXT X
160 MD=1
170 FOR DELAY=1 TO RND(1)*1000+2000
180 NEXT DELAY
190 IF RND(1)>0.5 THEN 240
200 POKE 7843,174+MD*54
210 POKE 7845,174+MD*54
220 FOR DELAY=1 TO 300
230 NEXT DELAY
240 POKE 7931,202+MD*11
250 POKE 7933,203-MD*2
260 MD=1-MD
270 GOTO 170
1000 DATA 22,19,214,1,0,20,1,19,2,18,3,17,22,11,219,4
1010 DATA 4,16,4,16,4,16,4,16,4,16,4,16,4,16,4,16,4,16
1020 DATA 3,17,3,17,3,17,10,9,160,2,4,16,5,15,15,8,160
1030 DATA 1,10,10,9,11,8,12,7,13,7,13,6,14,6,14,6,14
1040 DATA 11,7,160,3,9,11,8,12,8,12,7,13,6,14,6,1,160
1050 DATA 2,15,17,15,17,6,16,7,15,8,14,9,13,6,5,160
1060 DATA 1,6,14,6,14,198,3,7932,150,3,7888,174,3
1070 DATA 7843,174,3,7845,42,1,7852
```

NEW YEAR'S EVE

BY JOEY LATIMER

You and your trusty computer have gone through some fun times in 1984. So this December 31, why not gather your family 'round the screen and all ring in the new year together! Our *New Year's Eve* program is a blast and then some—it's almost as much fun (and nearly as noisy!) as watching the ball drop in New York's Times Square!

Type in the program exactly as shown, and SAVE it to disk or tape. Be especially careful when entering the DATA statements! We advise you to test RUN the program well before the hour of midnight. That way, you can correct any typing errors before they can spoil the fun (*see Tips to the Typist*).

When you RUN the program, the first thing you'll see is a prompt telling you to enter the current time in hours, minutes, and seconds. Enter the time in six digits, without any intervening spaces or punctuation (example: 9:55:02 p.m. is entered as 095502); press RETURN or ENTER. At five seconds to midnight, things should start popping!

TIPS TO THE TYPIST

1. When you type program lines into your computer, be sure to copy them *exactly* as written. Numbers, punctuation marks, and spaces are very important!

2. Remember to press RETURN or ENTER *after* every completed program line.

3. Run the program when you finish typing it in by typing RUN and pressing the RETURN or ENTER key. If the computer gives you an error message, don't panic. Mistakes can be fixed. List the program by typing the word LIST and pressing the RETURN or ENTER key and double-check each line. A foolproof way to correct a mistake is to type in the entire line again (including its line number). When you list the program again, you should find the new line in place of the old.

4. If you need more help, read the programming guide written for your computer. It will answer questions that can't possibly be covered here.

5. When all else fails . . . turn off the computer and relax.

```
350 CLS
360 TIM=HRS*3600+MIN*60+SEC
370 IF TIM>=43195! AND TIM<=43200! THEN 510
380 FOR D=1 TO 510
390 NEXT D
400 TIM=TIM+1
410 IF TIM>=46800! THEN TIM=3600
420 HRS=INT(TIM/3600)
430 MIN=INT((TIM-HRS*3600)/60)
440 SEC=TIM-HRS*3600-MIN*60
450 TIM$=":00:00"
460 MID$(TIM$,2-(MIN<10))=MID$(STR$(MIN),2)
470 MID$(TIM$,5-(SEC<10))=MID$(STR$(SEC),2)
480 LOCATE 10,17
490 PRINT STR$(HRS);TIM$;" "
500 GOTO 370
510 FOR X=950 TO 100 STEP -10
520 SOUND X,1
530 NEXT X
540 FOR X=1 TO 50
550 BG=INT(RND(1)*8)
560 COLOR ,BG
570 CLS
580 SOUND 50,1
590 NEXT X
600 GOSUB 1000
610 COLOR CC
620 CLS
630 CH=CR(1-(FL*(INT(RND(1)*4)+1)))
640 FOR BITMAP=1 TO 29
650 L=LT(BITMAP)
660 FOR Q=7 TO 0 STEP -1
670 IF L<BIN(Q) THEN 770
680 L=L-BIN(Q)
690 IF FL THEN GOSUB 1000:COLOR CC
700 LOCATE 2*(7-Q)+1,BITMAP+5
710 PRINT CHR$(CH)
720 IF FL THEN GOSUB 1000:COLOR CC
730 LOCATE 2*(7-Q)+2,BITMAP+5
740 PRINT CHR$(CH)
750 SOUND 45,1
760 SOUND 100,0
770 NEXT Q
780 NEXT BITMAP
790 FOR X=1 TO 30
800 SOUND N(X),D(X)
810 NEXT X
820 FL=NOT FL
830 GOTO 510
1000 P=INT(RND(1)*14)+1
1010 CC=BG+P+15*((BG+P)>15)
1020 RETURN
2000 DATA 0,0,129,255,1,0,0
2010 DATA 0,224,160,161,255,1,0,0
2020 DATA 0,239,145,145,239,0,0,0
2030 DATA 0,226,145,145,142,0
3000 DATA 196,8,262,12,247,4,262,8,330,8,294,12,277,4
3010 DATA 294,8,330,4,294,4,262,12,262,4,330,8,392,8
3020 DATA 440,24,440,8,392,12,330,4,330,8,262,8,294,12
3030 DATA 277,4,294,8,330,4,294,4,262,12,220,4,220,8
3040 DATA 196,8,262,24
4000 DATA 219,1,2,15,177
```

Note: If you have an IBM PCjr and are using Cartridge BASIC, you must add line 130 to the program: 130 PLAY "MF"

TI-99/4A/*New Year's Eve*

```
10 DIM BIN(7),LT(29),N(30),D(30),CB(5),CF(5)
20 RANDOMIZE
30 CALL CLEAR
40 FOR X=0 TO 7
50 BIN(X)=2^X
60 NEXT X
70 FOR X=1 TO 29
80 READ LT(X)
90 NEXT X
100 FOR X=1 TO 30
110 READ D(X),N(X)
120 NEXT X
130 READ CB(1),CB(2),CB(3),CB(4),CB(5)
140 READ CF(1),CF(2),CF(3),CF(4),CF(5)
150 FOR X=88 TO 127 STEP 8
160 CALL CHAR(X,"FFFFFFFFFFFFFFFF")
170 CALL CHAR(X+1,"AA55AA55AA55AA55")
180 CALL CHAR(X+2,"1824429999422418")
190 CALL COLOR(X/8-3,CF(X/8-10),1)
200 NEXT X
210 FL=0
220 CALL CLEAR
230 PRINT "TO SET THE COMPUTER CLOCK,"
240 PRINT "PLEASE INPUT THE TIME IN"
250 PRINT "HOURS, MINUTES, AND SECONDS"
260 PRINT "(E.G., 095502);"
270 PRINT "THEN PRESS <ENTER>."
280 PRINT
290 INPUT "WHAT TIME IS IT NOW?":T$
300 IF LEN(T$)<>6 THEN 220
310 TS=0
320 FOR X=1 TO 6
330 IF (ASC(SEG$(T$,X,1))>47)*(ASC(SEG$(T$,X,1))<58)TH
EN 360
340 TS=1
350 X=6
360 NEXT X
370 IF TS=1 THEN 220
380 HRS=VAL(SEG$(T$,1,2))
390 MN=VAL(SEG$(T$,3,2))
400 SEC=VAL(SEG$(T$,5,2))
410 IF (HRS<0)+(HRS>12)+(MN<0)+(MN>59)+(SEC<0)+(SEC>59
)THEN 220
420 CALL CLEAR
430 TIM=HRS*3600+MN*60+SEC
440 IF (TIM>=43195)*(TIM<=43200)THEN 610
450 FOR DL=1 TO 60
460 NEXT DL
470 TIM=TIM+1
480 IF TIM<46800 THEN 500
490 TIM=3600
500 IF TIM/2<>INT(TIM/2)THEN 440
510 HRS=INT(TIM/3600)
520 MN=INT((TIM-HRS*3600)/60)
530 SEC=TIM-HRS*3600-MN*60
540 M$="0"&STR$(MN)
550 S$="0"&STR$(SEC)
560 T$=STR$(HRS)&":"&SEG$(M$,LEN(M$)-1,2)&":"&SEG$(S$,
LEN(S$)-1,2)&" "
570 FOR X=1 TO LEN(T$)
580 CALL HCHAR(10,12+X,ASC(SEG$(T$,X,1)))
590 NEXT X
600 GOTO 440
610 CALL CLEAR
620 FOR X=1000 TO 200 STEP -18
630 CALL SOUND(100,X,0)
640 NEXT X
650 FOR X=1 TO 20
660 CALL SCREEN(CB(INT(RND*5)+1))
670 CALL SOUND(50,-5,0)
680 NEXT X
690 CALL SCREEN(1)
700 CH=FL*(INT(RND*2)+1)
710 CS=INT(RND*5)
720 FOR BITMAP=1 TO 29
730 L=LT(BITMAP)
```

BY INVITATION ONLY
An Exclusive New Year's Eve Party You Won't Want To Miss!

PUZZLE BY PETER FAVARO
PROGRAM BY STEVEN C.M. CHEN

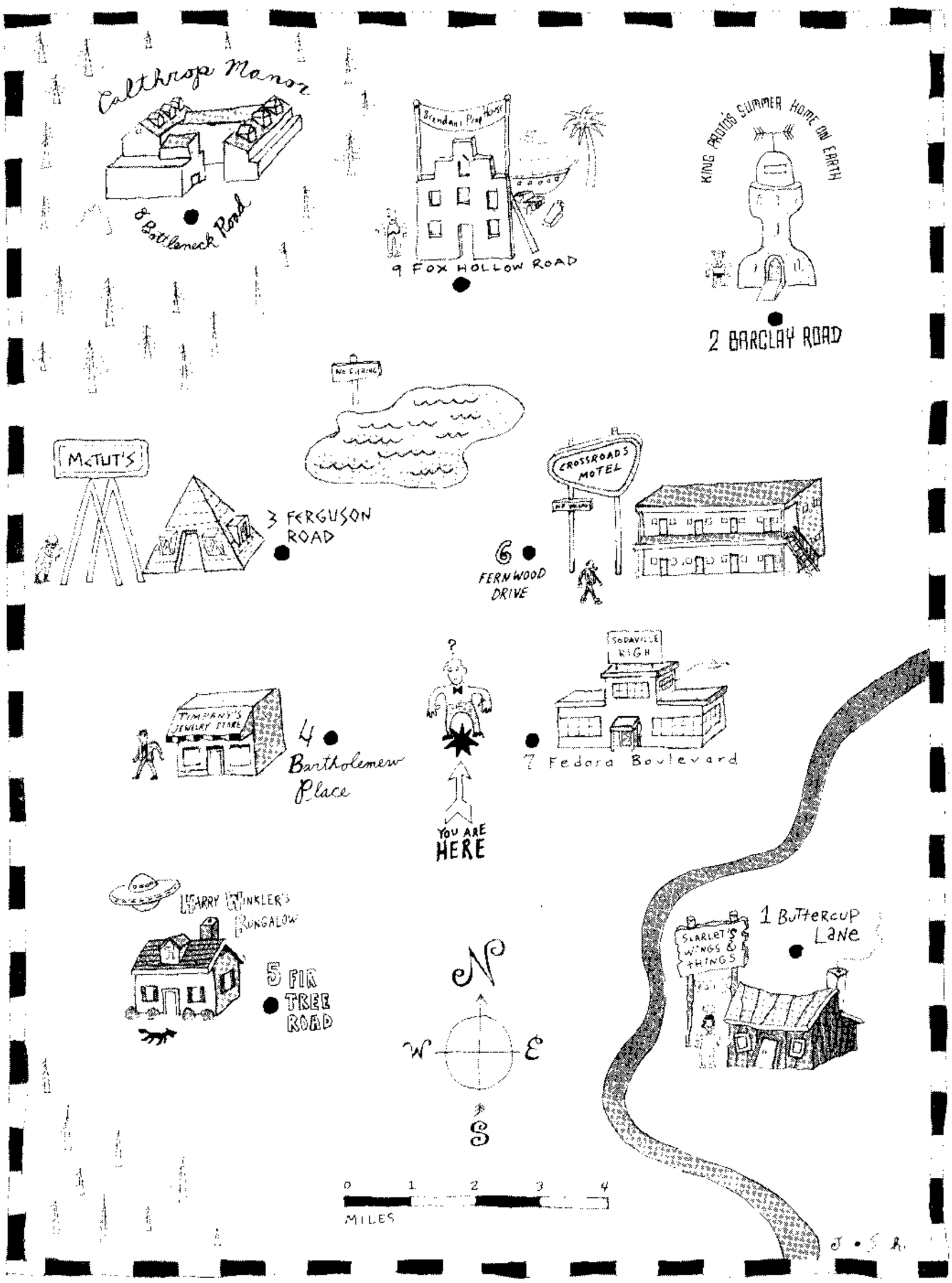
It arrives in the mail on Dec. 31, 1984, in a curious-looking envelope decorated with what at first appear to be candy canes. On closer inspection they turn out to be question marks — hundreds of them.

"What kind of odd holiday greeting could this be?" you wonder. You check the postmark and with great difficulty make out the letters D O R M I R. The name sounds familiar but you're not quite sure why. "Do I have an aunt or a cousin living on a Dormir Road or a Dormir Lane?" you ask. "No, that's not it . . . ."

You examine the envelope more closely and notice that the flap is sealed shut with a seal that reads: FROM THE ROYAL PALACE OF PROTO. "Proto? Where have I heard *that* name before?"

As you slide your thumb under the flap and pop it open you make the connection: *Proto and The Dormirians*! That's it! They were in one of my favorite FAMILY COMPUTING puzzles! (*April 1984 issue.*)

Eagerly you tear the envelope open. Inside is an invitation to a very exclusive New Year's Eve party being thrown by King Proto and all of the characters from FAMILY COMPUTING's 1984 puzzles! Everyone will be there: The high school sweethearts Kurt and Dede (*February 1984*); the mischievous chefs (*June 1984*); and even Frank ("Fingers") Larson, temporarily released from jail!



But where is the party being held? Although the postmark shows that the envelope was mailed from the planet Dormir, the invitation states that the party will be held on Earth—and not necessarily at King Proto's summer home! A map (*shown*) is included with the invitation and shows the nine places where the party could be held. It also includes your home. But unfortunately, the directions to the party are in code. In dismay you read...

ILLUSTRATION BY JOSH GOSFIELD

LOTJ YOMT
JG XWVL
PQNJ SAOP
WPVKN YQQFU
BJ IJMOC
RKQFI ZIBXOFKD
DMSDQ GNTRD
JLAXBB OAXV
UBZ KHVD

The sun is beginning to set and soon the party will begin. You know you don't have time to chase from place to place at random, but if you carefully study the map, you'll find the keys to decode the directions. When you have figured out the code, use your Deluxe Dash Decoder machine (your computer) to unravel it.

HOW TO PLAY

Set your computer to all uppercase letters before playing *By Invitation Only*. After you type in your name, the Deluxe Dash Decoder machine will be ready to go. Two alphabets will appear on the screen. The bottom alphabet will remain stationary. To shift the top alphabet press "B" (to go backward) or "F" (to go forward.) For example, if you press the "F" key once, the top alphabet will shift forward by one letter so that the upper A will be positioned over the lower B. This sets the machine to decode all As to Bs, all Cs to Ds, etc.

When you discover the proper setting to decode each line of the instructions, press "D" to decode. Type in one line of the coded directions, then press RETURN or ENTER.

A "decoded" line will appear on the screen. You will then be asked if the line is correctly decoded. If English words are formed (and you have not made any typos), press "Y" for yes. (The computer will not accept any directions with typos.) If gibberish appears on the screen, press "N" and adjust the Deluxe Dash Decoder machine to a different offset or enter another line to be decoded at the same setting.

The decoder machine will store every correctly decoded line. These can be read at any point by typing "R". If you have trouble decoding any of the directions, type "H" (after typing "R") for a helpful hint.

Once you have correctly decoded all nine lines, the full directions to the party will appear on the screen. Press a key, and you will arrive at the party. We hope you have a wonderful time and a very happy new year! (*The solution will appear in next month's issue.*)

Base Version (TRS-80 Model III)/ *By Invitation Only*

```
10 CLEAR 900:DIM D1$(10),D2$(9),M$(3)
20 WL=64:PI=6:TRU=-1:TX=0:DL=100:TA$=""
50 TS=(WL-26)/2+TX:TD=(WL-13)/2+TX:C=0
60 READ M$(0):M$(1)="":READ M$(2):M$(3)="          "
70 FOR I=1 TO 9:D2$(I)="**************":NEXT I:S1$="A"
80 FOR I=66 TO 90:S1$=S1$+CHR$(I):NEXT I
90 S2$=S1$:P$="PRESS ANY KEY TO CONTINUE."
100 FOR I=1 TO 10:T$="":FOR J=1 TO 2+TRU*(I=10)*6
110 READ A$:V=ASC(LEFT$(A$,1))-64:FOR Z=2 TO LEN(A$)
120 N=ASC(MID$(A$,Z,1))-V
130 T$=T$+CHR$(N+TRU*26*(N<65)):NEXT Z:T$=T$+" "
140 NEXT J:D1$(I)=LEFT$(T$,LEN(T$)-1):NEXT I
150 CLS:PRINT "WHAT IS YOUR NAME";
160 INPUT NA$:IF NA$="" OR LEN(NA$)>WL-1 THEN 150
170 CLS:N$="DELUXE DASH DECODER":GOSUB 2000:PRINT
180 PRINT TAB(TS);"CURRENT SETTING:"
190 Y=3:X=TS+17-TRU*(C=0):GOSUB 3000:B=SGN(C)+1
200 PRINT M$(B);TA$;ABS(C);M$(1+2*TRU*(B=1));" "
210 PRINT TAB(TS);S1$:PRINT TAB(TS);S2$:GOSUB 4000
220 R$="SET DECODER USING <B> (BACKWARD) OR <F>"
230 R$=R$+" (FORWARD) KEY; PRESS <D> TO DECODE OR <R>"
240 R$=R$+" TO READ DECODED DIRECTIONS.":GOSUB 1000
250 K$=INKEY$:IF K$="B" OR K$="F" THEN 340
260 ON ABS(K$="D") GOTO 380:IF K$<>"R" THEN 250
270 CLS:PRINT:N$="DECODED DIRECTIONS":GOSUB 2000
280 PRINT:FOR I=1 TO 9:PRINT TAB(TD);D2$(I):NEXT I
290 PRINT:R$="PRESS <H> FOR HELP OR ANY OTHER KEY TO C
ONTINUE.":GOSUB 1000
300 K$=INKEY$:IF K$="" THEN 300 ELSE IF K$<>"H" THEN 1
70
310 CLS:R$=D1$(10)+".":GOSUB 1000:GOSUB 4000
320 N$=P$:GOSUB 2000
330 IF INKEY$="" THEN 330 ELSE 170
340 IF (C>24 AND K$="F") OR (C<-24 AND K$="B") THEN 25
0
350 C=C+TRU*((K$="F")-(K$="B")):IF K$="F" THEN 370
360 S1$=MID$(S1$,2)+LEFT$(S1$,1):GOTO 190
370 S1$=RIGHT$(S1$,1)+LEFT$(S1$,25):GOTO 190
380 Y=7:X=0:GOSUB 3000:PRINT "CODED WORDS";:WC$=""
390 INPUT WC$:IF WC$="" THEN 380
400 WD$="":FOR I=1 TO LEN(WC$):T$=MID$(WC$,I,1)
410 IF T$<"A" OR T$>"Z" THEN 440
420 IC=ASC(T$)+C
430 T$=CHR$(IC+TRU*26*((IC<65)-(IC>90)))
440 WD$=WD$+T$:NEXT I:PRINT TAB(13);WD$
450 PRINT:PRINT "CORRECTLY DECODED?";
460 K$=INKEY$:IF K$="N" THEN 170
470 IF K$<>"Y" THEN 460
480 CC=0:FOR I=1 TO 9:IF D1$(I)=WD$ THEN D2$(I)=WD$
490 IF D1$(I)=D2$(I) THEN CC=CC+1
500 NEXT I:IF CC<>9 THEN 170
510 CLS:N$="DIRECTIONS TO PARTY":GOSUB 2000:PRINT
520 FOR I=1 TO 9:PRINT TAB(TD);D2$(I):NEXT I
530 PRINT:N$=P$:GOSUB 2000
540 IF INKEY$="" THEN 540
550 CLS:R$="YOU FOLLOW THESE DIRECTIONS AND ARRIVE"
560 R$=R$+" AT THE PARTY, WHERE YOU HEAR ..."
570 GOSUB 1000:LN=LEN(NA$):BG=TRU*(LN<WL-17)
580 FOR D=1 TO 2000:NEXT D:FOR I=1 TO 100
590 CLS:Y=RND(15):X=RND(WL-LN-1-BG*16)+TX
600 GOSUB 3000:PRINT "HAPPY NEW YEAR,";
610 PRINT STRING$(1+(1-BG)*(WL-16),32);NA$;"!"
630 FOR D=1 TO DL:NEXT D,I:CLS:END
1000 IF LEN(R$)<=WL THEN N$=R$:GOSUB 2000:RETURN
1010 J=WL+1:K=1:FOR I=J TO 2 STEP -1
1020 IF MID$(R$,I,1)=" " THEN K=0:J=I:I=2
1030 NEXT I:N$=LEFT$(R$,J-1):GOSUB 2000
1040 R$=RIGHT$(R$,LEN(R$)-J+K):GOTO 1000
2000 IF LEN(N$)=WL THEN PRINT N$;:RETURN
2010 PRINT TAB((WL-LEN(N$))/2+TX);N$:RETURN
3000 PRINT@(Y-1)*WL+X,"";:RETURN
4000 FOR I=1 TO PI:PRINT:NEXT I:RETURN
5000 DATA BACKWARD,FORWARD,SYBGW,EXNLS,QSP,SIHGW
5010 DATA JDEBX,IFNBC,EZSYNQ,LIAAPE,IPX,QEFIKY
5020 DATA NIBHWZ,DGPIEVMRK,RWFLWJ,FNUAYK,KLNCZDD
5030 DATA VBNKI,TVCA,MEBPX,IRW,NRIS,MZRNFHER
5040 DATA FEUA,TWUH,PIEBLU,WQEFP,EUZEEQJ
```

Atari/*By Invitation Only*

```
10 DIM A$(9),CL$(1),D1$(128),D2$(88),DP(10),M$(24)
20 DIM T$(41),NA$(39),P$(26),S1$(26),S2$(26),SP$(25),W
C$(16),WD$(16)
30 SP$=" ":SP$(25)=SP$:SP$(2)=SP$:C=0:CL$=CHR$(125)
40 OPEN #1,4,0,"K:":POKE 82,0
50 M$="BACKWARD":M$(17)="FORWARD "
60 FOR I=9 TO 16:M$(I,I)=CHR$(31-(I>12)):NEXT I
70 D2$="*":D2$(88)="*":D2$(2)=D2$
80 FOR I=65 TO 90:S1$(I-64)=CHR$(I):NEXT I
90 S2$=S1$:P$="PRESS ANY KEY TO CONTINUE."
100 FOR I=1 TO 10:T$="":FOR J=1 TO 2+(I=10)*6
110 READ A$:V=ASC(A$)-64:FOR Z=2 TO LEN(A$)
120 N=ASC(A$(Z))-V:T$(LEN(T$)+1)=CHR$(N+26*(N<65))
130 NEXT Z:T$(LEN(T$)+1)=" ":NEXT J
140 DP(I)=LEN(D1$)+1:D1$(DP(I))=T$(1,LEN(T$)-1):NEXT I
150 PRINT CL$;"WHAT IS YOUR NAME";
160 INPUT NA$:IF NA$="" THEN 150
170 POKE 752,1
180 PRINT CL$;SP$(1,10);"DELUXE DASH DECODER":PRINT
190 PRINT SP$(7,7);"CURRENT SETTING:"
200 POSITION 24,2:PRINT SP$
210 B=SGN(C)+1:POSITION 24-(B=1),2
```

```
220 PRINT M$(B*8+1,B*8+8-(B=2));" ";ABS(C)
230 PRINT SP$(1,7);S1$:PRINT SP$(1,7);S2$:POSITION 0,1
7
240 PRINT "SET DECODER USING <B> (BACKWARD) OR <F>"
250 PRINT " (FORWARD) KEY; PRESS <D> TO DECODE OR"
260 PRINT SP$(1,4);"<R> TO READ DECODED DIRECTIONS.";
270 GET #1,K:IF K=66 OR K=70 THEN 380
280 ON K=68 GOTO 420:IF K<>82 THEN 270
290 PRINT CL$;SP$(1,10);"DECODED DIRECTIONS"
300 PRINT :FOR I=1 TO 9
310 PRINT SP$(1,13);D2$(DP(I),DP(I+1)-1):NEXT I:PRINT
320 PRINT " PRESS <H> FOR HELP OR ANY OTHER KEY TO"
330 PRINT SP$(1,15);"CONTINUE."
340 GET #1,K:IF K<>72 THEN 180
350 PRINT CL$;SP$(1,3);D1$(DP(10),121)
360 PRINT SP$(1,16);D1$(123,128);"."
370 POSITION 7,17:PRINT P$:GET #1,K:GOTO 180
380 IF (C>24 AND K=66) OR (C<-24 AND K=70) THEN 270
390 C=C+(K=70)-(K=66):IF K=70 THEN 410
400 T$=S1$(1,1):S1$=S1$(2):S1$(26)=T$:GOTO 200
410 T$=S1$(26):T$(2,26)=S1$:S1$=T$:GOTO 200
420 POKE 752,0:POSITION 0,7:PRINT "CODED WORDS";
430 INPUT WC$:IF WC$="" THEN 420
440 WD$="":FOR I=1 TO LEN(WC$):T$=WC$(I,I)
450 IF T$<"A" OR T$>"Z" THEN 470
460 IC=ASC(T$)+C:T$=CHR$(IC+26*((IC<65)-(IC>90)))
470 WD$(LEN(WD$)+1)=T$:NEXT I:POKE 85,12:PRINT WD$
480 PRINT :PRINT "CORRECTLY DECODED?";
490 GET #1,K:IF K=78 THEN 170
500 IF K<>89 THEN 490
510 POKE 752,1:CC=0:FOR I=1 TO 9
520 IF D1$(DP(I),DP(I+1)-1)=WD$ THEN D2$(DP(I),DP(I+1)
-1)=WD$
530 IF D1$(DP(I),DP(I+1)-1)=D2$(DP(I),DP(I+1)-1) THEN
CC=CC+1
540 NEXT I:IF CC<>9 THEN 170
550 PRINT CL$;SP$(1,10);"DIRECTIONS TO PARTY":PRINT
560 FOR I=1 TO 9:PRINT SP$(1,13);D2$(DP(I),DP(I+1)-1):
NEXT I
570 PRINT :PRINT SP$(1,7);P$:GET #1,K
580 PRINT CL$;" YOU FOLLOW THESE DIRECTIONS AND ARRIVE
"
590 PRINT SP$(1,4);"AT THE PARTY, WHERE YOU HEAR ..."
600 FOR D=1 TO 1000:NEXT D
610 LN=LEN(NA$):BG=LN<23:FOR I=1 TO 100
620 PRINT CL$:SETCOLOR 2,RND(0)*16,6
630 POSITION INT(RND(0)*(39-LN-BG*16)),RND(0)*22
640 PRINT "HAPPY NEW YEAR,";SP$(1,(1-BG)*24+1);NA$;"!"
650 FOR T=150 TO 40 STEP -20:SOUND 0,T,10,10:FOR D=1 T
O 10:NEXT D:NEXT T
660 SOUND 0,0,0,0:FOR D=1 TO 50:NEXT D:NEXT I
670 SOUND 0,200,4,14:SOUND 1,100,4,6
680 FOR D=1 TO 600:NEXT D:GRAPHICS 0:POKE 82,2:END
1000 DATA SYBGW,EXNLS,QSP,SIHGW
1010 DATA JDEBX,IFNBC,EZSYNQ,LIAAPE,IPX,QEFIKY
1020 DATA NIBHWZ,DGPIEVMRK,RWFLWJ,FMUAYK,KLNCZDD
1030 DATA VBNKI,TVCA,MEBPX,IRW,NRIS,MZRNFHER
1040 DATA FEUA,TWUH,PIEBLU,WQEFP,EUZEEQJ
```

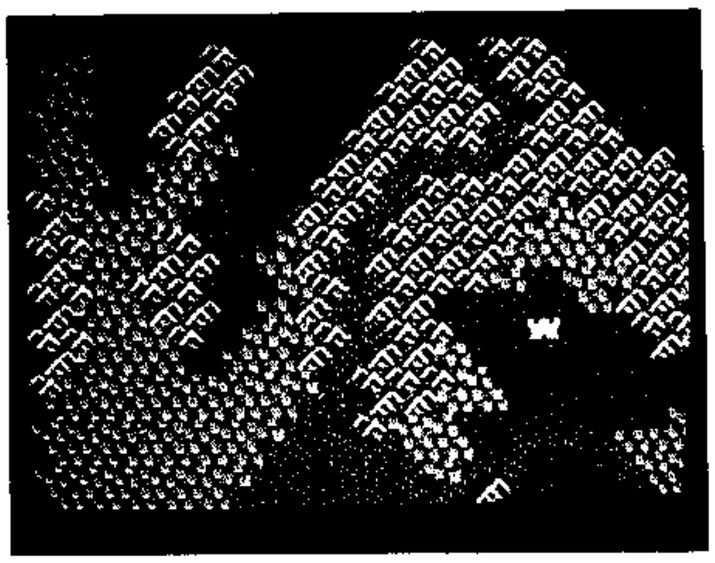
TI-99/4A/*By Invitation Only*

```
10 DIM D1$(10),D2$(9),M$(2)
20 RANDOMIZE
30 M$(0)=" BACKWARD"
40 M$(1)=""
50 M$(2)=" FORWARD"
60 FOR I=1 TO 9
70 D2$(I)="**************"
80 NEXT I
90 S1$="A"
100 FOR I=66 TO 90
110 S1$=S1$&CHR$(I)
120 NEXT I
130 S2$=S1$
140 P$=" PRESS ANY KEY TO CONTINUE."
150 FOR I=1 TO 10
160 T$=""
170 FOR J=1 TO 2-(I=10)*5
180 READ A$
190 V=ASC(SEG$(A$,1,1))-64
200 FOR Z=2 TO LEN(A$)
210 N=ASC(SEG$(A$,Z,1))-V
220 T$=T$&CHR$(N-26*(N<65))
230 NEXT Z
240 T$=T$&" "
250 NEXT J
260 D1$(I)=SEG$(T$,1,LEN(T$)-1)
270 NEXT I
280 CALL CLEAR
290 INPUT "WHAT IS YOUR NAME? ":NA$
300 IF (NA$="")+(LEN(NA$)>27)THEN 280
310 GOSUB 2000
320 PRINT TAB(6);"DELUXE DASH DECODER"
330 B=SGN(C)+1
340 PRINT :"CURRENT SETTING:";M$(B);ABS(C):S1$:S2$
350 GOSUB 2000
360 PRINT TAB(4);"SET DECODER USING <B>"
370 PRINT "(BACKWARD) OR <F> (FORWARD)"
380 PRINT "KEY; PRESS <D> TO DECODE OR"
390 PRINT TAB(5);"<R> TO READ DECODED"
400 PRINT TAB(9);"DIRECTIONS."
410 GOSUB 3000
420 IF (K=66)+(K=70)THEN 580
430 IF K=68 THEN 650
440 IF K<>82 THEN 410
450 GOSUB 2000
460 PRINT :TAB(5);"DECODED DIRECTIONS"
470 GOSUB 4000
480 PRINT :TAB(4);"PRESS <H> FOR HELP OR"
490 PRINT " ANY OTHER KEY TO CONTINUE."
500 GOSUB 3000
510 IF K<>72 THEN 310
520 CALL CLEAR
530 PRINT D1$(10)&"."
540 GOSUB 2000
550 PRINT P$
560 GOSUB 3000
570 GOTO 310
580 IF ((C>24)*(K=70)+(C<-24)*(K=67))THEN 410
590 C=C+(K=66)-(K=70)
600 IF K=70 THEN 630
610 S1$=SEG$(S1$,2,25)&SEG$(S1$,1,1)
620 GOTO 310
630 S1$=SEG$(S1$,26,1)&SEG$(S1$,1,25)
640 GOTO 310
650 PRINT
660 INPUT "CODED WORDS? ":WC$
670 IF WC$="" THEN 660
680 WD$=""
690 FOR I=1 TO LEN(WC$)
700 T$=SEG$(WC$,I,1)
710 IF (T$<"A")+(T$>"Z")THEN 740
720 IC=ASC(T$)+C
730 T$=CHR$(IC-26*((IC<65)-(IC>90)))
740 WD$=WD$&T$
750 NEXT I
760 PRINT TAB(14);WD$
770 PRINT :"CORRECTLY DECODED?";
780 GOSUB 3000
790 IF K=78 THEN 310
800 IF K<>89 THEN 780
810 CC=0
820 FOR I=1 TO 9
830 IF D1$(I)<>WD$ THEN 850
840 D2$(I)=WD$
850 IF D1$(I)<>D2$(I)THEN 870
860 CC=CC+1
870 NEXT I
880 IF CC<>9 THEN 310
890 CALL CLEAR
900 PRINT :TAB(5);"DIRECTIONS TO PARTY"
910 GOSUB 4000
920 PRINT :P$
930 GOSUB 3000
```

```
940 CALL CLEAR
950 PRINT "YOU FOLLOW THESE DIRECTIONS"
960 PRINT TAB(2);"AND ARRIVE AT THE PARTY,"
970 PRINT TAB(5);"WHERE YOU HEAR ..."
980 FOR D=1 TO 500
990 NEXT D
1000 CALL CLEAR
1010 FOR I=1 TO 100
1020 RA=INT(RND*(14-(15-LEN(NA$))*(LEN(NA$)>15)))
1030 PRINT :TAB(RA);"HAPPY NEW YEAR,"
1040 PRINT TAB(RA);NA$;"!"
1050 FOR J=440 TO 1000 STEP 100
1060 CALL SOUND(20,J,0)
1070 NEXT J
1080 CALL SOUND(10,110,30)
1090 NEXT I
1100 END
2000 FOR I=1 TO 8
2010 PRINT
2020 NEXT I
2030 RETURN
3000 CALL KEY(3,K,S)
3010 IF S=0 THEN 3000
3020 RETURN
4000 PRINT
4010 FOR I=1 TO 9
4020 PRINT TAB(7);D2$(I)
4030 NEXT I
4040 RETURN
5000 DATA SYBGW,EXNLS,QSP,SIHGW
5010 DATA JDEBX,IFNBC,EZSYNQ,LIAAPE,IPX,QEFIKY
5020 DATA NIBHWZ,DGPIEVMRK,RWFLWJ,FNUAYK,KLNCZDD
5030 DATA VBNKI,TVCA,MEBPX,IRW,NRIS,MZRNFHER
5040 DATA FEUA,TWUH,PIEBLUJXYI,EUZEEQJ
```

Timex Sinclair 1000 w/16K RAM Pack & Timex Sinclair 1500/*By Invitation Only*

```
10 FAST
20 DIM E$(9,14)
30 DIM F$(9,14)
40 DIM M$(3,9)
50 LET X$=""
60 LET M$(1)="BACKWARD"
70 LET M$(2)=" "
80 LET M$(3)="FORWARD"
90 LET A$="A"
100 FOR I=39 TO 63
110 LET A$=A$+CHR$ I
120 NEXT I
130 LET B$=A$
140 LET P$="PRESS ANY KEY TO CONTINUE."
150 LET S$=" "
160 LET Z$="SYBGW,EXNLS,QSP,SIHGW,JDEBX,IFNBC,EZSYNQ,L
IAAPE,IPX,QEFIKY,NIBHWZ,DGPIEVMRK,RWFLWJ,FNUAYK,KLNCZD
D,VBNKI,TVCA,MEBPX,IRW,NRIS,MZRNFHER,FEUA,TWUH,PIEBLU,
WQEFP,EUZEEQJ"
170 LET C=0
180 LET DI=6
190 LET DJ=1
200 FOR I=1 TO 9
210 LET F$(I)="**************"
220 LET T$=""
230 FOR J=1 TO 2
240 GOSUB 3000
250 LET T$=T$+" "
260 LET S$=S$+"  "
270 NEXT J
280 LET E$(I)=T$( TO LEN T$-1)
290 NEXT I
300 LET T$=""
310 FOR I=1 TO 8
320 GOSUB 3000
330 LET T$=T$+" "
340 NEXT I
350 LET G$=T$( TO 40)+"."
360 SLOW
370 PRINT "WHAT IS YOUR NAME?"
380 INPUT N$
390 IF N$="" OR LEN N$>31 THEN GOTO 380
400 CLS
410 PRINT TAB 7;"DELUXE DASH DECODER"
420 PRINT AT 2,3;"CURRENT SETTING: "
430 PRINT AT 17,6;"SET DECODER USING <B>"
440 PRINT "(BACKWARD) OR <F> (FORWARD) KEY;"
450 PRINT " PRESS <D> TO DECODE OR <R> TO"
460 PRINT TAB 4;"READ DECODED DIRECTIONS."
470 LET B=SGN C+2
480 LET P=20-(C=0)
490 PRINT AT 2,P;S$( TO 11);AT 2,P;M$(B, TO 9-8*(B=2)-
(B=3));ABS C
500 PRINT AT 3,3;A$;AT 4,3;B$
510 GOSUB 2000
520 IF K$="B" OR K$="F" THEN GOTO 690
530 IF K$="D" THEN GOTO 760
540 IF K$<>"R" THEN GOTO 510
550 CLS
560 PRINT AT 2,6;"DECODED DIRECTIONS"
570 FOR I=1 TO 9
580 PRINT AT I+3,9;F$(I)
590 NEXT I
600 PRINT AT 14,0;"PRESS <H> FOR HELP OR ANY OTHER"
610 PRINT TAB 7;"KEY TO CONTINUE."
620 GOSUB 2000
630 IF K$<>"H" THEN GOTO 400
640 CLS
650 PRINT TAB 2;G$( TO 28);AT 1,9;G$(29 TO 41)
660 PRINT AT 15,3;P$
670 GOSUB 2000
680 GOTO 400
690 IF (C>24 AND K$="F") OR (C<-24 AND K$="B") THEN GO
TO 510
700 LET C=C+(K$="F")-(K$="B")
710 IF K$="F" THEN GOTO 740
720 LET A$=A$(2 TO 26)+A$(1)
730 GOTO 470
740 LET A$=A$(26)+A$(1 TO 25)
750 GOTO 470
760 PRINT AT 6,0;"CODED WORDS? ";
770 INPUT C$
780 IF C$="" OR LEN C$>14 THEN GOTO 770
790 PRINT C$
800 FAST
810 LET D$=""
820 FOR I=1 TO LEN C$
830 LET T$=C$(I)
840 IF T$<"A" OR T$>"Z" THEN GOTO 880
850 LET IC=CODE T$+C
860 LET T=IC+26*((IC<38)-(IC>63))
870 LET T$=CHR$ T
880 LET D$=D$+T$
890 NEXT I
900 SLOW
910 PRINT TAB 13;D$
920 PRINT AT 9,0;"CORRECTLY DECODED?";
930 GOSUB 2000
940 IF K$="N" THEN GOTO 400
950 IF K$<>"Y" THEN GOTO 930
960 FAST
970 CLS
980 LET CC=0
990 FOR I=1 TO 9
1000 IF E$(I, TO LEN D$)=D$ THEN LET F$(I)=D$
1010 IF E$(I)=F$(I) THEN LET CC=CC+1
1020 NEXT I
1030 SLOW
1040 IF CC<>9 THEN GOTO 410
1050 PRINT TAB 6;"DIRECTIONS TO PARTY"
1060 PRINT
1070 FOR I=1 TO 9
1080 PRINT AT I+1,9;F$(I)
1090 NEXT I
1100 PRINT AT 12,3;P$
1110 GOSUB 2000
```



Keyboard movement of your characters takes them across a scrolling map. As you travel you'll encounter and battle monsters, and discover hidden scrolls, specialized weapons, and the amulets required by your magic-users for the casting of spells. You'll also visit towns where you can heal your characters, and be raised to new experience levels to buy arms, armor, and magic spells.

Since characters achieve higher levels of strength and defenses only through combat, the game revolves around your strategy and tactics skills in fighting the many varied monsters. Most of the monsters are profiled in the game's excellent documentation. These creatures range from the meek and mild to heavy-duty life-drainers, so it's best to SAVE the program frequently throughout play. Even the most experienced players have been killed repeatedly trying to defeat these creatures.

Xyphus' most innovative feature is its realistic multiplayer movement and combat simulation. Each of up to four players can decide where to move characters, which weapon to fight with, and with whom to do battle. Thus, players have the opportunity to determine their own actions, allowing for more group interaction in deciding strategy and tactics. This is crucial in fighting some of the marauding bands which spring out at you in ambush.

Xyphus is good fun for novice adventurers as well as experienced players, ages 10 plus, and is ideal for group and family situations.

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