

2ND ANNUAL
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PUBLISHED BY SCHOLASTIC INC.

DECEMBER 1985

VOLUME 3
NUMBER 12

FAMILY COMPUTING

\$2.50

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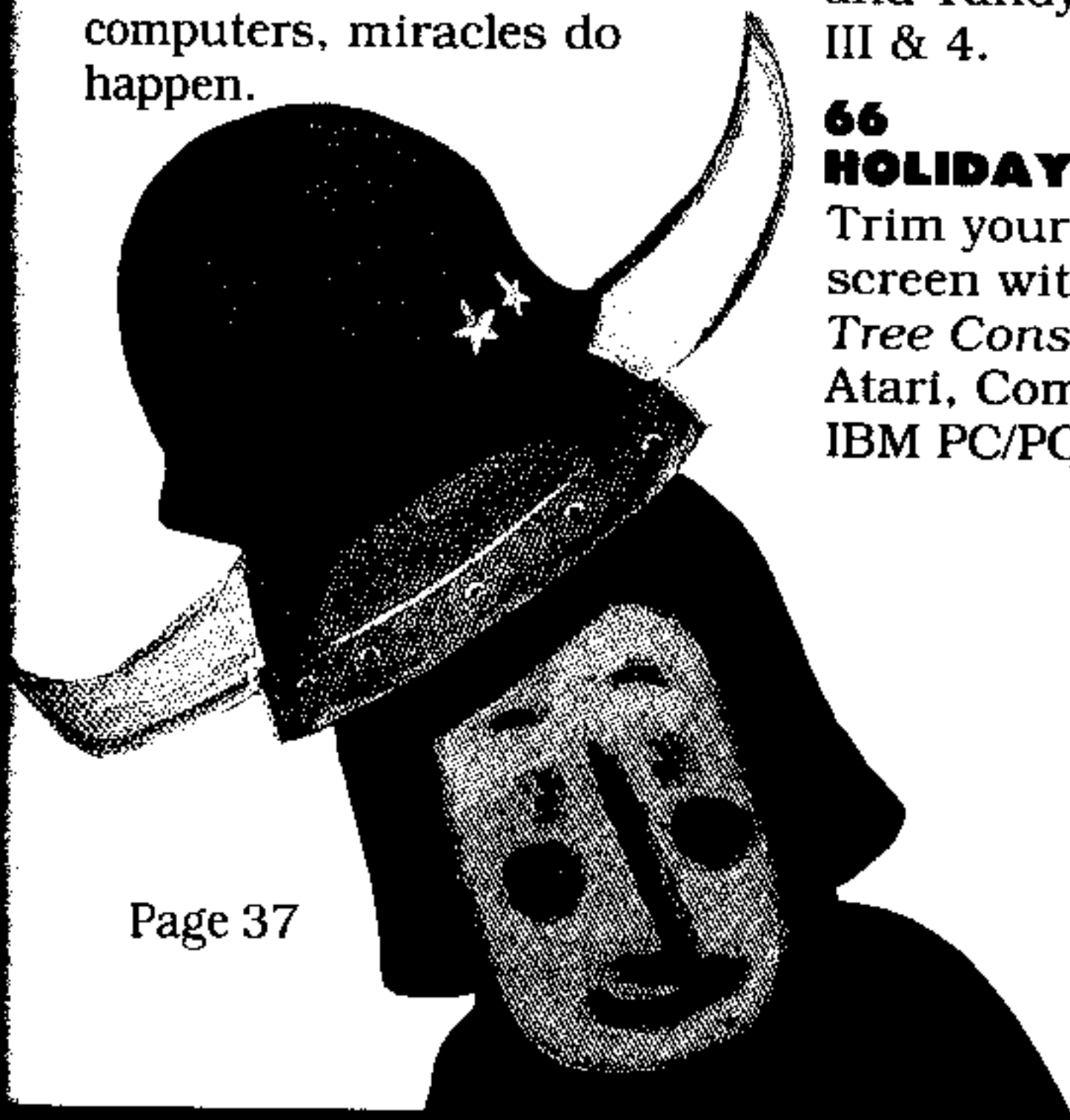
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FAMILY COMPUTING (ISSN 0738-6079) is published monthly by Scholastic Inc., 730 Broadway, New York, NY 10003. Subscriptions: in the U.S. and possessions, 12 issues for \$19.97; outside the U.S. add \$6 (surface mail) or \$25.97 (air-mail). Office of publication: 351 Garver Rd., P.O. Box 2700, Monroe, OH 45050-2700. Second-class postage paid at Monroe, OH 45050-9998 and additional offices. POSTMASTER: Send address changes and notice of undelivered copies to FAMILY COMPUTING, P.O. Box 2511, Boulder, CO 80302. Printed in U.S.A. Copyright © 1985 by Scholastic Inc. All rights reserved.

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1986 Computing Family of the Year Contest Announcement. Watch for rules and prizes.

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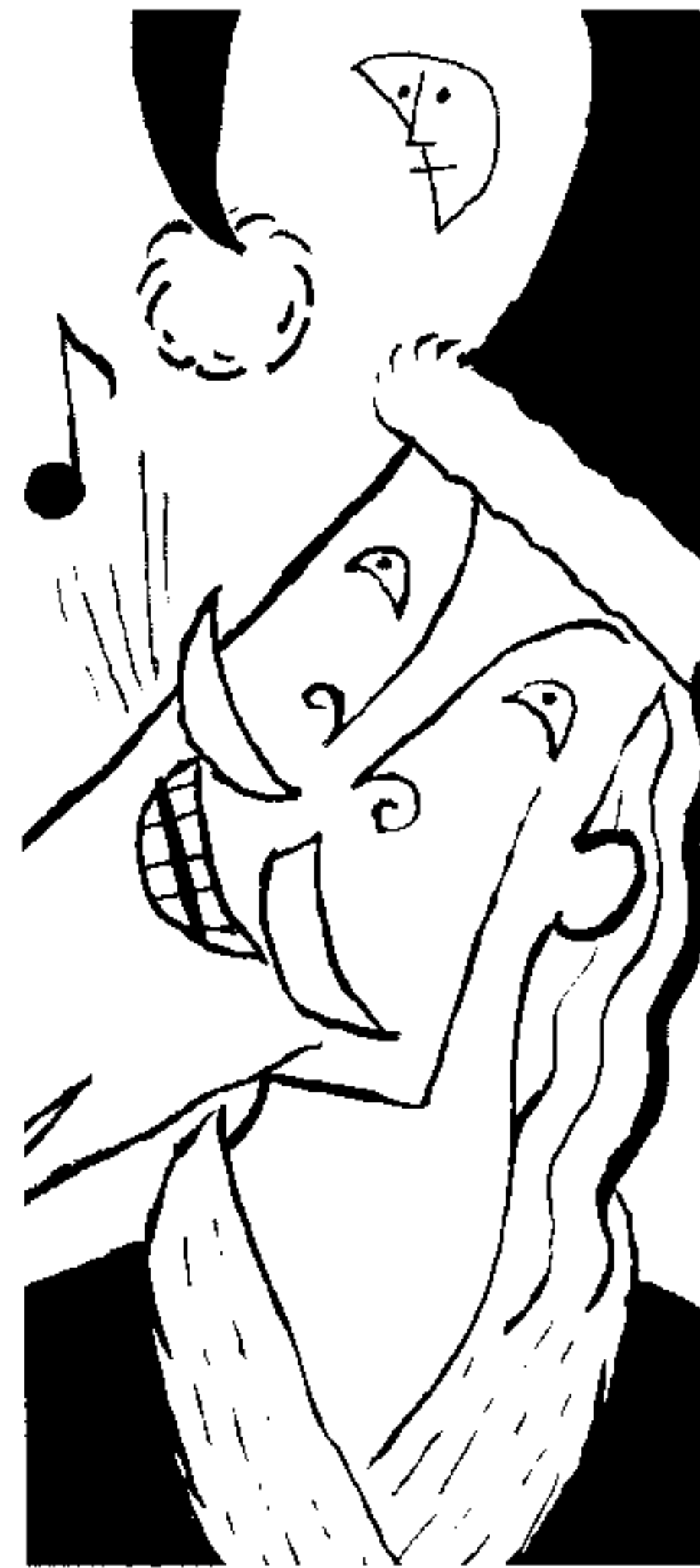
JINGLE BELLS

(With Tutorial, "How to Write Music Programs")

BY JOHN JAINSCHIGG AND PAUL DIXON

Jingling bells is one way to make beautiful music. It's as easy as grabbing the right bell at the right time and then ringing it for the correct length of time. Unfortunately, most people don't have a set of musical bells around the house. However, if you're reading this, chances are you do have a computer. More than likely, it can play music—if you can tell it what notes to play, when to play them, and for how long.

Our Beginner Program this month is a short music program that will surely put you and your computer into the holiday swing of things. Type the program in. SAVE it to disk or cassette, then RUN it. Be especially careful when typing in the DATA statements. If all goes well, in a few moments you'll hear *Jingle Bells* jingling through the house. And if you want to understand how it works—or make the program play a different song—read on!



HOW TO WRITE MUSIC PROGRAMS

Playing a note in BASIC differs from one brand of

computer to another. Some computers have a SOUND command that lets you produce tones and, in some cases, control a sound's duration, volume, and sometimes even its quality (whether the tone sounds pure or distorted; like a flute, or like a piano). The table below shows SOUND commands for various systems as we have used them in *Jingle Bells*.

Not all computers have SOUND commands. Commodore 64 sound is controlled by placing numbers in certain memory locations, using POKE statements. A special machine-language routine, also controlled by POKES, makes sound on the Apple, and the ADAM's sound chip must be controlled by a combination of machine code and POKES as well. However, all simple SOUND commands and "POKE-and-play" sound-making schemes have one thing in common. They all use numbers to represent the pitch and other characteristics of a note, though the range of numbers used varies widely from computer to computer.

To turn a melody into a program, you start by converting each of its pitches into a number, according to a table of equivalents found in the BASIC manuals that come with most computers. ADAM and Ap-

ple owners will have more difficulty than others in doing this. Procedures for controlling ADAM sound are quite complex, and are not explained in Coleco's documentation. Interested readers should consult *ADAM's Companion*, by Ramsey Benson (Avon Books, 1984, \$9.95). Numbers used to specify pitches on the Apple change, depending on what machine-language routine is used to generate the sound. A partial table of numeric values for the machine-language routine we used in *Jingle Bells* is shown below.

| | |
|----------------|---------|
| | G = 162 |
| | A = 144 |
| | B = 128 |
| Middle C = 121 | |
| D = 108 | |
| E = 96 | |
| F = 91 | |
| G = 81 | |

To play a note using the machine-language routine shown in the Apple version, you start by READING the machine code from DATA statements and POKE-ing it into addresses 768–796 in memory (see lines 30–60 and DATA in lines 1000–1020). POKE a duration number (from 2 to 255) into location 6 and a pitch number into location 8; then play the note by CALLING the routine using the statement CALL 768 (see lines 120, 130, and 140).

DURATION AND TEMPO

Playing a musical note on your computer takes three steps: 1. start playing the note; 2. wait for a specific length of time; and 3. stop playing the note. If your computer's sound-producing scheme lets you specify a note's duration at the same time you specify its pitch (Apple, IBM, Macintosh, TI, and CoCo work this way), you won't have to do any programming to handle steps two and three. Just supply the computer with a number for the note's duration—larger values cause a note

| Computer | SOUND command format | Description |
|---------------------------------|----------------------|--|
| Atari | SOUND CH,P,T,V | Sound continuous tone through channel CH at pitch P, using tone quality T, at volume V. |
| IBM PC & compatibles | SOUND P,D | Sound pitch P for duration D. Additional, optional parameters allow control of channel and volume. |
| Macintosh (Microsoft BASIC 2.0) | SOUND P,D | As above. |
| TI-99/4A | CALL SOUND (D,P,V) | Sound pitch P for duration D at volume V. Additional, optional parameters allow added voices to be played with the same command. |
| Tandy CoCo | SOUND P,D | Sound pitch P for duration D. |

BEGINNER PROGRAM

to play for a longer time—and the computer will sound the note and turn it off automatically.

If your computer's SOUND command or sound-making scheme doesn't incorporate a duration feature (ADAM, Atari, Commodore 64, and VIC-20 don't), your music program will have to include a routine that counts while each note is playing for a length of time you specify. In *Jingle Bells*, this counting is done by a FOR/NEXT loop that counts up to a different number for each note. (To learn more about "delay" loops, see Jitterman in the August FAMILY COMPUTING.)

Each note in your melody has a particular duration relative to the other notes and rests. That is, an eighth note is always half as long as a quarter note, which is half as long as a half note, and so on. Keeping this in mind, you can calculate the relative durations of the notes in your melody by finding the notes with the shortest durations, giving these notes an arbitrary value of 1, then expressing the durations of all other notes as multiples of this value. For example, one phrase of *Jingle Bells* is coded like this:



As you can see, here eighth notes get the value 1; quarter notes, which sound for twice as long as eighth notes, get the value 2; dotted quarter notes, the value 3.

Once you've got a table of relative durations pulled together, you can then look at your computer manual (or do some trial-and-error testing) to determine what should be the duration value for your shortest note. The computer can multiply each of the relative duration values by this "tempo constant" to derive the actual duration value for

each note.

For example, if the tempo constant (called TEMPO in our program) is 24, the actual duration values for the first four notes in the phrase "Oh, what fun . . ." are 24×2 , 24×2 , 24×3 , and 24×1 (that is, 48, 48, 72, and 24). Increasing the value of TEMPO slows down the tune; decreasing the value speeds it up. Try it and see!

DOING IT YOURSELF

Adventuresome programmers may want to try modifying *Jingle Bells* to play a melody of their own. Start by deciding on a tune and converting each of its notes to a set of pitch and relative duration values as described above. Substitute this data, alternating pitches and durations, for ours in the DATA statements. There are 144 notes in *Jingle Bells*; the number of notes in your tune will probably differ. Count them and change the size of the storage arrays (DIMENSIONED in lines 10 or 20) to match. Change the upper limit of the FOR/NEXT loops that READ data into the arrays to match this number also, and that of the FOR/NEXT loop that plays the tune as well. Remove the statements that duplicate parts of the *Jingle Bells* melody—your program won't need them (the REM statements will show you which these are).

If all goes well, your tune will play when you type RUN. If the speed isn't right, you can alter the value of the constant TEMPO until you hear something you like better. That's all there is to it!

If you come up with an enhancement of one of our Beginner Programs that you're especially proud of, we'd like to see it, and maybe mention it in a future issue. Send a printout (no tapes or disks, please) to

Beginner Programs
FAMILY COMPUTING
730 Broadway
New York, NY 10003

—J.J.

ADAM/Jingle Bells

```

9 REM --PROTECT MEMORY FOR STORING MACHINE CODE--
10 LOMEM: 29000
20 DIM f(144),s(144),d(144)
30 tempo = 100
39 REM --READ IN MACHINE CODE FOR SOUND--
40 FOR i = 28000 TO 28005
50 READ a
60 POKE i,a
70 NEXT i
79 REM --READ IN SONG DATA (FIRST, SECOND, DURATION)--
80 FOR i = 1 TO 95
90 READ f(i),s(i),d(i)
99 REM --NEXT LINE DUPLICATES ONE PART OF SONG--
100 IF i < 50 THEN f(i+95) = f(i):s(i+95) = s(i):d(i+95) = d(i)
110 NEXT i
119 REM --PLAY SONG--
120 FOR i = 1 TO 144
129 REM --TURN ON VOLUME FOR VOICE 1--
130 POKE 28006,144
140 CALL 28000
149 REM --SET FIRST PART OF PITCH FOR VOICE 1--
150 POKE 28006,f(i)
160 CALL 28000
169 REM --SET SECOND PART OF PITCH FOR VOICE 1--
170 POKE 28006,s(i)
180 CALL 28000
189 REM --DELAY FOR NOTE'S DURATION--
190 FOR j = 1 TO d(i)*tempo
200 NEXT j
209 REM --TURN OFF VOLUME FOR VOICE 1--
210 POKE 28006,159
220 CALL 28000
230 NEXT i
240 END
999 REM --MACHINE CODE TO SEND SOUND DATA TO CHIP--
1000 DATA 58,102,109,211,255,201
1999 REM --SONG DATA--
2000 DATA 138,10,2,138,10,2,138,10,4,138,10,2,138,10,2
2010 DATA 138,10,4,138,10,2,143,8,2,134,13,3,143,11,1
2020 DATA 138,10,8,128,10,2,128,10,2,128,10,3,128,10,1
2030 DATA 128,10,2,138,10,2,138,10,3,138,10,1
2040 DATA 138,10,2,143,11,2,143,11,2,138,10,2,143,11,4
2050 DATA 143,8,4,138,10,2,138,10,2,138,10,4,138,10,2
2060 DATA 138,10,2,138,10,4,138,10,2,143,8,2,134,13,3
2070 DATA 143,11,1,138,10,8,128,10,2,128,10,2,128,10,3
2080 DATA 128,10,1,128,10,2,138,10,2,138,10,3
2090 DATA 138,10,1,143,8,2,143,8,2,128,10,2,143,11,2
2100 DATA 134,13,8,142,17,2,138,10,2,143,11,2,134,13,2
2110 DATA 142,17,7,142,17,1,142,17,2,138,10,2
2120 DATA 143,11,2,134,13,2,143,15,8,143,15,2,128,10,2
2130 DATA 138,10,2,143,11,2,131,14,8,143,8,2,143,8,2
2140 DATA 128,10,2,143,11,2,138,10,8,142,17,2,138,10,2
2150 DATA 143,11,2,134,13,2,142,17,7,143,17,1,143,17,2
2160 DATA 138,10,2,143,11,2,134,13,2,143,15,8
2170 DATA 143,15,2,128,10,2,138,10,2,143,11,2,143,8,2
2180 DATA 143,8,2,143,8,3,143,8,1,143,7,2,143,8,2
2190 DATA 128,10,2,143,11,2,134,13,4,143,8,4

```

Apple II series/Jingle Bells

```

10 DIM P(144),D(144)
20 TEMPO = 24
29 REM --READ IN MACHINE CODE FOR MAKING SOUNDS--
30 FOR I = 0 TO 28
40 READ A
50 POKE 768+I,A
60 NEXT I
69 REM --READ IN SONG DATA (PITCH, DURATION)--
70 FOR I = 1 TO 95
80 READ P(I),D(I)
89 REM --NEXT LINE DUPLICATES ONE PART OF SONG--
90 IF I < 50 THEN P(I+95) = P(I):D(I+95) = D(I)

```

BEGINNER PROGRAM

```
50 IF I<50 THEN P(I+95)=P(I):D(I+95)=D(I)
60 NEXT I
69 REM --PLAY SONG--
70 FOR I=1 TO 144
79 REM --PLAY A NOTE--
80 SOUND P(I),D(I)*TEMPO
89 REM --TURN OFF NOTE TO PREVENT LEGATO--
90 SOUND 32767,1
100 NEXT I
110 END
999 REM --SONG DATA--
1000 DATA 659,2,659,2,659,4,659,2,659,2
1010 DATA 659,4,659,2,784,2,523,3,587,1
1020 DATA 659,8,698,2,698,2,698,3,698,1
1030 DATA 698,2,659,2,659,3,659,1
1040 DATA 659,2,587,2,587,2,659,2,587,4
1050 DATA 784,4,659,2,659,2,659,4,659,2
1060 DATA 659,2,659,4,659,2,784,2,523,3
1070 DATA 587,1,659,8,698,2,698,2,698,3
1080 DATA 698,1,698,2,659,2,659,3
1090 DATA 659,1,784,2,784,2,698,2,587,2
1100 DATA 523,8,392,2,659,2,587,2,523,2
1110 DATA 392,7,392,1,392,2,659,2
1120 DATA 587,2,523,2,440,8,440,2,698,2
1130 DATA 659,2,587,2,494,8,784,2,784,2
1140 DATA 698,2,587,2,659,8,392,2,659,2
1150 DATA 587,2,523,2,392,7,392,1,392,2
1160 DATA 659,2,587,2,523,2,440,8
1170 DATA 440,2,698,2,659,2,587,2,784,2
1180 DATA 784,2,784,3,784,1,880,2,784,2
1190 DATA 698,2,587,2,523,4,784,4
```

*This program has been tested and found to work on the following computers and hardware configurations, using the BASICs shown: IBM PC w/Disk BASIC D2.00 or Advanced BASIC A2.00. IBM PCjr w/Cassette BASIC C1.20 or Cartridge BASIC J1.00. Tandy 1000 w/GW-BASIC 2.02 version 00.05.00.

Macintosh w/Microsoft BASIC 2.0/Jingle Bells

```
DIM P(144),D(144)
TEMPO=2
REM --READ IN SONG DATA (PITCH, DURATION)--
FOR I=1 TO 95
  READ P(I),D(I)
REM --NEXT LINE DUPLICATES ONE PART OF SONG--
IF I<50 THEN P(I+95)=P(I):D(I+95)=D(I)
NEXT I
REM --PLAY SONG--
FOR I=1 TO 144
REM --PLAY A NOTE--
  SOUND P(I),D(I)*TEMPO
NEXT I
END
REM --SONG DATA--
DATA 659,2,659,2,659,4,659,2,659,2,659,4,659,2
DATA 784,2,523,3,587,1,659,8,698,2,698,2,698,3
DATA 698,1,698,2,659,2,659,3,659,1,659,2,587,2
DATA 587,2,659,2,587,4,784,4,659,2,659,2,659,4
DATA 659,2,659,2,659,4,659,2,784,2,523,3,587,1
DATA 659,8,698,2,698,2,698,3,698,1,698,2,659,2
DATA 659,3,659,1,784,2,784,2,698,2,587,2,523,8
DATA 392,2,659,2,587,2,523,2,392,7,392,1,392,2
DATA 659,2,587,2,523,2,440,8,440,2,698,2,659,2
DATA 587,2,494,8,784,2,784,2,698,2,587,2,659,8
DATA 392,2,659,2,587,2,523,2,392,7,392,1,392,2
DATA 659,2,587,2,523,2,440,8,440,2,698,2,659,2
DATA 587,2,784,2,784,2,784,3,784,1,880,2,784,2
DATA 698,2,587,2,523,4,784,4
```

TI-99/4A/Jingle Bells

```
10 DIM P(144),D(144)
20 TEMPO=100
29 REM --READ IN SONG DATA (PITCH, DURATION)--
30 FOR I=1 TO 95
40 READ P(I),D(I)
49 REM --NEXT 3 LINES DUPLICATE ONE PART OF SONG--
50 IF I>49 THEN 80
60 P(I+95)=P(I)
70 D(I+95)=D(I)
80 NEXT I
89 REM --PLAY SONG--
90 FOR I=1 TO 144
99 REM --PLAY A NOTE--
100 CALL SOUND(D(I)*TEMPO,P(I),2)
110 NEXT I
120 END
999 REM --SONG DATA--
1000 DATA 659,2,659,2,659,4,659,2,659,2
1010 DATA 659,4,659,2,784,2,523,3,587,1
1020 DATA 659,8,698,2,698,2,698,3,698,1
1030 DATA 698,2,659,2,659,3,659,1
1040 DATA 659,2,587,2,587,2,659,2,587,4
1050 DATA 784,4,659,2,659,2,659,4,659,2
1060 DATA 659,2,659,4,659,2,784,2,523,3
1070 DATA 587,1,659,8,698,2,698,2,698,3
1080 DATA 698,1,698,2,659,2,659,3
1090 DATA 659,1,784,2,784,2,698,2,587,2
1100 DATA 523,8,392,2,659,2,587,2,523,2
1110 DATA 392,7,392,1,392,2,659,2
1120 DATA 587,2,523,2,440,8,440,2,698,2
1130 DATA 659,2,587,2,494,8,784,2,784,2
1140 DATA 698,2,587,2,659,8,392,2,659,2
1150 DATA 587,2,523,2,392,7,392,1,392,2
1160 DATA 659,2,587,2,523,2,440,8
1170 DATA 440,2,698,2,659,2,587,2,784,2
1180 DATA 784,2,784,3,784,1,880,2,784,2
1190 DATA 698,2,587,2,523,4,784,4
```

Tandy Color Computer/Jingle Bells

```
10 DIM P(144),D(144)
20 TEMPO=2
29 REM --READ IN SONG DATA (PITCH, DURATION)--
30 FOR I=1 TO 95
40 READ P(I),D(I)
49 REM --NEXT LINE DUPLICATES ONE PART OF SONG--
50 IF I<50 THEN P(I+95)=P(I):D(I+95)=D(I)
60 NEXT I
69 REM --PLAY SONG--
70 FOR I=1 TO 144
79 REM --PLAY A NOTE--
80 SOUND P(I),D(I)*TEMPO
90 NEXT I
100 END
999 REM --SONG DATA--
1000 DATA 193,2,193,2,193,4,193,2,193,2
1010 DATA 193,4,193,2,204,2,176,3,185,1
1020 DATA 193,8,197,2,197,2,197,3,197,1
1030 DATA 197,2,193,2,193,3,193,1
1040 DATA 193,2,185,2,185,2,193,2,185,4
1050 DATA 204,4,193,2,193,2,193,4,193,2
1060 DATA 193,2,193,4,193,2,204,2,176,3
1070 DATA 185,1,193,8,197,2,197,2,197,3
1080 DATA 197,1,197,2,193,2,193,3
1090 DATA 193,1,204,2,204,2,197,2,185,2
1100 DATA 176,8,147,2,193,2,185,2,176,2
1110 DATA 147,7,147,1,147,2,193,2
1120 DATA 185,2,176,2,159,8,159,2,197,2
1130 DATA 193,2,185,2,170,8,204,2,204,2
1140 DATA 197,2,185,2,193,8,147,2,193,2
1150 DATA 185,2,176,2,147,7,147,1,147,2
1160 DATA 193,2,185,2,176,2,159,8
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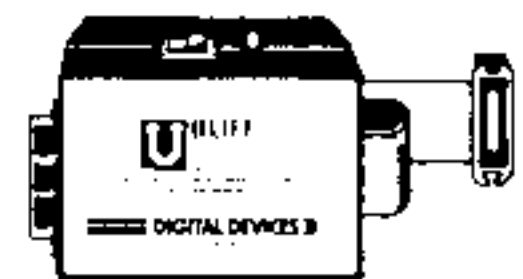
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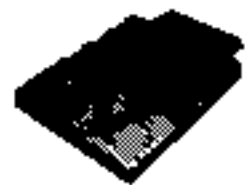
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The Special Ks' Buyer's Guide to Controllers

K-POWER's Special Ks (David Langendoen, Damon Osgood, and Alex Shakar) have logged hours of intense game play on all sorts of joysticks. Their finding: It's not always the price tag that makes for a hot-shot controller. What they suggest is to look for sturdy construction, well-placed fire button(s), and a stick that has just the right amount of give. Their thoughts on some of the most popular controllers follow. Compatibility and prices are specified within parentheses.

APPLE

APPLE JOYSTICK (Apple IIe/IIc; \$59.95). Comfort and durability are this joystick's strong points. The stick is fairly loose (maybe too loose for some games), and the fire buttons make rapid fire easy. Both buttons are located on top of the base, so it's sometimes difficult to use both at once.

ATARI

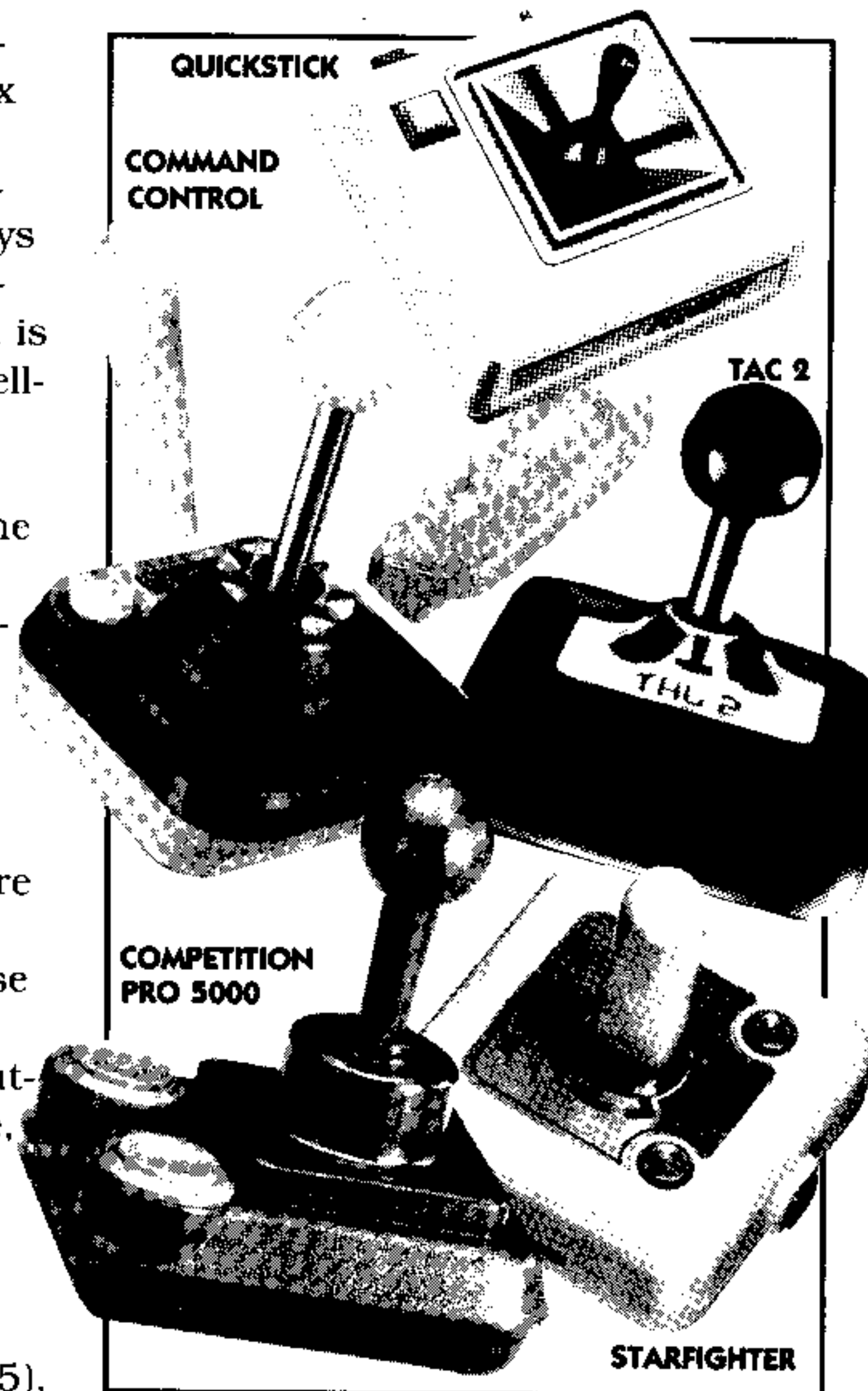
CX43 SPACE AGE (Atari, C 64; \$9.95). Built for comfort above all, this joystick is pistol-shaped, with a trigger-type fire button and the stick on top. The trigger is very sensitive, but the stick isn't always accurate.

CH PRODUCTS

MACH II/III (Apple II plus/IIe/IIc, IBM PC/PCjr, Tandy CoCo; \$44.95-\$54.95). An exceptionally comfortable and accurate joystick, the Mach II has a sturdy base and a metal stick for extra durability. The stick itself is a little too loose for some games, and the fire buttons are fast. A special feature lets you perfectly center the joystick by turning a couple of knobs. The Mach III has an added button on top of the stick. This is a good feature, but makes the stick somewhat top-heavy and can slow down play.

COIN CONTROLS

COMPETITION PRO 5000 (Apple IIe/IIc, Atari, C 64, TI-99/4A with \$7.95 adapter; \$17.95-\$29.95). One of the best joysticks we tested, the model 5000 is accurate, durable, and good for extended play. There are two large fire buttons on the base that are helpful for rapid fire.



Apple games requiring two buttons are difficult to play because the buttons are spaced far apart.

KRAFT

KRAFT PREMIUM (Apple II series, IBM PC; \$32.95) and **KRAFT QUICKSTICK** (Apple IIc/Macintosh; \$69.95-\$79.95). A superior joystick in every respect, the Premium is extremely accurate and comfortable to use. The fire buttons are responsive, and placed so you can use both without moving your hand. An added feature: The user can switch between a self-centering and a free-floating stick. Quickstick has a mouse option.

SWITCH-HITTER (Atari, C 64; \$11.95). Although this joystick feels and looks fragile, the fire button works well, and the stick is responsive and easy to control. There is also a switch that lets you alternate between four- and eight-way directional control.

RADIO SHACK

THE DELUXE JOYSTICK (Tandy CoCo; \$19.95 a pair). This joystick is hard to use in some game situations because it is free-floating and not par-

ticularly accurate. The fire button is good (when it doesn't pop off), and the stick is fairly comfortable.

SUNCOM

TAC 2 (Atari, C 64, VIC-20; \$12.95). The casing is hard plastic, and the stick is metal with a plastic ball on top. It fits snugly in your hand, feels solid, and provides accurate control. The only drawback is the stiff fire button, which cuts down on speed.

STARFIGHTER (Apple II series [\$5.95 adapter needed with II/II plus], Atari, C 64; \$10.95-\$24.95). The Apple version offers two unique features: a throw selector, which lets you adjust how far you want to move the joystick, and a high/low sensitivity switch. The fire buttons are slightly stiff, and the alternate button on the Apple may give righties some difficulty since they have to reach past the cord to press it.

T.G. PRODUCTS

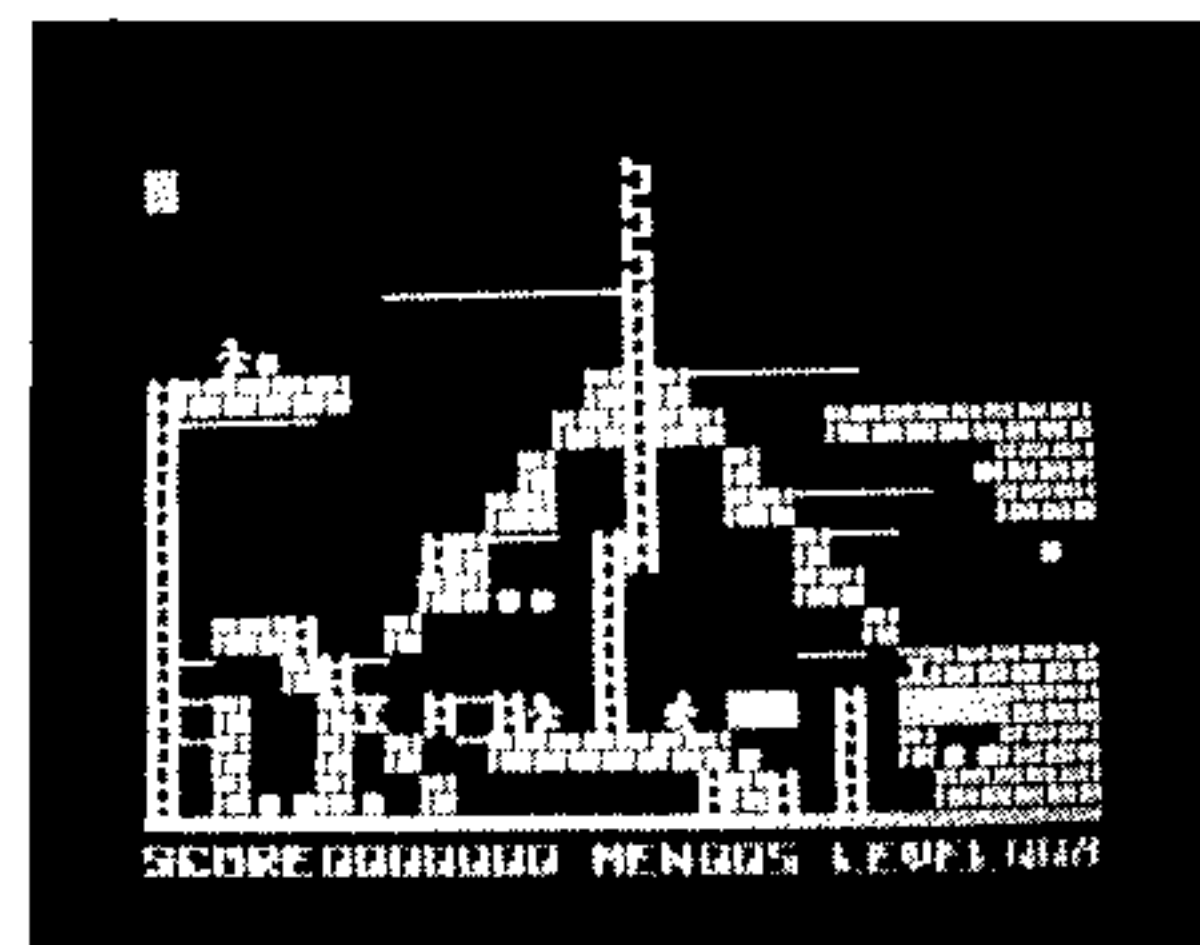
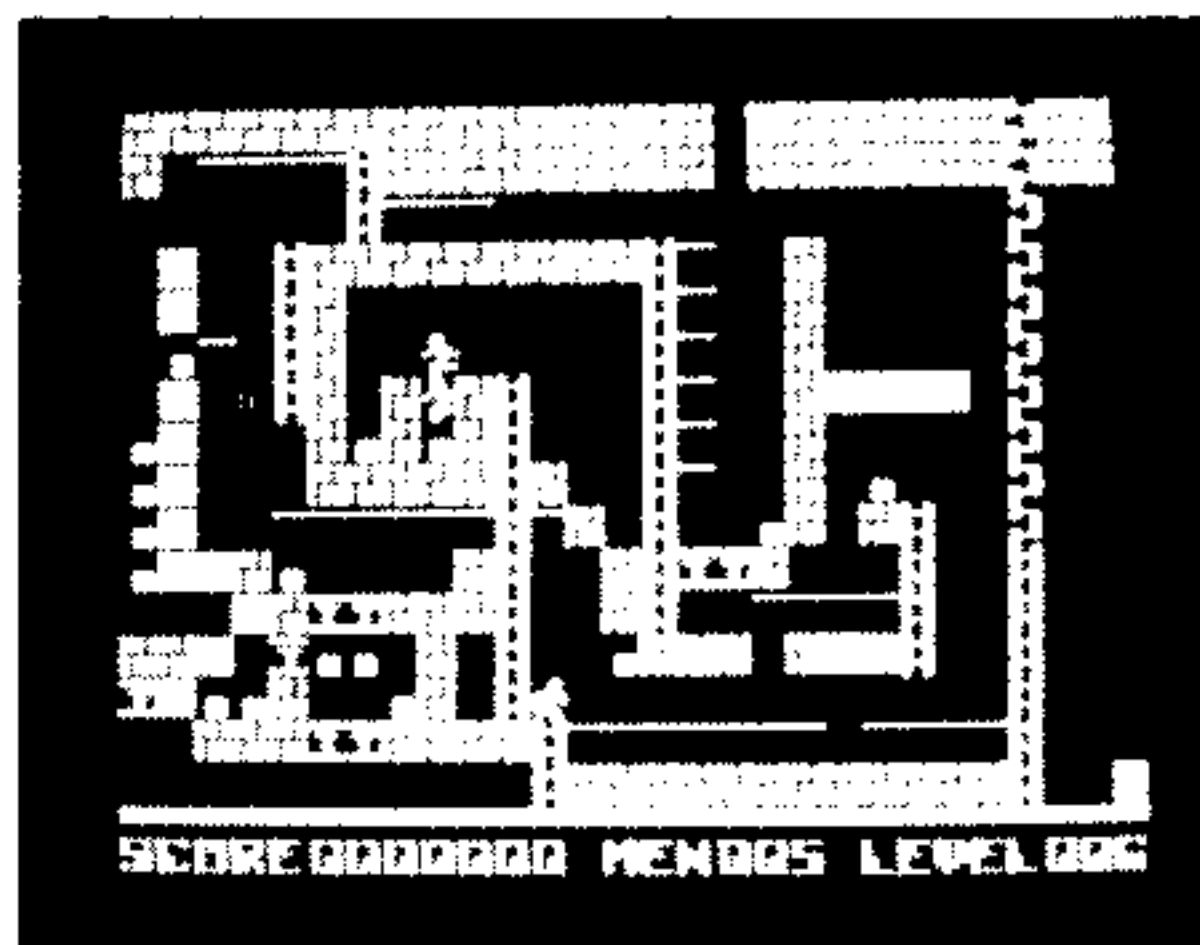
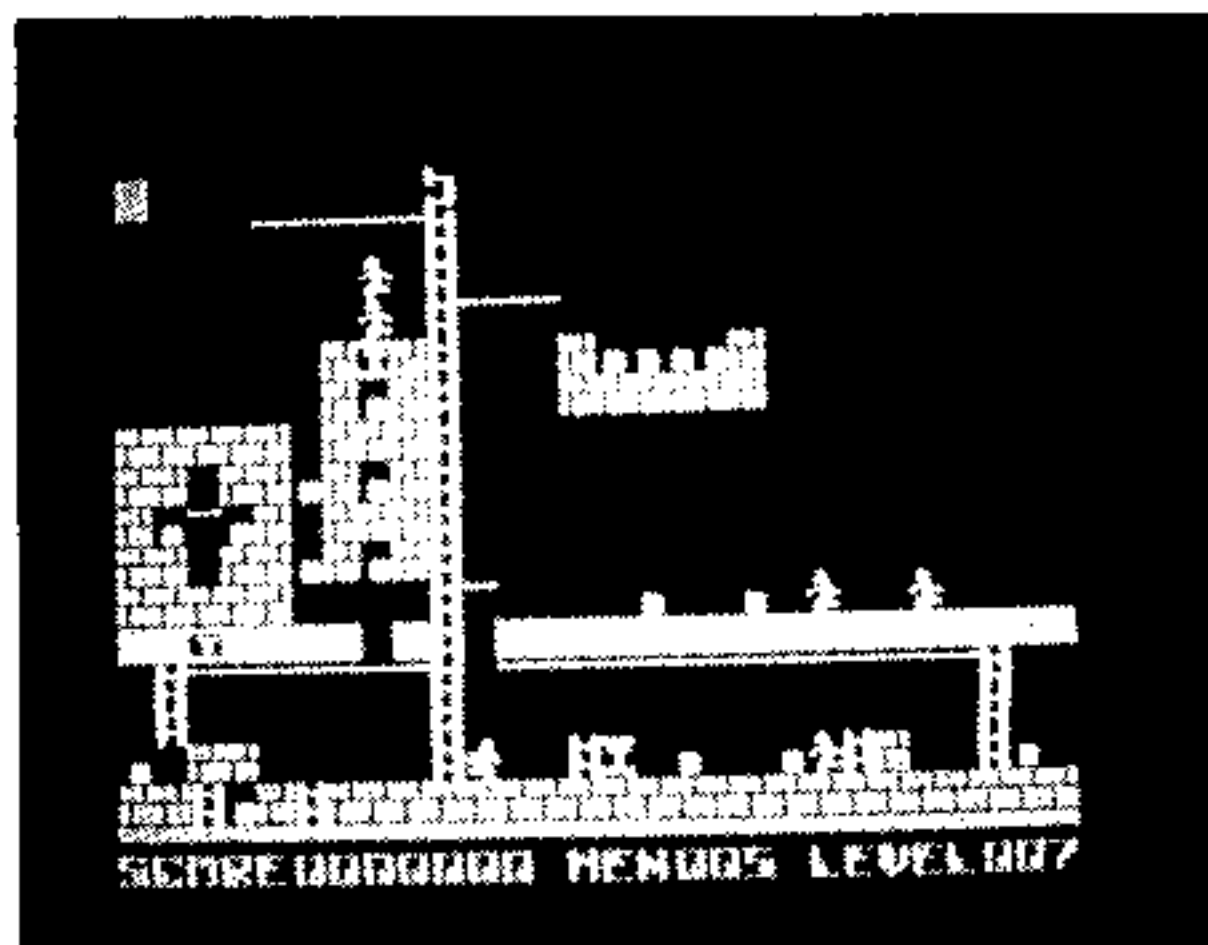
J-2000 JOYSTICK (Apple II series, IBM PC/PCjr; \$49.95). Good for long periods of game play, this joystick consists of a big, sturdy base, a small stick on the right, and two large buttons on the left. The user can choose between self-centering and free-floating stick modes. The two fire buttons are good for fast firing, but might break after too much use.

WICO

THE BOSS (Atari, C 64; \$17.95). The Boss is one of the best sticks on the market. It features a square base with rounded edges, a "grip" handle that offers comfort with little slipping, and a fire button on top that is built for speed and comfort. There is no button on the base. This can be a drawback if you don't like top-of-stick firing. It can become very tiring on the hand if used for prolonged periods.

COMMAND CONTROL (Atari, C 64, TI-99/4A, VIC-20; \$26.95, \$32.95 for combination model). The Command Control's base is slightly larger and has a fire button in the left-hand corner, as well as on the stick. To the rear of the stick is a switch that lets you select operating buttons. The Command Control comes with a "bat" handle, or with three interchangeable handles: bat, ball, and grip.

LODE RUNNER



Broderbund. Arcade/strategy. Your mission: to climb your way through the 150 different screens and collect all the gold you can lay your hands on. (Levels created on Apple.)

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H I N T H O T L I N E

SWASHBUCKLER, Datamost (Apple). Arcade/strategy. Your mission: to fight off a horde of evil pirates, brigands, and their nasty pets (rats, spiders, et al) using your rapier and Errol Flynn-like fighting prowess.

🔑 When fighting a barbarian (bald head and club) past the first level, push him to the edge of the screen and keep lunging. He will eventually drop his guard, and you can skewer him.

🔑 Once you kill one of your opponents, force the second to the edge of the screen and strike him. Then, before he stands, lunge again, and he'll come up into your blade and die without a fight. —STEVEN KONECNY, Carson City, Nevada; CHRIS BOLEN, 14, Chico, California

MINER 2049er, Micro Fun (Apple only). Arcade/skill. Your mission: Claim all the mine sections while avoiding radioactive mutants.

🔑 When you're asked for the number of players, press SHIFT-3. You can now play any level you want by just pressing the corresponding number key.

🔑 To get extra men, wait for the message PLAYER 1 PREPARE TO ENTER LEVEL 1, then press CONTROL-RESET. You now should see a prompt and cursor at the bottom of the screen (if the computer reboots, try again). Type CALL-151, press RETURN, then type 816: (any number of men from one to 27) and press RETURN. Finally, type 980C and press

RETURN again. The game will load, but now you will have the specified number of men. This hint can be used with the first hint. —JOHN LUNA and JUSTIN MAYER, 14, Woodland Hills, California; JOHN A. BASE, 14, Burke, Virginia

FLIGHT SIMULATOR II, subLOGIC (Apple, Commodore 64). Simulation. Your mission: to learn how to take off in, fly, and land a small plane.

🔑 If you're low on fuel and there is no airport nearby (or you just aren't very good at landings), go into the editor mode, and then go back to flight mode. When you return, your fuel tanks will be full. —TROY HANSON, 11, Buffalo, Minnesota; J. F., 11, Salem, Virginia

AQUATRON, Sierra On-Line (Apple). Arcade/skill. Your mission: to destroy the invaders of your water-covered world.

🔑 Holding down the CONTROL and SHIFT keys and pressing 2 on the Apple IIe and IIc, or P on the II plus, will advance you one level. If you do this to jump past a Suicide Level, you'll get a free base. —ROBERT VOLDEMAR ZEMMEIS, 14, Tacoma, Washington

CONAN, Datasoft (Apple). Arcade/adventure. Your mission: to seek out and destroy the evil Volta, Conan's archenemy.

🔑 On the fourth level, after you unlock the door, go back to where you got the key. You'll then receive

another key, which you can use to relock the door (although you can still walk through it). Repeat this and you can continue unlocking and locking it, meanwhile building a large score. —CURT HEPNER, 16, Vallejo, California

SUMMER GAMES, Epyx (Apple, Atari, Commodore 64). Sports simulation/arcade/strategy. Your mission: to outperform computer or human opponents in eight events modeled after the Olympic contests.

🔑 In the Pole Vaulting event, try this when you get to heights of 5.5 meters and over: choose low pole grip, and as soon as you plant your pole, push up. Then press the button just before your pole knocks the bar down. If done correctly, you'll fly under the bar but get a successful jump nonetheless. —RYAN PHILLIPS, 16, Montpelier, Vermont; BILLY CARTER, 14, Spartanburg, South Carolina

We're looking for a few good hints! Help K-POWER readers be all that they can be by sending us hints for your favorite games. We have all the Zork and Pac-Man hints we can handle, but we'll be glad to publish and pay \$10 for hints we've not heard of. Send them to Hint Hotline, c/o K-POWER, 730 Broadway, New York, NY 10003. Hints will not be considered for publication unless accompanied by full name, address, telephone number, and date of birth. (Note: the computer systems listed in brackets indicate the computer version the hints work for.)

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